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Odesa National Polytechnic University

ENGLISH FOR FUTURE CHEMISTS

Textbook for first-level applicants (bachelor's degree) of
Institute of Chemical Technology and Pharmacy.
Practical course

Odesa

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This textbook is intended to be used as a practical English course for first-level applicants (bachelor's degree) on the specialty Institute of Chemical Technology and Pharmacy. Each lesson consists of a text and a set of lexical and grammatical exercises, which are composed to improve the skills of activating the vocabulary and grammatical minimum of a professional direction.

This textbook provides preparation for international oral communication in English for special purposes, namely, mastering lexical, grammatical and stylistic skills, as well as the ability to read, translate, summarize and expand oral English-language information in a scientific functional style, which is provided for by the requirements of the Foreign Language Study Program in a non-philology university.

Content

INTRODUCTION

The purpose of the textbook “English for future chemists” for first-level applicants (bachelor's degree) of Institute of Chemical Technology and Pharmacy, specialty161 Chemical Technology and Engineering, is to form during 60 hours of independent work (level of language proficiency – B1) reading abilities and skills on the subject of specialty 161 Chemical technologies and engineering in the 1st year of study (reached level of language proficiency – B2). Due to training and performance of reading texts and communicative tasks, first-level applicants (bachelor's degree) will be able to achieve practical mastery of the English language in the specialty.

Practical mastery of a foreign language within the framework of this course assumes the presence of the following skills, which make it possible to:

- read original literature in a foreign language in the relevant field of knowledge;
- prepare information extracted from foreign sources in the form of a translation or summary;
- make presentations and reports in a foreign language on topics related to the scientific work of a future specialist;
- conduct a conversation on specialty.

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UNIT 1

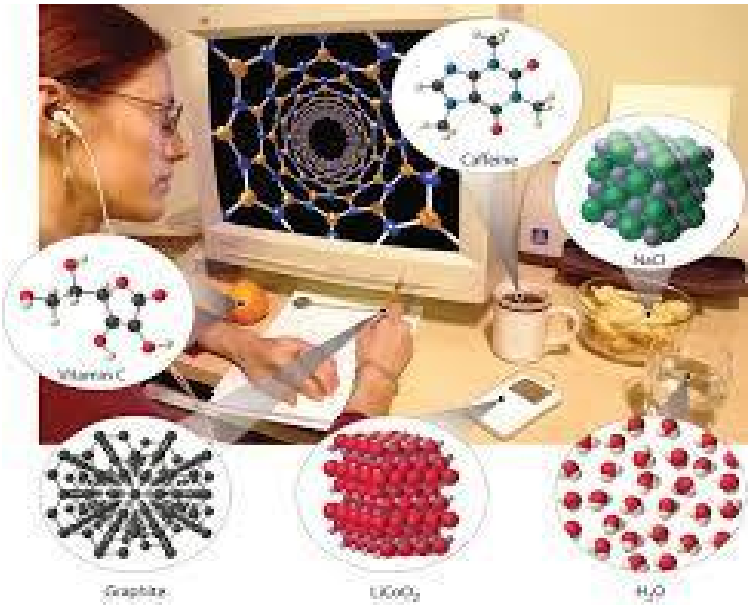
1. Look up new words given below in your dictionary and memorize them.

to undergo	to take advantage
extensively	properties of substances
oil deposits	depletion
fields of study	application
sample	nutrition
flux of nutrients	to get sore
rate of exchange	magnifying

2. **Read and translate the text.**

Chemistry in Everyday Life.

Chemistry is the study of matter and the changes that material substances undergo. Of all the scientific disciplines, it is perhaps the most extensively connected to other fields of study. Geologists who want to locate new mineral or oil deposits use chemical techniques to analyze and identify rock samples. Oceanographers use chemistry to track ocean currents, determine the flux of nutrients into the sea, and measure the rate of exchange of nutrients between ocean layers. Engineers consider the relationships between the structures and the properties of substances when they specify materials for various uses. Physicists take advantage of the properties of substances to detect new subatomic particles. Astronomers use chemical signatures to determine the age and distance of stars and thus answer questions about how stars form and how old the universe is. The entire subject of the environmental science depends on chemistry to explain the origin and impacts of phenomena such as air pollution, ozone layer depletion, and global warming. The disciplines that focus on living organisms and their interactions with the physical world rely heavily on biochemistry, the application of chemistry to the study of biological processes. A living cell contains a large collection of complex molecules that carry out thousands of chemical reactions, including those that are necessary for the cell to reproduce. Biological phenomena such as vision, taste, smell, and movement result from numerous chemical reactions. Fields such as medicine, pharmacology, nutrition, and toxicology focus specifically on how the chemical substances that enter our bodies interact with the chemical components of the body to maintain our health and well-being. For example, in the specialized area of sports medicine, a knowledge of chemistry is needed to understand why muscles get sore after exercise as well as how prolonged exercise produces the euphoric feeling known as “runner’s high.”



Although most people do not recognize it, chemistry and chemical compounds are crucial ingredients in almost everything we eat, wear, and use. A woman is taking down notes while she is looking at a computer screen with various things around her desk. The chemical compounds which make up these items are highlighted with magnifying pointers. The chemical compounds are caffeine in a cup of coffee, NaCl in a bowl of chips, H2O in a glass of water, LiCoO2 in an iPod, Graphite in a pencil, vitamin C in an orange.

3. Answer the questions.

1. What is chemistry?
2. What disciplines is chemistry connected to?
3. Why is chemistry so important for the environmental science?
4. What does a living cell contain?
5. What does any biological phenomenon depend on?
6. What fields of science investigate the interaction between substances and chemical components of the body?

4. Give a full answer, at least 3-5 sentences.

1. Tell about how chemistry is used in geology, oceanography, engineering, physics, astronomy.
2. Look around and name chemical substances that are near you.

5. Match the sentences.

1. Understanding of chemistry is essential for understanding much	a. disciplines, including astronomy, geology, paleontology, biology, and medicine.
2. Chemistry is the study of matter	b. of the natural world and is central to many other disciplines.

3. It is essential for understanding much of the natural world and central to many other scientific	c. and the changes material substances undergo.

6. Match the word with the correct definition.

Word	Definition
1. Science	a) the process of taking food into the body and absorbing the useful substances from foods.
2. Nutrition	b) the branch of science relating to drugs and medicines.
3. Substance	c) the smallest amount of a chemical substance which can exist by itself.
4. Pharmacology	d) a thing that is composed of two or more separate elements;
5. Molecule	e) the study of the nature and behaviour of natural things and the knowledge that we obtain about them.
6.Chemical compound	f) a solid, powder, liquid, or gas with particular properties.

7. Find the mistakes in the sentences. Write down all unknown words and translate them.

1. You should also to know there is a difference between mass and weight. Mass are a measure of the matter in an object while weight are a measure of gravity's pull on an object. (3 mistakes)
2. Words such as big, little, long, or short are use to describes volumes. (2 mistakes)
3. What are the main state of matter? Everyone know about solids, liquids, gases, and plasmas. (2 mistakes)
4. How is a physical change in matter? Molecules can moving from one physical state under another and not change their atomic structure**.** (3 mistakes)
5. Generally, the basic chemical structure are not changed when there are a physical change. (2 mistakes)

8. Compose a story on one of the topics (up to 100 words).

- The relationship between the chemistry and other disciplines.
- Chemistry as the study of matter.

Grammar module

Personal pronouns, *to be, to have,* countable and uncountable nouns, *there is/are*.

1. Fill in the gaps using *he, she, it, we, they, you*.

cat and horse ……
Mary ……
Tom …….
Jack and I ……
books ……...
sister ……
You and Dave …….
plane ……
sunshine …….
cheese ……
cactus …….
parents ……
Pamela ……
news …….
scissors …….
geese …….

flowers ……

piano …….
school ……
daughter ……
milk …….
children ……
sugar ……
feet ……
bicycle ……
Ann and Kate ……
tennis …….
son …….
mice …….
sky …….
shop …….
buses …….
papers ……
Mr. Green ……

2. Fill in the gaps using *am, is, are, am not, isn't, aren't*.

1. It …… an onion. (+)
2. İzmir …… a city. (+)
3. Jasmine ……. a student. (-)
4. He ……. a postman. (+)
5. We ……. friends. (+)
6. It ……. nine o'clock. (+)
7. I ……. hungry. (-)
8. Manhattan ……. an island. (-)
9. Mark ……. 20 years old. (+)
10. Mr. Richards ……. a lawyer. (+)
11. A bee ……. a big insect. (-)
12. I ……. ill. I ……. happy. (+ / -)
13. Newsweek ……. a magazine. (+)
14. London ……. a big city. (+)
15. I ……. a professional football player. (-)
16. Dave and Adrian ……. sisters. They ……. brothers. (- / +)

17. I know you. You ……. in my class. (+)
18. New York ……. near to New Jersey. (+)
19. Cows ……. insects. They ……. mammals. (- / +)
20. Susan and I ……. teachers. We ……. students. (- / +)

3. Change the sentences into questions.

Example: I am an engineer. ……. *Am I an engineer?*

1. You are ill. ……..
2. Linda is a pretty girl. ……...
3. Belinda is a singer. ……..
4. Nick is an actor. ……...
5. We are good friends. ……
6. He is an officer. ……
7. It is an eraser. ……..
8. You and Eddie are partners. ……
9. Rosie is angry. ……
10. Jack and I aren't good swimmers. ……

4. Fill in the gaps using an appropriate form of the verb *to be.*

Tess and Jen _____ (1) best friends. They do everything together. They spend every day together. One day they meet on the bus to school. They start talking. "Hey, Jen," says Tess. "How _____ (2) you?" "Hey, girl," says Jen. "I _____ (3) doing fine. What _____ (4) going on? What _____ (5) you doing today?" "Oh," says Tess, "I _____ _____ (6) doing anything special. I don't have any plans." "That _____ (7) cool." "Yeah," says Tess. "But I have something to tell you." "Really! Can I try to guess?" "Umm…" says Tess. "Well…" "Okay, I get three guesses. Ready?" "Umm, well… okay." "_____ (8) we eating dinner together?" "No, that _____ _____ (9) it." "Okay. Are we going to the soccer game together?" "No. It ____ ____ (10) that either." Tess looks nervous. Her eyes look sad. A tear starts to fall down her cheek. "Oh," says Jen, wiping a tear from her own eye. "Now I know. You _____ (11) moving away."

5. Use the correct form of the verb *to have.*

1. Marilyn and Robert _____ three children.
2. Birds _____ feathers.
3. This book _____ 100 pages.
4. My car _____ four doors.
5. Our teacher _____ a cold today.
6. This businessman _____ a lot of money.
7. Some big cities _____ a lot of crime.
8. We _____ three bedrooms in our house.
9. I _____ a lot of work to do today.
10. She _____ a doctor's appointment today.

6. Use *has, doesn't have, have, don't have* in the following sentences.

1. A dog _____ six legs.
2. Canada _____ a lot of land, but it _____ a lot of people.
3. Fish _____ fins, but they _____ feathers.
4. Cars _____ four wheels, but a bicycle _____ two wheels.
5. High rise buildings _____ elevators, but my house only _____ stairs.

7. Define the words in bold as countable or uncountable.

1. The **children** are playing in the garden.
2. I don't like **milk.**
3. I prefer **tea**.
4. **Scientists** say that the environment is threatened by pollution.
5. My mother uses **butter** to prepare cakes.
6. There are a lot of **windows** in our classroom.
7. We need some **glue** to fix this vase.
8. The **waiters** in this restaurant are very professional.
9. My father drinks two big **glasses** of water every morning.
10. The **bread** my mother prepares is delicious.
11. **Drivers** must be careful; the road is slippery.
12. Some **policemen** are organizing road traffic to avoid any accidents.
13. I bought three **bottles** of mineral water for our picnic.
14. I'd like some **juice,** please!
15. Successful **candidates** will join the camp later this year.
16. A rise in **oil** prices is inevitable since there is more and more world demand for energy.
17. The **exercises** on this website are interesting.
18. Dehydrated babies must drink a lot of **water**.
19. Adult illiterates learn through a special government **program.**
20. I met some nice **people** when I was walking along the beach.

8. Change these sentences so that you use *there* + the correct form of *to be.*

1. Two apples are on the table.

_____

2. A boy doesn't exist in the street.

_____

3. Does an ATM exist near here?

_____

4. A party will exist tomorrow.

_____

5. A lot of illnesses existed in the 14th century.

_____

6. Hardly any people were at the meeting.

_____

7. A Starbucks is next to the bank.

_____

8. Does a table exist in the garden?

_____

9. A bath doesn't exist in my flat.

_____

10. Does a train exist to Glasgow tonight?

_____

11. Does somewhere to get coffee exist in the station?

_____

12. A lot of mountains exist in Switzerland.

_____

13. Many mosquitoes didn't exist near the lake.

_____

14. Will biscuits exist at the meeting?

_____

15. Any bread doesn't exist in the kitchen.

_____

16. Does a good clothes shop exist in this town?

_____

17. Did good teachers exist at your school?

_____

18. A police station exists nearby.

_____

19. Did a lot of people exist in the restaurant?

_____

20. No flowers exist in the hall.

_____

UNIT 2

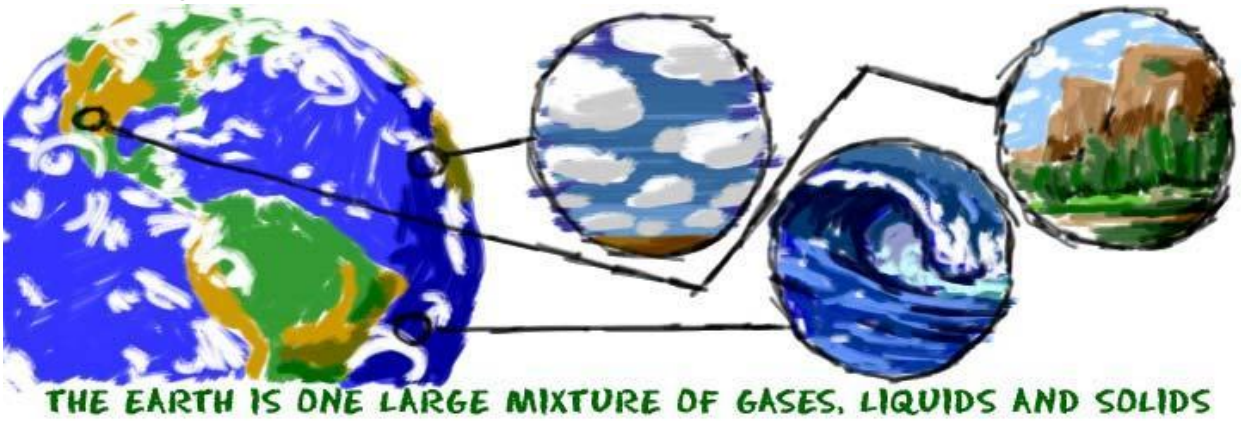
1. Look up new words given below in your dictionary and memorise them.

matter	in terms of
density	weight
acid	environment
to dissolve	unit
stuff	property
equipment	to arrange
to observe	average
quality	tiny
to take up	to investigate

2. Read and translate the text.

What is Chemistry?

Chemistry is the scientific study of matter. As a chemist, you might look at the amount of space an object can fill (density). As a chemist, you might measure the energy of atoms (state of matter). Chemists also look at the way acids can dissolve certain compounds (reactions). Chemistry always goes back to the study of matter. Over thousands of years, chemists have come to understand many different ways that matter changes and moves across the Universe.

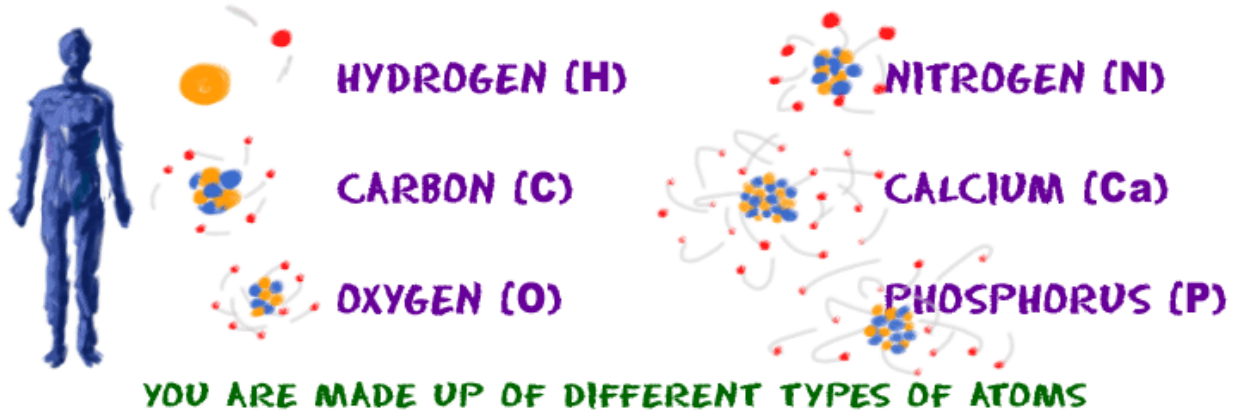


If chemistry is the study of matter, what is matter? Matter is the stuff around you. Matter is the air you breathe, the water you drink, the ground you walk on, the flowers you smell, and the food you taste. Any object you can see, smell, or touch is made of matter. There are also very small pieces of matter that you can't see or touch. Chemists use special equipment to study those little units of matter. Scientists theorize all of the matter we can observe makes up about 5% of the Universe. The rest is made of dark matter and dark energy.

There are two main qualities of matter. Matter takes up space. Even the smallest particles and pieces of atoms take up some space. Matter also has a mass. Technically, mass is the amount of matter you have. For now, you can think of mass in terms of weight. You don't need chemistry to tell you an elephant has a lot of mass, a butterfly

has less mass, and an atom has even less mass. Holding an object you can understand the object's weight and it gives you a good idea of its mass when compared to other objects.

Just so you know, mass and weight are different. Mass is an amount of matter that is the same everywhere in the Universe. One kilogram of iron (Fe) will have the same mass on the Earth or the Moon. Weight is based on the gravity of the environment. That kilogram of iron will weigh more on the Earth because the Earth has a stronger gravity than the Moon. Since Jupiter is much larger than the Earth (stronger gravitational force), the weight of that iron on Jupiter will be much heavier. The mass will be the same.



Atoms are the smallest and most basic units of matter that have the properties of an element. All atoms have the same basic parts (electrons, protons, and neutrons), but they are arranged in different ways. Because they have different numbers of parts, atoms of each element have different masses. Hydrogen (H) has an average atomic mass of 1 while carbon (C) is about 12 and calcium (Ca) is about 40.

You might say, "Why doesn't chemistry focus on electrons? Shouldn't chemists work with the smallest pieces of matter?" Yes, electrons are smaller than atoms and there are subatomic particles that are smaller than electrons. But those tiny particles don't have the properties of an element. When the small parts are combined into atoms, chemists can start to see properties and patterns in their behavior.

3. Answer the following questions.

1. What do chemists usually investigate?
2. What is matter? How can it be studied?
3. What are two main qualities of matter?
4. What is the difference between mass and weight?
5. What are the smallest parts of matter?

4. Write down the average atomic mass for

Na, Si, Ag, Br, Pb, Au, Cu and *Mg.*

Write down a full answer, not only numbers.

Example: The average atomic mass of Natrium (sodium) is twenty two point nine.

5. Explain why atoms, not protons, are the smallest units of matter.
Write down your explanation (at least 3-5 sentences).

6. Fill in the gaps.

Pieces of chemical atoms element work protons are called

What are elements?

Elements are 1. _____ of matter where all of the atoms have the same 2. _____ properties. Elements are made 3. _____ similar atoms. We want to say the atoms are exactly the same, but that's not quite true. An 4. _____ is made of atoms that have the same number of 5. _____. If you have a batch of atoms and they all have the same number of protons, they are all one element.

For example, if the atoms all have four protons, they are beryllium (Be) atoms. Some of those 6. _____ may have four electrons (neutral). Some atoms may have three electrons, leaving the atom with a positive charge (ions). Those ions are still considered beryllium atoms. Neutrons 7. _____ the same way. You may have four neutrons, but you might also have three or five neutrons. Atoms with the same number of protons and different numbers of neutrons 8. _____ isotopes of an element. Isotopes and ions are still the same element even though they have different numbers of neutrons and electrons.

7. Give the derivatives of the following words.

Atom - _____
Chemistry - _____
Compare - _____
Measure - _____
Acid - _____

8. True or false.

1.Chemistry is the study of elements.
2.Matter takes up weight and has a mass.
3.Mass is the amount of matter in an object or substance.
4.Isotopes are made of small pieces of matter (electrons, protons, and neutrons).
5.Atoms are not the most basic pieces of an element.
6.Elements are made of the same types of atoms (based on the number of protons).
7.Matter can't change physical states without having a chemical reaction.
8.Chemical reactions occur when matter interacts and transforms (changes in chemical bonds).

9. Compose a story on one of the topics (up to 100 words).

- What are matter and its types in chemistry?
- What are the 4 types of matter in chemistry?

Grammar module

Some, any, much, many, few, little

1. Complete the sentences. Use *some* or *any.*

1. I'm going to buy ..... posters for my room.
2. They didn't have ..... hair clasps.
3. There isn't ..... juice in the fridge. Could you buy?
4. Please give me ..... more ice cream. - I don't have.
5. I was at the butcher's to buy ..... ham for you.
6. We have plenty of fruit. Don't buy .....
7. Her teacher was angry because she didn't do ..... homework.
8. I saw Alex ..... minutes ago, but I don't know where she is now.
9. We saw ..... deer on our way to our uncle's cottage.
10. I have ..... very interesting news for you.
11. She didn't leave me ..... note what to buy for dinner.
12. He is very glad to have ..... really good friends.
13. When we were in Madrid, we visited ..... sights.
14. We need ..... more time to finish the report.
15. If I had ..... sweets, I would give you.
16. Didn't ..... of your friends pass this test?
17. He repaired his bike without ..... help.
18. We found ..... old photos of them in the attic.
19. She hardly ever buys me ..... new clothes.
20. She will be very angry if you don't bring ..... flowers.

2. Choose the correct variant *some or any.*

1. Have we got ..... bread? (A real question, I have no idea.)
2. ..... student will tell you that they don't have enough money. (It doesn't matter which student.)
3. We've got ..... furniture, but we still need a table.
4. She bought ..... new clothes.
5. You can buy beer in ..... pub. (It doesn't matter which pub.)
6. Can I have ..... more juice? (I expect you will say 'yes'.)
7. Did you buy ..... juice? (I have no idea, this is a real question.)
8. I can speak ..... French.
9. Would you like ..... tea? (An offer - I think you will say 'yes'.)
10. In London in the winter there's hardly ..... sunlight.
11. Go into ..... shop on the high street and ask. (It doesn't matter which shop.)
12. Would you like ..... more meat? (An offer - I think you will say 'yes'.)
13. There's ..... money in my handbag.
14. Did you buy ..... chicken? (I expect you will say 'yes', because we talked about it before.)
15. I don't have ..... sunblock with me.

16. She never drinks ..... water.
17. Do you have ..... sugar? (I expect you will say 'yes', because usually you have sugar.)
18. It's hard in a new city without ..... friends.
19. I didn't find ..... problems.
20. Could you give me ..... paper? (A request - I expect you will say 'yes'.)

3. Choose *How much* or *How many*.

1. _____ cheese do you buy?
2. _____ books are there in your bag?
3. _____ money do you spend every week?
4. _____ friends does Linda have?
5. _____ sugar do you need?
6. _____ tomatoes are there in the fridge?
7. _____ meat are you going to buy?
8. _____ milk did you drink yesterday?
9. _____ apples do you see?
10. _____ furniture is there in the room?

4. Choose the correct variant.

1. How … apples are there on the table?
a) many
b) much

2. How … time do we have before the test?
a) many
b) much

3. I want to buy a new sports car, but I only have … money.
a) a few
b) a little

4. I moved to this city last week, so I still don’t have … friends.
a) many
b) much

5. There are … people waiting outside the theater.
a) many
b) much

6. There is … bread on the table next to the jam.
a) a few

b) a little

7. How … times did the phone ring before you answered it?
a) many
b) much

8. Are you hungry? There are … cookies in the cupboard.
a) a few
b) a little

9. I have … friends who live in other countries.
a) many
b) much

10. I had a great time at the beach, but now I have … sand in my shoes!
a) many
b) much

11. There wasn't … food in the kitchen, so I decided to go to a restaurant.
a) many
b) much

12. How many pets do you have, many or …?
a) a few
b) a little

13. I had lots of free time, so I read … books during the holiday.
a) a few
b) a little

14. I think we still have … time to study before the exam.
a) a few
b) a little

5. Choose the correct answer.
1. Would you like____ bread?
a) a slice of
b) a bar of
c) a bunch of
d) a can of

2. I eat ____ boiled egg every morning.
a) a
b) an

c) a few
d) a little

3. Can you give me____ tomato juice?
a) a few
b) many
c) some
d) any

4. How ____ carrots do you need?
a) much
b) many
c) a few
d) a little

5. I ate only ____ cake tonight.
a) a loaf of
b) a bottle of
c) a pinch of
d) a piece of

6. We have ____ bread, don't we?
a) a few
b) a little
c) too many
d) too much

7. There aren't ____ eggs in the basket.
a) too much
b) a lot of
c) any
d) some

8. You should eat ____ orange every day.
a) a
b) an
c) any
d) a few

9. There is ____ cheese on the plate.
a) some
b) many
c) any
d) a few

10. There is ____ honey in the pot.
a) any
b) many
c) a lot of
d) a few

11. Please give me ____ onions.
a) a lot
b) a few
c) too much
d) a little

12. There isn't ____ water in the glass.
a) a few
b) many
c) an
d) any

13. How ___chicken would you like, sir?
a) much
b) many
c) a few
d) a little

14. There is ____ milk in the baby bottle.
a) many
b) a lot of
c) a few
d) any

15. We have ____ strawberries here.
a) a little
b) a lot of
c) any
d) too much

16. We have ____ strawberry jam.
a) a bar of
b) a bottle of
c) a jar of
d) a can of

17. Don't put ____ salt in the soup.

a) a few
b) many
c) too much
d) too many

18. I'll make ____ lemonade to drink.
a) a few
b) many
c) any
d) some

19. There is ____ food on the table.
a) too much
b) too many
c) a few
d) many

20. Give me ____ coke with the pizza.
a) a can of
b) a jar of
c) a bunch of
d) a pinch of

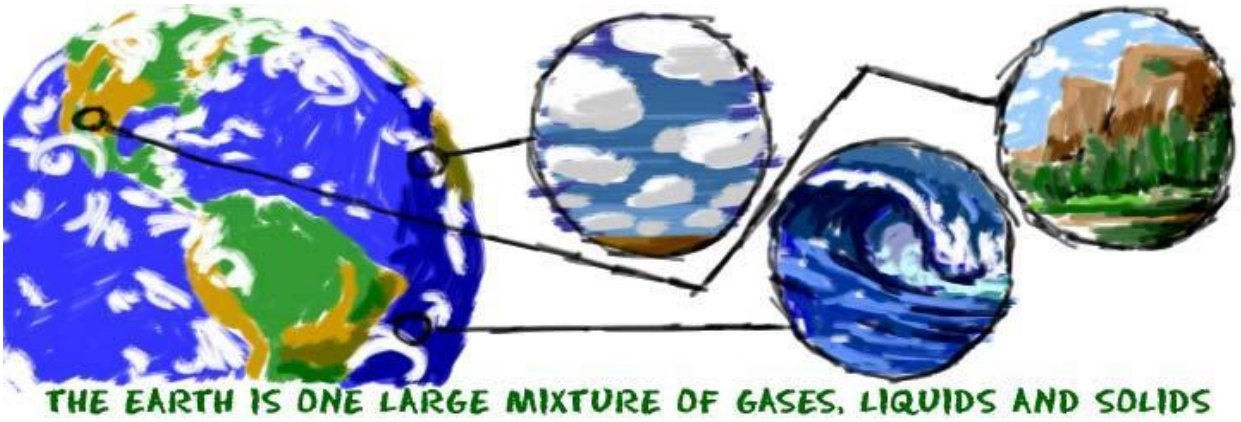
UNIT 3

1. Look up new words given below in your dictionary and memorise them.

to define	brittle
lead	to apart
to fill	odor
weight	condensation
gravity's pull	deposition
to occupy	vaporization
marble	ionization
to explore	deionization
to remove	freezing
property	sublimation

2. Read and translate the text.

Matter



What is matter? Matter is everything around you. Atoms and compounds are all made of very small parts of matter. Those atoms go on to build the things you see and touch every day. Matter is defined as anything that has mass and takes up space (it has volume).

What is mass? Mass is the amount of matter in an object. You might have a small object with a lot of mass such as a statue made of lead (Pb). You might have a large object with very little mass such as a balloon filled with helium (He). You should also know there is a difference between mass and weight. Mass is a measure of the matter in an object while weight is a measure of gravity's pull on an object.

What is volume? Volume is the amount of space something occupies. Words such as big, little, long, or short are used to describe volumes. A marble takes up a small volume while a star occupies a large volume. Different states of matter will fill volumes in different ways.

Even though matter can be found all over the Universe, you will only find it in a few forms (states) on Earth. We cover five states of matter in the text. Each of those states is sometimes called a phase. There are many other states of matter that exist in extreme environments. Scientists will probably discover more states of matter as we continue to explore the Universe.

Five States of Matter

What are the main states of matter? Everyone should know about solids, liquids, gases, and plasmas. Scientists have always known about solids, liquids, and gases. Plasma was a new idea when it was identified by William Crookes in 1879. We can also talk about the Bose-Einstein condensate (BEC). It's a fun state of matter when you remove almost all energy from a system. The scientists (Cornell, Ketterle, and Wieman) who worked with the Bose-Einstein condensate received a Nobel Prize for their work in 2001.

What makes a state of matter? It's all about the physical state and energy in the atoms and molecules. Think about solids. Physical properties of a solid often include "hard" and "brittle." Liquids are fluidy, move around a little, and fill up containers. Gases are always around you, but the molecules of a gas are much farther apart than the molecules in a liquid. If a gas has an odor, you'll often be able to smell it before you can see it. The BEC is all about atoms that are closer and less energetic than atoms in a solid.

3. What is a 'phase transition'?
Insert the following terms into the phase transition scheme.

melting condensation deposition vaporization ionization deionization freezing sublimation

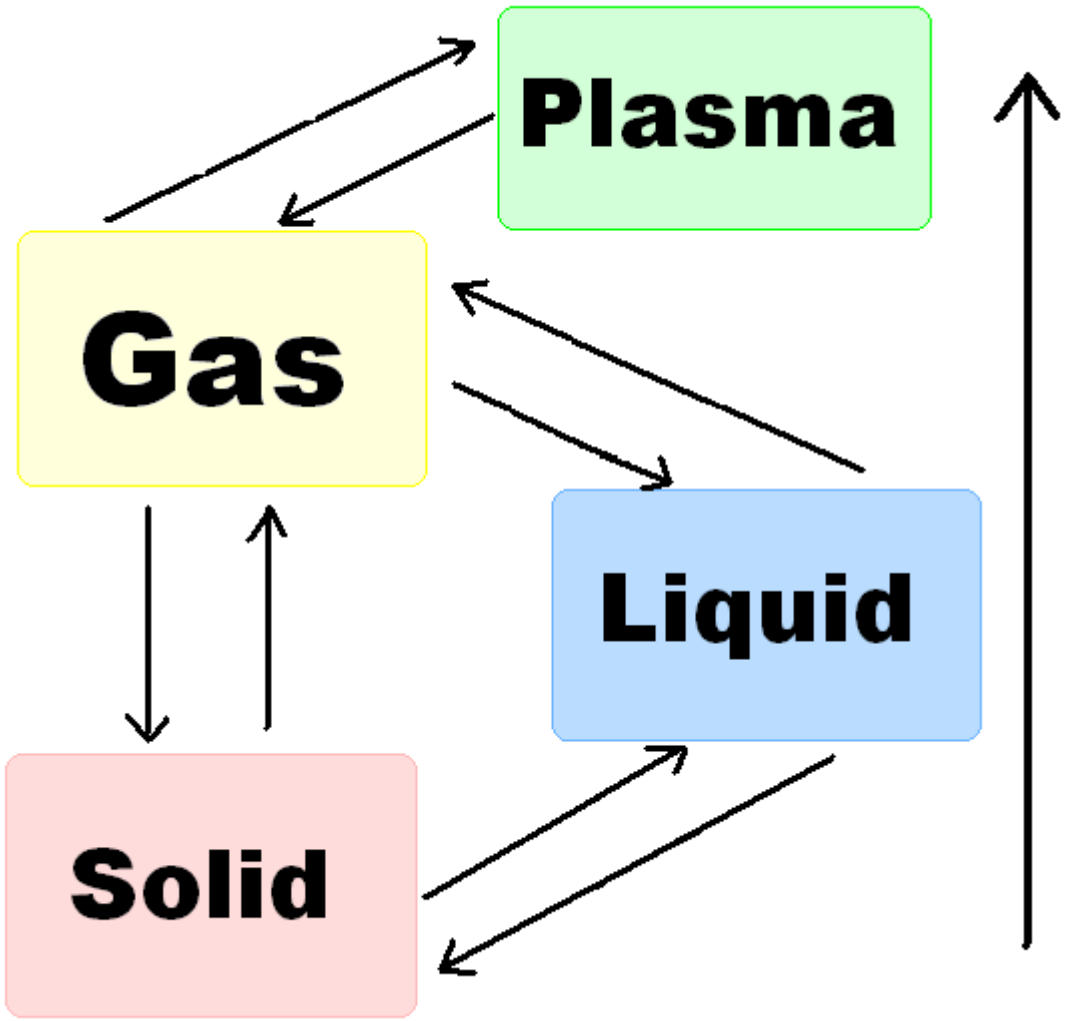
Describe these changes using the patterns:

"Solid can be transformed into liquid by melting",

"… can be changed into …. by …"

"… can be turned into …. by …"

"… can be converted into …. by …"



4. Choose the correct answer and explain your choice (1-2 sentences). Find additional information if you need.

1) How many states of matter are discussed in the text? Name them.
Two
Three
Four
Five

2) Atoms in a liquid are farther apart than the atoms in a gas.
True
False

3) Which has the least energetic molecules?
Solids
Liquids
Gases
Plasmas

4) What force pulls liquids towards the ground?
Pressure
Temperature
Gravity

5) When a substance goes from being a solid to a liquid, it is a...
Chemical Change
Physical Change

6) You may find plasma in a star.
True
False

7) Which of these choices will NOT change the state of matter?
Temperature
Crushing a Crystal
Pressure
Electricity

8) If you leave water in a glass and some molecules turn into a gas, it is called...
Egasoration
Evaporation
Extinction
Solidification

9) Which of these choices is NOT an example of plasma?
Aurora Borealis
Fluorescent Light Bulb
Neon Sign
Incandescent Light Bulb

10) What is usually the total charge of plasma?
Positive
Negative
Neutral

11) What is the term used to describe the phase change as a liquid becomes a solid?
evaporation

condensation
freezing

12) What term is used to describe the phase change of a solid to a liquid?
freezing
melting
boiling

13) What is the term used to describe the phase change of a liquid to a gas?
boiling
condensation
melting

14) Among gases, liquids, and solids what is the densest state of matter?
solids
liquids
gases
plasmas

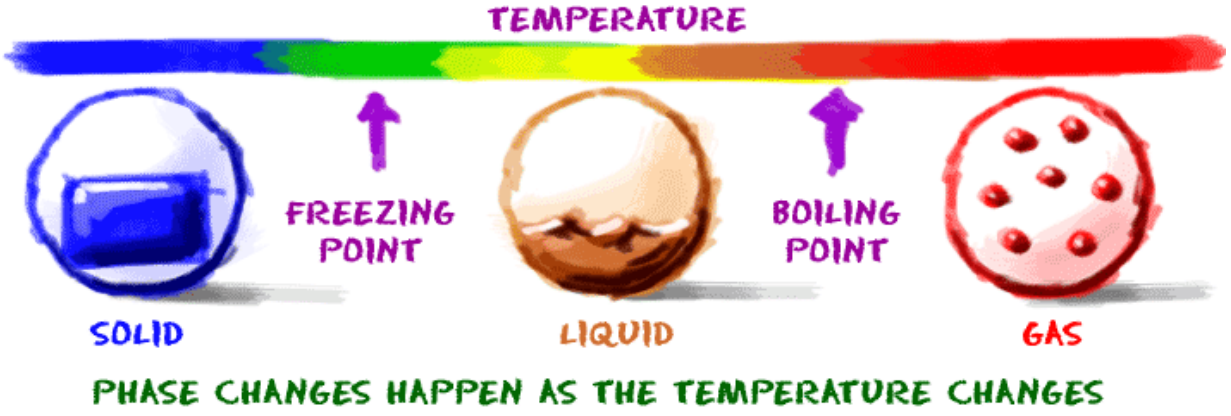
5. Fill in the gaps.

can hydrogen peroxide made up atomic variety molecules chemical formula has the same structure

Changing States of Matter

What is a physical change in matter? Molecules 1. _____ move from one physical state to another (phase change) and not change their 2. _____ structure. Oxygen (O_2) gas 3. _____ the same chemical properties as liquid oxygen. The liquid state is colder and denser (less energy), but the 4. _____ are the same. Water (H_2O) is another example. A water molecule is 5. _____ of two hydrogen (H) atoms and one oxygen (O) atom. It has the same molecular 6. _____ whether it is a gas, liquid, or solid. Although its physical state may change because of different amounts of energy, its atomic structure remains 7. _____.

So what is a chemical change in matter? Let's start with that glass of pure water. If the 8. _____ of water were to change, that would be a 9. _____ change. If you could add a second oxygen atom to a water (H_2O) molecule, you would have 10. _____ (H_2O_2). The molecules would not be "water" anymore. In reality, there are a 11. _____ of steps that go into creating hydrogen peroxide from water.



6. Give the definitions of the following word combinations:
melting point
boiling point
freezing point

7. Make up sentences with the following words:
melting point
boiling point
condensation
vaporization
atomic structure

8. What is the difference between chemical and physical changes?

9. Compose a story on one of the topics (up to 100 words).

- What is matter?
- Main states of matter

Grammar module

Present Simple vs Past Simple

1. Open the brackets in Present Simple.
1. My sister ... (read) a book.
2. Frank ... (like) dogs.
3. My parents ... (do) the shopping.
4. We sometimes ... (meet) in front of the cinema.
5. Uncle George ... (go) to the doctor's.
6. Our friends ... (play) football in the park.
7. She ... (go) to the park every Friday.

8. He ... (ride) his bike every day.
9. We ... (have) the best ideas.
10. Carol ... (say) goodbye.
11. She ... (be) the best singer in our class.
12. My sister ... (live) in a big house.
13. The children ... (eat) hamburgers.
14. Bill ... (have) got two notebooks.
15. I ... (be) at home.

2. Open the brackets in Present Simple.

1. They ... a cold. (have)
2. She ... up at seven. (get up)
3. We ... breakfast at eight. (have)
4. Peter ... to school. (go)
5. Anna ... home at two. (get)
6. He ... an ice cream. (want)
7. I ... peppermint. (hate)
8. Kelly ... TV. (watch)
9. She ... her homework. (do)
10. Our teacher ... in Oxford Street. (live)
11. Eric and Tom ... blue shirts. (wear)
12. My sister ... a song. (sing)
13. My mum ... spaghetti. (cook)
14. Mr. Black ...in his office. (work)
15. The girls often ... a book. (read)

3. Put the words into the correct order. Write down the sentences.

1. what / you / have / for breakfast?
2. when / he / come / home on Fridays?
3. how often / she / go out / with her friends?
4. your brother / live / in England?
5. the kids / like / their new English teacher?
6. visit / they / sometimes / on Sundays / their aunt.
7. you / to the mall / go / often / with your friends?
8. a tennis match / hardly ever / watches / he.
9. usually / have / we / dinner / before seven / don't.
10. read / the paper / always / she / in the morning?

4. Write down forms of irregular verbs and translate them.

shine			
hear			
find			
shut			
beat			

breed			
stick			
lose			
swim			
lay			
spin			
throw			
bite			
swing			
grind			

5. Complete the table with the necessary form of the verbs.

		said
leave		
	had	
		flown
do		
		become
	paid	
		seen
wear		
	rang	
get		
		stuck
	led	
begin		
		written
	caught	

6. Fill in the past form of the verb in brackets.

1. Mammoths ... big animals, bigger than elephants. (be)
 Mammoths ... 100 years ago. (not live)
 Mammoths ... a long time ago. (live)
 Mammoths ... meat. They ... grass. (not eat / eat)
 They ... two large tusks about three meters long. (have)
2. I ... by credit card. I ... cash. (pay / not pay)
3. They ... in the sea, but they ... in the lake. (swim / not swim)
4. She only ... a pound. She ... 3 pounds. (spend / not spend)
5. I ... some elephants. I ... any lions. (see / not see)
6. He ... some milk. He ... any water. (drink / not drink)

7. Put the sentences into Past Simple.

1. He always goes to work by car. Yesterday he ... to work by bus.

2. They always get up early. This morning they ...up late.
3. Bill often loses his key. He ... one last Saturday.
4. I write a letter to Jane every week. Last week I ... two letters.
5. She meets her friends every evening. She ... them yesterday evening, too.
6. I usually read two newspapers every day. I only ... a newspaper yesterday.
7. They come to my house every Friday. Last Friday they ... , too.
8. We usually go to the cinema on Sunday. We ... to the cinema last Sunday, too.
9. Tom always has a shower in the morning. Tom ... a shower this morning, too.
10. They buy a new car every year. Last year they ... a new car, too.
11. I eat an orange every day. Yesterday I ... two oranges.
12. We usually do our shopping on Monday. We ... our shopping last Monday, too.
13. Ann often takes photos. Last weekend she ... some photos.
14. We leave at 8.30 every morning. But yesterday we ... at 8.00.
15. Martin visits his grandparents every summer. Martin ... his grandparents last summer.

8. Open the brackets. Use Present Simple or Past Simple.

1. She ... (go) to Australia in 1994 and she liked it very much.
2. My father usually ... (like) his steak well-done.
3. The dog ... (eat) its toy last night.
4. The policeman ... (talk) to the burglar yesterday.
5. (you /have) a test last week?
6. I often see her mother but she never ... (speak) to me.
7. The gentleman ... (speak) to his servant 2 hours ago.
8. The kangaroo always ... (carry) its baby.
9. My friend ... (talk) a lot every day.
10. The man ... (drive) to the supermarket last weekend.
11. My brothers ... (leave) for England last week.
12. My sisters ... (leave) for England every year in June.
13. I don't like that man because he often ... (laugh) at me.
14. Her sister never ... (smoke).
15. The cat usually ... (leave) its basket when it is hungry.

UNIT 4

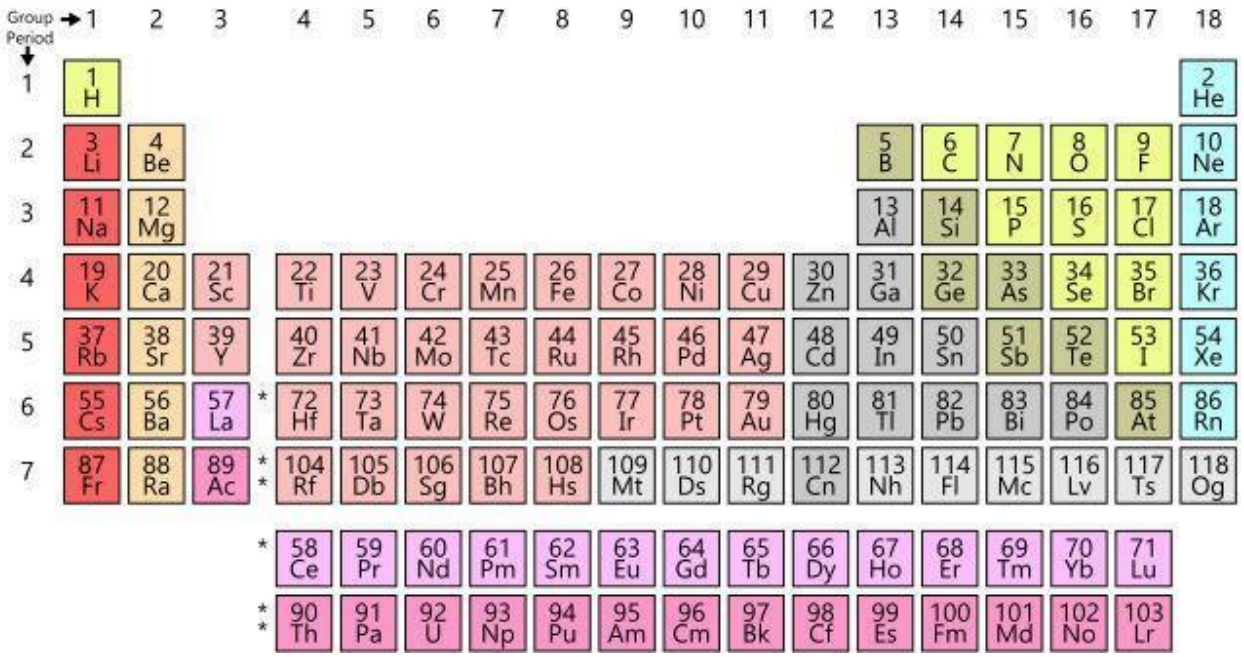
1. Look up new words given below in your dictionary and memorise them.

to include
to contain
to consist of
outer shell
to line up
row
column
stable
to tend
alkali
align
to predict
a bit
to be named after
to observe

2. Read and translate the text.

The Periodic Table

The Periodic table is a way of listing the elements. Elements are listed in the table by the structure of their atoms. This includes how many protons they have as well as how many electrons they have in their outer shell. From left to right and top to bottom, the elements are listed in the order of their atomic number, which is the number of protons in each atom.



Periodic Table of Elements

It is called "periodic" because elements are lined up in cycles or periods. From left to right elements are lined up in rows based on their atomic number (the number of protons in their nucleus). Elements in the columns have similar properties.

Each horizontal row in the table is a period. There are seven (or eight) total periods. The first one is short and only has two elements, hydrogen and helium. The sixth period has 32 elements. In each period the left most element has 1 electron in its outer shell and the right most element has a full shell.

Groups are the columns of the periodic table. There are 18 columns or groups and different groups have different properties.

One example of a group is the noble or inert gases. These elements all line up in the eighteenth or last column of the periodic table. They all have a full outer shell of electrons, making them very stable (they tend not to react with other elements). Another example is the alkali metals which all align on the left-most column. They are all very similar in that they have only 1 electron in their outer shell and are very reactive. You can see all the groups in the table above.

This lining-up and grouping of similar elements helps chemists when working with elements. They can understand and predict how an element might react or behave in a certain situation.

Each element has its own name and abbreviation in the periodic table. Some of the abbreviations are easy to remember, like H for hydrogen. Some are a bit harder like Fe for iron or Au for gold. For gold the "Au" comes from the Latin word for gold "aurum".

3. Choose the correct variant.

1) The atomic number of an atom is the number of _____ in the atom's nucleus.
a. Electrons
b. Neutrons
c. Neutrinos
d. Valence electrons
e. Protons

2) What do elements in the same column of the Periodic Table have in common?
a. The same atomic weight
b. The same number of electrons in the outermost shell
c. The same total number of electrons
d. The same number of electron shells
e. The same melting and boiling points

3) What are the horizontal rows of the Periodic Table called?
a. Bases
b. Shells
c. Layers
d. Periods
e. Stratas

4) What family of elements is in the right-most column of the Periodic Table?
a. Alkali metals
b. Transition metals
c. Halogens
d. Actinides
e. Noble gases

5) What family of elements is in the left-most column of the Periodic Table?
a. Alkali metals
b. Transition metals
c. Halogens
d. Actinides
e. Noble gases

6) Elements in the Periodic Table are listed in order of their _____.
a. Atomic number
b. Electrons
c. Density
d. Melting point
e. They are listed in alphabetical order

7) Which of the following is the abbreviation for the element gold?
a. G
b. Fe
c. Au
d. Go
e. Ld

8) What scientist is usually credited with inventing the Periodic Table?
a. Albert Einstein
b. Isaac Newton
c. Antoine Lavoisier
d. Dmitri Mendeleyev
e. Alfred Nobel

9) What is the abbreviation used in the Periodic Table for hydrogen?
a. Fe
b. H
c. Hy
d. Hd
e. Gn

10) What is the name of the family of elements that has a full outer shell of electrons?
a. Alkali metals

b. Transition metals
c. Halogens
d. Actinides
e. Noble gases

4. Mind the difference between *consist*, *contain* and *include*.

Contain is used to say that an object has something inside it.

Include is used to describe elements of a group of objects/ideas.

A lot of the time they can be used interchangeably but with slightly different meanings. In a sentence where you could say something "**consists of**" other things then you can use both:

- This meal consists of rice, peas and chicken.
- This meal contains rice, peas and chicken. (This comes across as a *complete* list of everything in the meal)
- This meal includes rice, peas and chicken. (Using "includes" suggests that these are only a few of the ingredients)

The periodic table **consists of** rows and columns.
It **contains** elements.
Different elements **include** carbon, sulphur, hydrogen, oxygen etc.

Fill in the gaps with the necessary word.

1. The classic symptoms of exposure to toxic chemicals _____ headaches, sore throats, vomiting, etc.
2. The trees _____ between 460-800 billion tones of carbon.
3. The local fauna _____ wolves, snakes and a wide range of unpleasant insects.
4. The graphs do not _____ information about the use of the cell.
5. Other greenhouse gases _____ carbon dioxide, methane and chlorofluorocarbons.
6. Does the price _____ the tax?
7. The tour _____ a visit to the Science museum.
8. The committee _____ ten members.
9. Her report _____ several inaccuracies.
10. The diet _____ largely _____ vegetables.
11. You should _____ some examples in your essay.
12. This drink doesn't _____ any alcohol.

5. Choose the correct synonym for each term.
1. renowned a) famous b) unknown

2. raise	a) lower	b) elevate
3. use	a) employ	b) enable
4. deteriorate	a) strengthen	b) weaken
5. expand	a) excite	b) increase
6. equilibrium	a) balance	b) liquid
7. terminate	a) begin	b) end
8. substantial	a) massive	b) less

6. Use the Periodic table and fill the table below. What is the difference between these groups?
Which elements are:

metals	nonmetals	metalloids

7. Fill in the gaps. There are two extra variants.

Carbon J and Q Astatine Silver Helium W and Y Arsenic

Fun facts about the Periodic Table

- …. is unique because it is known to form up to 10 million different compounds. It is important to the existence of life.
- …. is the rarest element on earth. Only approximately 25 grams occur naturally on the planet at any given time.
- The only letters that you cannot find in the periodic table are the letters …
- The country Argentina is named after the element ….
- Although there is … on Earth, it was first discovered by observing the sun.

8. Do you know the history of creating of the Periodic table? Why is it a really great invention? Continue this story (up to 100 words).
Write down some interesting facts about the Periodic table.

The periodic table was proposed by Dmytro Mendeleev in 1869. Using the table, Mendeleev was able to predict accurately the properties of many elements before they were actually discovered…

9. Compose a story on one of the topics (up to 100 words).

- The Periodic Table of chemical elements.
- Present interesting facts about the Periodic Table.

Grammar module

Future Simple and *to be going to do smth*

1. Make up sentences using Future Simple.
1. Amanda/move/to a new flat/next month.
2. Daniel/attend/language courses/next year.
3. His cousin/buy/the tickets for the plane/in two days.
4. Our students/study/philosophy/next term.
5. I/do the ironing/after dinner.
6. We/have/History exam/in three days.
7. Larry and Tom/go/to the skating-rink/in an hour.
8. You/write/the invitations/for the party/tomorrow.
9. Mark/go/to the swimming-pool/next Tuesday.
10. They/leave/for Berlin/in a week.

2. Ask questions to the words in bold.
1. The postman will deliver **fresh newspapers in the morning**.
2. **We** will have a picnic **in the park**.
3. **Her** brother will **translate this article** next week.
4. Alex will return **home at seven o'clock**.
5. You will read **my** report **very attentively**.
6. My friend will soon send **me an e-mail** letter.
7. **Her cousin** will give you some discs **in two days**.
8. Jane will **learn this poem**.
9. **My** mother will feed **the fish** in the evening.
10. **They** will drive **to the country** next Sunday.

3. Make up questions using the following words.
1. they/trip/return/When/their/will/from?
2. tomorrow/the/sign/our/morning/Will/boss/documents?
3. not/early/bed/Will/to/tonight/I/go?
4. publish/in/they/article/the/newspaper/Will/your/local?
5. problem/they/solve/this/will/How?
6. for/will/birthday/What/give/you/her/her?
7. after/they/not/me/classes/meet/Will?
8. receive/the/in/the/documents/morning/Will/secretary/the?
9. you/Where/from/the/will/flat/put/your/key?
10. next/Will/in/train/minutes/arrive/twenty?

4. Open the brackets.
One day a woman goes along the street and sees a beautiful bracelet in the window of a jewellery shop. She decides that she wants it. So she comes into the shop and asks the shop assistant, «… you … **(to show)** me this bracelet?» «Here you are, madam»,

answers the shop-assistant and gives her the bracelet. «Unfortunately, I haven't enough money with me, but I want to buy it very much. … you … **(to hold)** the bracelet for me if I pay you a small deposit?» asks the woman. «I … **(to hold)** this bracelet if you pay £50», answers the shop assistant. «But when … you … **(to come)** to pay the rest of money and collect it?» «My husband … **(to come)** and pay for the bracelet as soon as he does something unforgivable. Perhaps he … **(to come)** this weekend», answers the woman.

5. Make up sentences using *to be going to.*

1. Mr. Potter (sell) his house.
2. Our neighbours (spend) their next holidays in the Caribbean.
3. I (move) to another town.
4. (what/you/do) about this?
5. My husband (build) a tree house for the kids.
6. His friends (learn) Spanish.
7. (you/help/me)?
8. (she/study/in Dublin)?
9. I (tell/not) you the secret.
10. She (ring/not) me.
11. (they/paint/the room)?
12. We (invite/not) him to our party.
13. Greg (work/not) abroad.
14. (he/apply/for that job)?
15. Her parents (lend/not) her any more money.

6. Open the brackets using *to be going to.*

1. It ____ (rain).
2. They ____ (eat) pasta.
3. I ____ (wear) black shoes tonight.
4. They ____ (not / help) you.
5. Karen ____ (not / walk) home.
6. ____ (cook / you) lunch?
7. Mary ____ (share / not) his biscuits.
8. ____ (leave / she) the house?
9. ____ (take part / he) in the contest?
10. We ____ (not / spend) my holiday abroad this year.

7. Complete the sentences using *will (´ll)* or *to be going to.*

1. Why are you turning on the television? - I ____ a film. (I / watch)
2. Oh, I've just realised. I haven't got any money. - Haven't you? Well, don't worry. ____ you some. (I / lend)
3. I've got a headache. - Have you? Wait a second. ____ an aspirin for you. (I / get)
4. Why are you filling those buckets with water? - ____ the car. (I / wash).

5. I've decided to repaint this shed. - Oh, have you? What colour ____ it? (you / paint)
6. Where are you going? Are you going shopping? - Yes, ____ something for lunch. (I / buy)
7. I don't know how to use this camera. - It's not difficult. ____ you. (I / show)
8. What would you like to order? - ____ a sandwich, please. (I / have)
9. Have you send the agreement? - Oh, I'm sorry. I completely forgot. ____ it now. (I / do)
10. The picture in this room doesn't look very safe, does it? - No, it looks as if ____ down. (it / fall)

8. Choose the correct variant.

1. A: We don't have any bread.
   B: I know. I ... some. I took some money from your purse.
a) will buy
b) 'm going to buy
c) going to buy

2. A: We don't have any bread.
   B: Really? I ... some from the shop then.
a) will get
b) 'm going to get
c) will to get

3. A: Why do you need to borrow my suitcase?
   B: Because I ... my mother in Scotland next month.
a) 'm going to visit
b) will visit
c) am going visiting

4. A: I'm really cold.
   B: I ... the heating on.
a) 'll turn
b) 'm going to turn
c) going to turn

5. A: What are your plans after you leave university?
   B: I ... in a hospital in Africa.
a) going working
b) will work
c) am going to work

6. A: All the lights have gone off!
   B: Don't worry. I ... a look.

a) am going to take
b) going to take
c) will take
7. A: Why are you carrying your laptop?
B: I ... some homework on the train.
a) will to do
b) am going to do
c) will do

8. A: I can't find my keys.
B: I ... you look for them.
a) am going help
b) will help
c) ‘m going to help

9. A: Did you remember to buy the tickets?
B: Oh no, I forgot! I ... them online now.
a) will buy
b) am going to buy
c) going buying

10. If you take a look at this graphic, you can see that the economy ... worse very soon.
a) will get
b) is going to get
c) will to get

9. Choose the correct variant.
1. A: I don't think he _____ come tonight.
B: But he says he _____ come.
a. will / will
b. is going to / will
c. will / is going to

2. A: I've bought this paint because I _____ the kitchen.
B: I'm sure it _____ fantastic.
a. 'm going to paint / will look
b. will paint / 's looking
c. will paint / will look

3. A: What _____ after you graduate?
B: I _____ around the world.
a. will you do / 'm going to travel
b. are you going to do / 'm going to travel

c. are you going to do / will travel

4. A: _____ for a walk later?
B: No. I _____ home.
a. Are you going to go / 'm going to stay
b. Will you go / 'm going to stay
c. Will you go / will stay

5. A: I need the camera because I _____ some pictures. But I don't know how it works.
B: Don't worry. I _____ you.
a. 'll take / 'll show
b. 'm going to take / 'll show
c. 'll take / 'm going to show

6. A: _____ to work today?
B: Yes, but the traffic is awful, so I _____ late.
a. Will you drive / will be
b. Will you drive / 'm going to be
c. Are you going to drive / 'm going to be

7. A: Hurry up! The bus is leaving. You _____ it.
B: No, I _____ the train. It's faster.
a. are going to miss / 'm going to take
b. will miss / will take
c. are going to miss / will take

8. A: According to the voting intention numbers, I _____ the election.
B: What _____ when you are the president?
a. will win / are you going to do
b. 'm going to win / are you going to do
c. will win / will do

9. A: They are winning 2-1 and there are only 2 minutes left. They _____ this match.
B: No, I think maybe Manchester United _____ a goal in the last minute.
a. are going to win / will score
b. will win / will score
c. are going to win / are going to score

10. A: Don't make so much noise. You _____ dad.
B: OK. I _____ now.
a. will wake up / will stop
b. will wake up / 'm going to stop
c. are going to wake up / will stop

10. Open the brackets using *will* or *to be going to*.

1. A: Have you decided what to do with the washing machine?
   B: Yes, I ... (buy) a new one.
2. A: That glass is dirty.
   B: No problem. I ... (clean) it.
3. A: Why are you taking the camera?
   B: I ... (take) a picture of the sunset.
4. Please, slow down. Are you crazy? We ... (have) an accident!
5. You look tired. Sit down, and I ... (make) you a cup of tea.
6. Do you think he ... (ask) her out?
7. Do you think you ... (arrive) before she arrives?
8. He ... (not run) the marathon. He says he needs more training.
9. It looks delicious! We ... (enjoy) this meal so much!
10. A: I want coffee, but I don't have coins for the vending machine.
    B: No problem. I ... (buy) you a coffee.

UNIT 5

1. Look up new words given below in your dictionary and memorise them.

percent = per cent
to make up
blowtorch
welding
to split
huge
to release
outermost electron
to float
pressure
to breathe
to purify
spring
to bounce up and down
resort

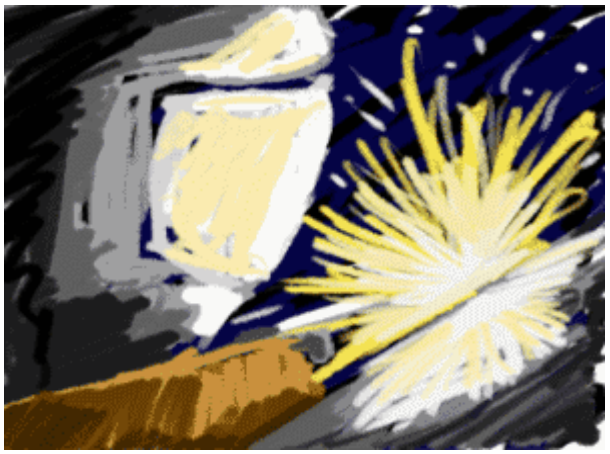
2. Read and translate the text.

Some important elements

Over ninety percent of all the atoms in the Universe are hydrogen atoms. By mass, hydrogen makes up about 75% of all matter in the Universe. Hydrogen atoms are also the smallest and lightest of all the atoms with only one electron and one proton in a common single hydrogen atom (called *protium*).

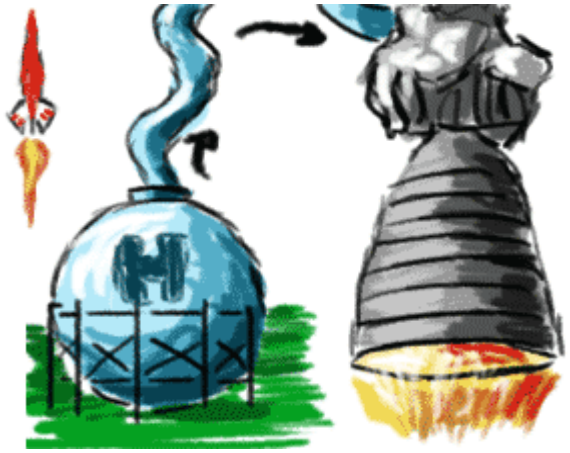
Where can it be found?

Welding



Sometimes you see someone working with a blowtorch to cut or welding to bring things together. Those processes need gases that can burn very hot. In welding, electricity splits hydrogen molecules and when the atoms recombine, huge amounts of heat are released.

Rocket Fuel



Hydrogen is awesome as a rocket fuel because of all of the energy released. The hydrogen is compressed into a liquid form(H_2) and stored in tanks. It is combined with liquid oxygen (O_2) to create the most efficient reaction and release of energy.

Similar to hydrogen (H), helium(He) is usually found as a gas and has no color or smell. Helium is found everywhere in the Universe and is the second most common element, just behind hydrogen. As far as we're concerned, helium is a "happy" element. It is inert, because its outermost electron orbital is full with two electrons. You can also find helium in compressed air tanks, lasers, and as coolants in nuclear reactors.

Balloons

Have you ever got a balloon as a present? You know how that balloon always tries to float away? That's because there is helium inside. Helium is a very light element. When you put it inside a balloon it tries to float.

Compressed Air Tanks

Whenever you see a SCUBA diver in the water, you should know that he has some helium in his air tank. Divers combine helium and regular air in those tanks at very high pressures. When they go deep in the water the helium makes it easier for them to breathe.

Lasers

Sometimes helium is used in lasers. It's a good element to use because it is non-reactive. Even at really high temperatures helium will not bond with other elements.

Lithium is the third element of the periodic table and was discovered in 1817 by a chemist named Arfvedson. You might find lithium in everyday objects, such as medicines and batteries.

This is the first metal encountered in the periodic table, and it is a silvery colored solid when purified. One thing to remember is that lithium is never found alone in nature. It is always bonded to other elements.

Batteries

You have batteries in many of your toys. In flashlights you need batteries. In your watch you probably have a battery. Most of those batteries need lithium to work. Lithium is an important element in the way a battery makes electricity.

Medicine

Lithium is used as a medicine too! When you take lithium it acts on nerves in your brain and changes the way you act.

Rocks and Soil

Lithium is a metallic element and is found in many rocks. When you're out gathering interesting looking rocks, lithium is probably one of the elements inside.

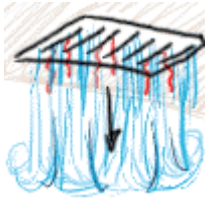
Hot Springs

Sometimes people take vacations at resorts. Some of those resorts are near "Springs". We're not talking about a spring that bounces up and down, but mineral water springs that come out of the ground. Many people think that is healthy and fun to find these springs.

Nuclear Reactors

Lithium is a very important element in nuclear reactors. It is a very light element which makes it important to scientists. It is used in many chemical reactions and processes.

Air Conditioners



Next time it's really hot out and you're nice and cool inside, you should thank lithium. Lithium is used in air conditioning systems. You know that everyone uses air conditioning. That means everyone is using some lithium.

3. Answer the questions.

1. What is the most widespread atom in the Universe?
2. Why can hydrogen be used in welding?
3. What is the second most common element?
4. Can lithium be found in a purified way?
5. Where is lithium used in the everyday life?

4. Where can the following elements be found and what are they used for?

1. Magnesium -
2. Platinum –
3. Sulfur -
4. Uranium –
5. Silicon -

5. What is the symbol for

tin
potassium
sodium
mercury
gold?

What do you know about these elements? What are the main characteristics and properties?

6. Choose the correct variant.

1) Approximately how many known elements are in the periodic table?
less than 10
less than 50
more than 100
more than 200

2) Elements in the periodic table are arranged by...
Atomic Number
Atomic Weight
Number of Neutrons
Chemical Reactivity

3) Which of these things are NOT listed in the periodic table?
Element Name or Symbol
Atomic Weight
Atomic Orbital Radius
Atomic Number

4) Which scientist came up with the concept of a current periodic table?
Jason Priestly
Dmitri Mendeleev
Antoine Lavoisier
Albert Einstein

5) The rows of the periodic table are called periods.
True
False

6) Which of these choices is NOT a family of elements?
Halogens
Alkali Metals
Noble Gases
All are Families of Elements

7) Where are halogens found on the periodic table?
Left Side
Right Side
Top
Bottom

8) Halogens are very...
Reactive
Stable
Heavy
Radioactive

9) Which of these is a noble gas?
Chlorine (Cl)
Hydrogen (H)
Neon (Ne)
Fluorine (F)

10) Which of these is NOT a gas found in the Earth's atmosphere?
Nitrogen (N)
Oxygen (O)
Gold (Au)
Argon (Ar)

11) All of the following are in the same rows/periods of the periodic table EXCEPT...
Beryllium(Be), Oxygen(O), Fluorine (F)
Hydrogen(H), Helium(He)
Sodium(Na),Carbon(C), Chlorine(Cl)
Lithium(Li), Boron(B), Neon(Ne)

12) You might find boron (B) in the soap in your bathtub.
True
False

13) You can find lots of phosphorus in fireworks.
True
False

14) Scientists describe the …. states of carbon.
Two
Three
Four
Twelve

15) Much amount of potassium can be found in …
Apples
Peas
Bananas
Pineapples

7. Find out some interesting facts about the following elements:

Ti_____
Pt _____
I _____
P _____
Cu _____

8. Fill in the gaps.

scientist versatile large find nature convert trace crystals meat found properties use

Selenium

Selenium is one of the most 1. _____ elements of the periodic table. You can 2. _____ it in many forms (allotropic forms) including reddish 3. _____ and metallic gray. It was named after the moon when discovered in 1817 by the 4. _____ Berzelius. While rare, selenium is normally 5. _____ in minerals.

Of the lesser members in the sulfur family, selenium is the most abundant in 6. _____, often found in copper and lead mining. Tellurium and polonium are other members in the same family (and found in the same column of the periodic table).

7. _____ amounts of selenium will act as a poison but you need 8. _____ amounts of this mineral to survive. You usually get selenium in your diet when you eat 9. _____.

Probably one of the most well-known uses for selenium is its 10. _____ in solar cells. Selenium has photovoltaic 11. _____. That term means that it can convert light into energy. It just makes sense that selenium is an important part of any equipment design to 12. _____ the Sun's energy into electricity.

9. Compose a story on one of the topics (up to 100 words).

- Some important elements of the Periodic table.
- The most widespread atom in the Universe. Its application and properties.

Grammar module

Present Continuous and Past Continuous

1. Write down the affirmative, negative and question form of the sentence.

E.g.: Drink / this man (This man is drinking; This man is not drinking; Is this man drinking?)

1. Shine / the sun / brightly.

2. Have / you / breakfast.
3. Run / he / in the park.
4. Look for / they / eyeglasses.
5. Rain / it / in Madrid.

2. Make up sentences.
1. (I / study at the moment).
2. (I / not / sleep).
3. (you / play badminton tonight).
4. (we / watch TV).
5. (she / not / work in Spain).
6. (he / not / wait for the bus).
7. (they / read).
8. (we / not / go to the cinema tonight).
9. (you / not / read the newspaper).
10. (she / eat chocolate).
11. (I / not / live in Paris).
12. (we / study French).
13. (they / not / leave now).
14. (they / live in London).
15. (he / work in a restaurant now).
16. (I / not / meet my father at four).
17. (she / not / drink tea now).
18. (she / play the guitar).
19. (we / cook).
20. (he / walk to school now).

3. Use Present Continuous in the sentences.
E.g.: He often buys a new notebook. Look, he is buying a notebook again.
1. He usually goes to school. Look, he ... to school!
2. He often drinks a coffee. Look, he ... a coffee!
3. I swim every day. Look, I ... !
4. She washes her hair every day. Look, she ... her hair!
5. The cat always drinks its milk. Look, it ... its milk!
6. We sometimes dance in the living room. Look, we ... in the living room!
7. They usually run to church. Look, they ... to church!
8. You often write emails. Now, you ... an email.
9. Mother cooks in the kitchen every day. Right now, mother ... in the kitchen.
10. The monkey eats bananas. Look, the monkey ... a banana!
11. In the afternoon we never watch TV. We ... at the moment.
12. They sometimes have breakfast. Look, they ... their breakfast!
13. Father usually drives a big car. At the moment father ... a little red car.
14. The penguin swims very well. Look, the two little penguins ... !
15. The children always have their breakfast. The children ... their breakfast now.

4. Open the brackets in Past Continuous.

1. He ... all day yesterday. (rest)
2. We ... through the window when mother came in. (look)
3. They ... a newspaper when I entered. (read)
4. I ... to her but she. didn't hear me. (speak)
5. I didn't go for a walk because it ... . (rain)
6. When you telephoned I ... my room. (sweep)
7. They ... with John's wife when I came in. (talk)
8. While we ... we heard a shot. (play)
9. She ... along the embankment when I met her yesterday. (walk)
10. We ... home when, it started to snow. (go)
11. I ... very hard when he called. (study)
12. She ... when her friend arrived. (sleep)
13. They ... to the lecture when the light went off. (listen)
14. She still ... when we returned home. (work)
15. When he ... his garden he found a silver coin. (dig)

5. Make up sentences. Use Past Continuous.

1. (he / cook).
2. (she / play cards)?
3. (I / not / cry).
4. (you / not / feel well).
5. (where / you / go when I met you)
6. (she / not / sleeping at midnight).
7. (They / work)?
8. (you / sleep when I got home)?
9. (it / rain at lunchtime).
10. (what / you / do)?
11. (why / she / run)?
12. (you / not / read).
13. (how / we / do at that time)?
14. (he / not / watch a film at 3pm).
15. (I / do my homework at eight o'clock).
16. (where / it / rain)?
17. (you / shop when I called you).
18. (she / eat dinner when we arrived).
19. (he / live in Tokyo at the time)?
20. (it / snow)?

6. Make up the affirmative, negative and question form of the sentence. Use Past Continuous.

1. (when / he / work there)?
2. (you / make dinner)?

3. (they / drink coffee when you arrived)?
4. (when / we / sleep)?
5. (they /not/ study last night).
6. (we / talk when the accident happened).
7. (he / not / exercise enough).
8. (I / talk too much)?
9. (it / not / snow).
10. (how / they / feel)?
11. (they / not / talk).
12. (where / I / stay)?
13. (why / he / study on a Saturday night)?
14. (I / go to school when you saw me)
15. (you / sleep at 6 am).
16. (she / work when I called).
17. (we / not / leave when you called).
18. (I / not / stay in a hotel).
19. (we / make too much noise)?
20. (they / take the exam)?

7. Choose the correct variant.

1. I …… a movie when the lights went out.
am watching
was watching
2. I …… dinner when the guests arrived.
am preparing
was preparing
3. I …… now.
am writing
was writing
4. 'Where are the kids?' 'They …… in the garden.'
are playing
were playing
5. We …… for them to come.
are still waiting
were still waiting
6. The guests …… in the lobby.
are waiting
were waiting
7. It …… We cannot go out now.
is raining
was raining
8. The students …… for their exam.
are preparing
were preparing

9. The mother …… for the child to return.
is waiting
was waiting
10. I …… for the bus when the accident took place.
am waiting
was waiting
11. I …… in Mumbai at that time.
am living
was living
12. I …… when the phone rang.
am sleeping
was sleeping

8. Complete the following sentences using Present Continuous or Past Continuous.

1. I …… (water) the plants in the morning.
2. What …… (you do) at 6 o'clock yesterday evening?
3. They …… (wait) for the bus when the accident happened.
4. She …… (get) impatient.
5. The boys …… (play) in the garden.
6. It …… (rain) cats and dogs.
7. I …… (revise) my lessons now.
8. Somebody …… (knock) at the door.
9. We …… (wait) for the guests to turn up.
10. The students …… (shout) slogans outside the campus.
11. The birds …… (fly) in the sky.
12. John and Sandra …… (expect) their first child.

9. Choose the correct variant. Mind the difference between Present Continuous, Past Simple and Past Continuous.

1. There ____ some annoying people at her party last Friday.
are being were was being
2. When the hurricane ____ my son was really frightened.
was beginning is beginning began
3. We ____ now. Are you ready?
left are leaving were leaving
4. Susan ____ out last weekend.
didn't go out isn't going out wasn't going out
5. I ____ my favourite TV programme when the lights went out.
am not watching was watching didn't watch
6. When I visited my cousin he ____ for an important exam.
was studying studied is studying
7. There ____ many people at his last concert.
wasn't aren't being weren't

8. Please, be quiet. I ____ the news now.
watched 'm watching was watching
9. What ____ yesterday morning?
were you doing did you doing you doing
10. He ____ football ten minutes ago but now he is with me.
is playing was playing played

UNIT 6

1. Look up new words given below in your dictionary and memorise them.

exposure to
harmful chemicals
safety gear
to ensure
vulnerable
eye rash
loss of vision
(to) spill
(to) splash
emergency
flame
contamination
to burn
tongs
spatula
to measure
shallow dish
sample
nozzle
solution
burette
clamp

2. Read and translate the text.

Personal Protective Equipment

Working in a chemistry lab is always exciting; however, there are potential dangers of exposure to harmful chemicals. Hence it is always advised to wear the proper gear, also known as personal protective equipment (PPE), before entering the chemistry lab. The safety gear to work in the chemistry lab mainly consists of three things:

- **Safety Goggles:** As the name suggests, safety goggles ensure the safety of your eyes. They are one of the most important safety gear, as the eyes are the most vulnerable part of the human body. Several chemicals like acids may cause a severe injury to eyesight, such as eye rash or a permanent loss of vision.
- **Lab Coat:** The lab coat is a general uniform of medical and chemical professionals. The knee-long coat ensures the safety of the body and clothing from accidental spills and splashes of harmful chemicals. Moreover, in case of emergencies like fire or contamination, a lab coat can be easily and quickly removed.
- **Latex/Nitrile Gloves:** Chemicals can be very reactive, and physical contact with such chemicals cause severe burns. Latex or nitrile gloves work as a barrier between human skin and protect it from injuries.

3. Match the pictures with the description.

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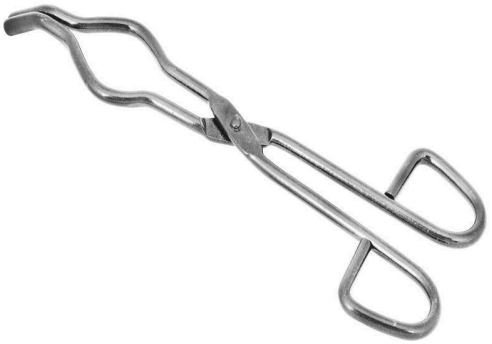
<tr>
<td> 
A</td>
<td> 
B</td>
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<tr>
<td> 
C.</td>
<td> 
D</td>
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</table>

E

F

G

1) A spatula is a tool used to carry, mix, or spread solid or paste materials in the chemistry lab. They come in various shapes and sizes and are usually made of stainless steel. For easier handling, some of them have a plastic handle or a fixed hardwood grip.

2) Tongs are scissor-like tools used to grip and lift objects and avoid the risk of getting burnt. They are used to hold, transfer or pick small objects out of a reaction container.

3) Pipettes can have various sizes. These are narrow glass cylindrical pipes, used for measuring an exact volume of liquid and placing it into another container.

4) A petri dish is a shallow, transparent cylindrical tube used to carry out biochemical reactions in general. It's typically composed of heat-resistant glass and comes with a lid to keep the sample safe from contamination.

5). A dropper, also known as Pasteur pipette, is a common small apparatus, usually made up of plastic or glass cylinder, having a small nozzle on one side and a rubber holder on the other. It is used to put the liquids or solutions in any medium dropwise, that is, one drop at a time, necessary equipment when any reagent is required in an extremely small amount in a solution.

6). Burettes: Very popular equipment, mostly used in the titration reactions, and is used to deliver a known volume of any substance to other equipment. This apparatus is a long-graduated tube, with a stopcock present at the lower end and a narrow opening at the bottom. They are usually set up by using a burette clamp in combination with a ring stand. It usually comes in the sizes of 10ml, 25ml, or 50ml.

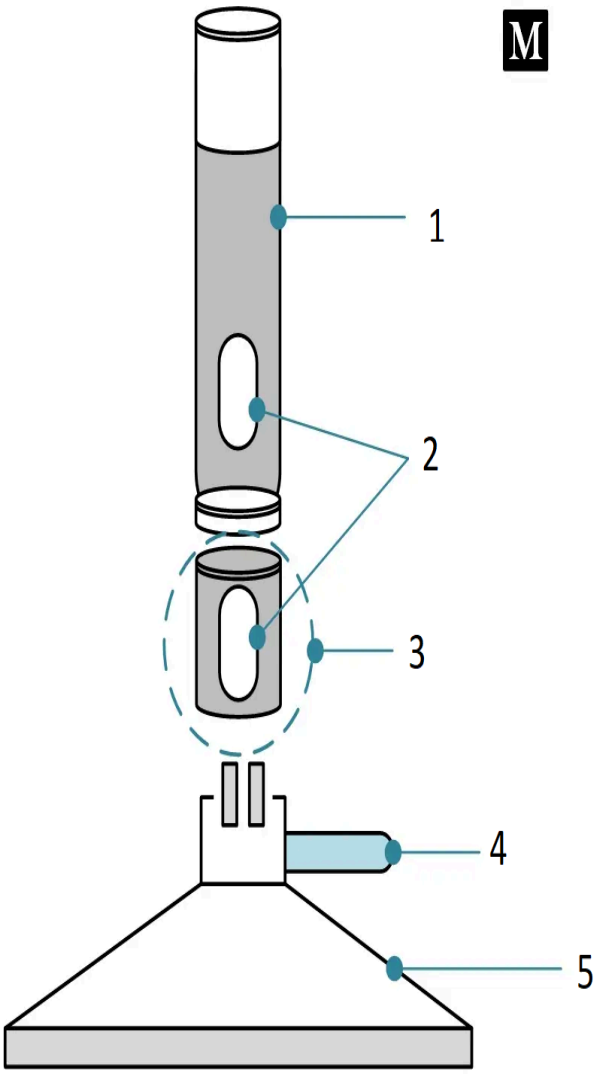
7) Ring stands, rings, and clamps: These are the apparatus that are used to suspend burettes, flasks, crucibles, etc. either above other containers or above Bunsen burners for heating purposes. While heating these flasks, wire mesh is a necessary apparatus for the even distribution of the heat.

4. Study the description of a burner.

A Bunsen burner is a type of gas burner that produces a safe, smokeless, hot flame that can be used for various scientific experiments. The burner is named after Robert Bunsen, a German scientist who designed it in 1857 with his laboratory assistant, Peter Desaga. The basic function of a Bunsen burner in the laboratory is heating, sterilization and combustion.

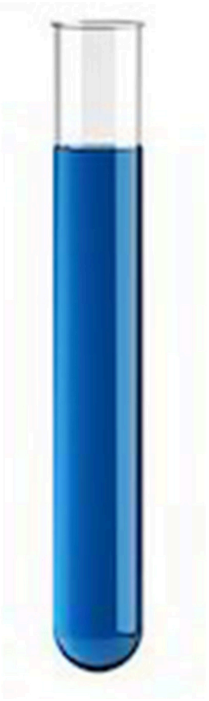
Bunsen burner parts

A) They allow air to enter the burner to make a mixture of air and gas or other liquid fuel with air.
B) It is a metal tube about 5 inches long that rests on the base of the burner. It has two diametrically opposed holes near the bottom end which form the air vent. The gas from the nozzle mixes with the air from the vent and burns at its upper end
C) It is a short metallic cylindrical sleeve with two holes diametrically opposed to each other. Present around the ventilation holes, the main function of the collar is to control the amount of air entering the barrel.
D) It is a wide and heavy part of variable shape which provides support for the Bunsen burner. It is connected to a side tube called the gas tube.
E) a flammable substance used as a fuel

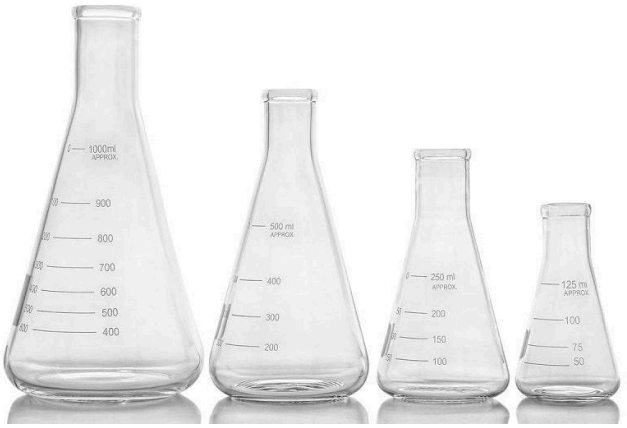


1- Barrel or chimney , 2 - Air holes , 3 - The air regulator (Collar), 4 –Gas, 5 - Base

5. Different types of glassware are used in laboratories. Read the descriptions and identify the tubes and cylinders.



A.



B.

C.

D.

E.

1. Test tubes: They are usually cylindrical pipes made up of glass with a rounded bottom. They come in different sizes but the most common standard size is 18*150 mm. Test tubes are one of the most important apparatus as they are used from storing

to mixing reagents in any chemical or biological reactions. They become very handy when a large number of samples need to be tested.

2. ***Beakers*** are one of the most commonly used laboratory apparatus that one can come across in a chemistry lab. They are cylindrical, have a flat bottom, and a small spout on the top to pour chemicals. Beakers are usually made of borosilicate glass or plastic. While plastic beakers are only used to mix the chemicals, glass beakers can be used to heat chemicals also. Beakers come in several sizes with volumes ranging from 5 milliliters to 10000 milliliters. Beakers are often used to hold, mix, and heat chemicals.

3. A dropping funnel is a piece of laboratory glassware that provides a controlled flow of liquids while transferring them from one vessel to another. It is typically cylindrical in shape and has a stopcock at the bottom, before the opening outlet. They are particularly used in performing those chemical reactions in which drop-wise or slow addition of reagent is required.

4. Erlenmeyer flask, also known as a conical flask that has conical body, flat bottom, and a cylindrical neck. It is one of the most commonly used flasks to carry out various experiments in the chemistry lab, such as titration, filtration, crystallization, etc. It was first patented in 1860 by a German chemist Emil Erlenmeyer. The slanting sides and wide base of an Erlenmeyer flask make it a perfect conical vessel to mix the chemicals by swirling without any risk of spillage. Additionally, the cylindrical neck of a conical flask can accommodate a glass stopper. Moreover, it can also be used for heating and boiling purposes.

5. Funnels: Funnels are necessary equipment to pour substances and solutions in narrow-mouthed test tubes and conical flasks. The most common ones are filter, thistle, and dropping funnels.

6. There are a lot of electric devices and electronic gadgets that are used in chemical laboratories. Read the paragraphs about the most common ones and write the derivatives of the words in brackets.

A digital balance is a device 1. _____(usage) to measure the weight of 2. _____ (chemistry) reagents in the chemistry lab. They are highly sensitive and can even 3. _____ (weight) 0.001 gm of a substance. For this reason, they are 4. _____ (period) calibrated and usually kept inside glass walls. When weighing the substances, the walls should be 5. _____ (keep) close to reduce any error in the measurement.

A melting point apparatus is a device used to 1. _____ (determination) the melting point of the chemical compounds. The above-discussed thiele tube is one of the 2. _____ (melt) point apparatus. Other types may include the Fischer-Jhon apparatus, Gallenkamp melting-point apparatus, and automatic melting-point

apparatus. Unlike the thiele tube, these apparatus do not 3. _____ (requiest) oil or any other chemical to determine the melting point of the 4. _____ (give) substance, instead, the sample is placed 5. _____ (direct) inside the apparatus with the help of a capillary tube.

A digital colorimeter is a device used in a chemistry lab to determine the 1. _____ (concentrate) of a known solution by 2. _____ (measurement) the absorbance of a particular wavelength of light by a given solution. Digital colorimeter works on the principle of Beer-Lambart's law, which states that the 3. _____ (absorb) of light by a solution is directly 4. _____ (proportion) to the concentration of the solution. This device includes a photoresistor that 5. _____ (monitoring) light transmittance or absorbance through the sample, which is then utilized to calculate concentration.

A water bath is one of the most 1. _____ (essence) apparatus in a chemical laboratory. It is a device used for heating 2. _____ (flame) chemical samples at a constant temperature. A laboratory water bath is generally 3. _____ (compose) of a heating assembly, a stainless-steel chamber that holds the water and samples, and a 4. _____ (usage) interface. Some water baths have extra features like circulating water to 5. _____ (maintenance) a consistent temperature or a shaking water bath to keep the samples moving while they are cooked.

7. Match the verbs with their definitions.

1. to mix	a) to keep (something) from happening.
2. to heat	b) to move or cause to move slightly.
3. to stir	c) to cause or allow (liquid) to flow over the edge of its container, especially unintentionally.
4. to prevent	d) to combine or put together to form one substance or mass.
5. to pour	e) to compress or squeeze forcefully so as to break, damage, or distort in shape.
6. to spill	f) to cause or enable (a condition or situation) to continue.
7. to measure	g) to make or become hot or warm.
8. to crush	h) to reduce (something) to small particles or powder by crushing it.
9. to maintain	i) to ascertain the size, amount, or degree of (something) by using an instrument or device marked in standard units.
10. to grind	j) to flow rapidly in a steady stream

8. **Describe lab equipment. Use words given below.**

INCLUDEPICTURE "https://4.imimg.com/data4/JY/YN/MY-12371805/florence-flask-500x500.jpg" * MERGEFORMATINET

Flask
glass
round
long
liquids neck
bottom

INCLUDEPICTURE "https://www.orgchemboulder.com/Technique/Equipment/Images/Watchglass.jpg" * MERGEFORMATINET

Watch glasses
Glass,
solid(s),
liquid(s),
shallow,
lid,
evaporation

INCLUDEPICTURE "https://www.avogadro-lab-supply.com/cdn/shop/products/CylinderSet-768_768x.jpg?v=1591308388" * MERGEFORMATINET

Graduated cylinders
long,
measure,
liquid,
volume,
markings,
size

Burettes
tube,
open at the top,
liquid,
markings,
clamp

9. Compose a story on one of the topics (up to 100 words).

- Basic equipment in a modern laboratory equipment.
- Electric devices and electronic gadgets in a modern laboratory equipment.

Grammar Module

Simple Tense vs Continuous Tense

1. Fill in the gaps with Present Continuous or Present Simple, paying attention to their difference.

1. The children ……. (play) outside now.
2. She usually ……. (read) the newspaper in the morning.
3. I …… (do) my homework now.
4. I …… (eat) my dinner now.
5. ……. (you / want) a pizza?
6. They ……. (watch) TV now.
7. I ……. (not / like) spaghetti.
8. The baby ……. (sleep) now.
9. My mother usually ……. (cook) dinner in the evening.
10. He ……... (write) a letter to his pen-friend every month.
11. She ……. (not / like) football.
12. Mary ……. (listen) to music now.
13. Tom usually ……(drink) coffee, but he ……. (drink) tea now.
14. We ……. (go) to the disco tonight.
15. He …… (go) to work by bus everyday.

2. Complete the sentences with Present Simple or Present Continuous.

1. Susan usually ……. (go) to school by bus, but now she ……. (go) to school by train.
2. Mary often ……. (read) in bed, but today she is very tired and she ……. (not / read).
3. The boys usually …… (ride) their bikes to school. They ……. …… (like / ride) their bikes. They …… (be) very naughty boys. They always …… (go) to school late. Today their teacher ……. (be) very angry, because they …… (be) late again.
4. Mary ……. (like / eat) sweets. Every morning she ……. (have) coffee with a lot of sweets and chocolate. For lunch she and her friends often ……. (eat) sweets or ice-cream. She …… (not / like / eat) fruit or vegetables. She …… (eat / never) eggs or cheese. Today she ……. (be) sick. She …… (sleep) in her room now.

3. Ask questions for the underlined words.

1. ……...?
George **<u>often</u>** has chemistry classes.
2. ……?
Mike eats **<u>corn-flakes</u>** for breakfast every morning.
3. ……?

The teacher is **writing some examples on the board.**
4. ……?
Tom is grinding some ingredients now.
5. ……?
My parents **never** smoke cigarettes.
6. ……?
Peter and Rob often measure volumes **with graduated cylinders**.
7. ……?
Sam is mixing two chemicals **in his laboratory**.
8. ……?
I read **a few** manuals every month.
9. ……?
I can't understand Hans **because I don't know German**.
10. ……?
No, Sally isn't writing a report now.

4. Write *don't, doesn't, isn't, aren't* or *am not* in the blank space in each sentence.
1. He isn't listening to the radio right now.
2. He doesn't listen to the radio every evening.
3. We ……. watching a television program now.
4. We ……. watch television every day.
5. They ……. study their lessons after class.
6. They ……. studying their lessons right now.
7. It ……. raining very hard right at the moment.
8. It ……. rain very much during the summer.
9. Mr. Johnson …… eating his lunch now.
10. Mr. Johnson …… always eat at that place.
11. I ……. see any students in that room.
12. I ……. hear anyone in the hall now.

5. Fill in the gaps with the correct form of Past Simple or Past Continuous.
1. He ……. (talk) with Mary, when Mrs. Smith came in.
2. They …… (study) two hours last night.
3. Jane ……. (sleep) when the telephone rang.
4. As I ……. (walk) to the lab, I met my friend.
5. We ……. (watch) TV last night.
6. The customer …… (pay) his cheque when he dropped his credit card.
7. The barber ……. (cut) my hair yesterday.
8. She ……. (dance) when she hurt her ankle.
9. It ……. (rain) hard when I got up.
10. It ……. (rain) hard last night.

6. Complete the sentences with the words in brackets using Past Simple or Past Continuous.

1. Sally …… (eat) dinner last night when someone ……. (knock) on the door.
2. I began to study at seven last night. Fred …… (come) at seven thirty. I …… (study) when Fred ……. (come).
3. While I ……. (study) last night, Fred …… (drop by) to visit me.
4. My roommate's parents ……. (call) him last night while we ……. (watch) TV.
5. My mother called me around five. My husband came home a little after five. When he ……. (come) home, I ……. (talk) to my mother on the phone.
6. Yesterday Tom and Janice …… (go) to the zoo around one. They …… (see) many kinds of animals. They stayed at the zoo for two hours. While they …… (walk) home, it ……. (begin) to rain, so they ……. (stop) at a small café and …… (have) a cup of coffee.
7. Yesterday afternoon I …… (go) to visit the Parker family. When I ……. (get) there around two o'clock, Mrs. Parker ……. (be) in the yard. She …… (plant) flowers in her garden. Mr. Parker ……. (be) in the garage. He ……. (work) on their car. He ……. (change) the oil.

7. Make sentences from the words in brackets. Put the verbs into the correct form.

1. we / see / an accident / when / we / wait / for the bus.
2. it begin / to rain / when / I / walk home.
3. Ann / to wait / for me / when / I / to arrive.
4. They / not drive / fast when / the accident / to happen.
5. We / not go / out / because it / to rain.
6. What / you / to do / at this time yesterday?
7. Ann / not to wait / for us / when / we / to arrive.
8. George / fall off / the ladder / while he / to paint / the ceiling.
9. I / to do / some shopping / yesterday / when / I / to see / a Dutch friend / of mine.
10. While / Diana / to watch / her favourite programme / there / to be / a power cut.

8. Fill in the correct future tense - *will*, *to be going to* or Present Continuous.

1. They ... (drive) to New York tomorrow morning.
2. I hope the weather... (be) nice.
3. I offered him this job. I think he ... (take) it.

4. I promise I ... (not tell) your secret to anyone.
5. Take your umbrella with you. It ... (rain).
6. They ... (play) cards this evening.
7. I ... (go) to the cinema tomorrow.
8. They ... (fly) to Seattle next summer holidays.
9. I ... (invite) 50 people to the party, and I hope everyone ... (come).
10. That exercise looks difficult. I ... (help) you.
11. He ... (go) to the football match?
12. Are you sure they ... (win) the match?
13. She probably ... (stay) till Thursday.
14. He ... (not leave) tomorrow.
15. We think he ... (come) home late in the night.

9. Use the verbs in brackets in the correct future tenses – *will, to be going to*, Present Simple or Present Continuous.

1. The train _____ at 11:45. (to leave)
2. We _____ dinner at a nice restaurant on Saturday, but we haven't booked a table yet. (to have)
3. My ski instructor believes it _____ in the mountains tomorrow evening. (to snow)
4. On Sunday at 8 o'clock I _____ my friend. (to meet)
5. They _____ to London on Friday evening at 8:15. (to fly)
6. Wait! I _____ you to the station. (to drive)
7. The English lesson _____ at 8:45. (to start)
8. I _____ my sister in April. (to see)
9. Look at the clouds - it _____ in a few minutes. (to rain)
10. Listen! There's someone at the door. I _____ the door for you. (to open)

10. Choose the correct variant.

1. Masako: It's starting to rain.
   Chris: Don't worry. _____ you my umbrella.
   a. I'll lend
   b. I'm lending
   c. I lend

2. Masako: What time does the History class start tomorrow?
   Chris: _____ at two-thirty.
   a. It starts
   b. It is going to start
   c. It will start

3. Masako: What time should we go to the airport?
   Chris: The plane _____ in half an hour. I think we should leave now.
   a. will land
   b. lands

4. Masako: Has Sue made up her mind about university yet?
   Chris: Yes — I spoke to her last night. _____ to Calgary.
   a. She will go
   b. She goes
   c. She's going

5. Masako: Have you decided what to do about your broken washing machine?
   Chris: Yes. _____ tomorrow.
   a. I'll have it fixed
   b. I'm going to have it fixed
   c. I have it fixed
6. Masako: How many books did you buy?
   Chris: I don't know. _____ them.
   a. I'll count
   b. I count
   c. 'm counting
   d. I'm going to count

7. Masako: Joe borrowed your car.
   Chris: WHAT? _____ him. I need it!
   a. I'll kill
   b. I'm killing
   c. I kill

8. Masako: Are you free for lunch tomorrow?
   Chris: Sorry! _____ tennis with Yong Soo.
   a. I'm playing
   b. I'll play
   c. I play

9. Masako: Have you ever been to Paris?
   Chris: No, but _____ next year with my parents.
   a. I'll go
   b. I'm going
   c. I go

10. Masako: There's no milk in the fridge.
    Chris: Really? _____ some tomorrow.
   a. I'll get
   b. I'm getting
   c. I'm going to get

UNIT 7

1. Look up new words given below in your dictionary and memorise them.

to be adopted	chemical bonds
either	covalent
require	electrovalent = ionic bond
vital force	to attract
to be exerted	to affect
ammonium cyanate	hydrogen fluoride
to prove	to remove
to be abandoned	charged particles
permanent	vicinity
to conform	to reverse

2. Read and translate the text.

Inorganic chemistry

The modern idea of the nature of a chemical compound—a single substance containing fixed proportions of two or more elements—was adopted early in the 19th century. The number of known compounds then was growing fast as chemists learned to separate and analyze the substances found in nature. To organize and simplify the facts concerning these compounds, they classified those obtained from living organisms—plants and animals—as organic and all others as inorganic. This seemed especially logical as long as no one knew how to convert any compound of either class into any compound of the other. Many scientists believed that the formation of organic compounds required the action of some unidentified vital force that could be exerted only by living things.

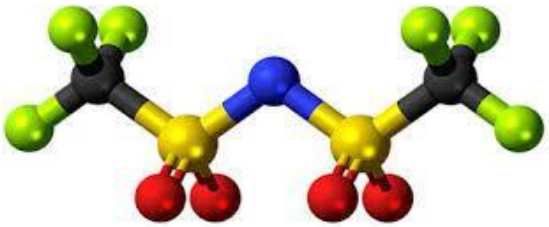
In 1828 the German chemist Friedrich Wohler made the organic compound urea by heating the inorganic compound ammonium cyanate. He thereby proved that no vital force is needed, but the idea continued to affect the thinking of some chemists

for many years. By the time the concept was abandoned, the division of chemical compounds into organic and inorganic had become permanent. All of the organic compounds contain carbon, but very few of the inorganic ones do, so the definition of organic compounds was changed to conform to this fact: any compound of carbon is an organic compound except carbon monoxide, carbon dioxide, carbonates, cyanides, cyanates, thiocyanates, and certain carbides.

Once the definition of inorganic compounds has been decided, inorganic chemistry can be defined as the study of these compounds and of the elements from which they are formed.

More than 100 chemical elements are known and the atoms of all but two of them (helium and neon) form compounds by combining with atoms of other elements. There are two main kinds of forces, or chemical bonds, that hold atoms together in compounds: covalent and electrovalent (connection between ions or ionic).

A covalent bond forms when two atoms attract the same pair of electrons, which is said to be shared. A covalent bond affects only two atoms, but most atoms can form more than one covalent bond at a time. The compound hydrogen fluoride consists of molecules in which one atom of hydrogen and one atom of fluorine are held together by a covalent bond. Atoms of oxygen or sulfur, however, form two covalent bonds in many of their compounds. Atoms of nitrogen or phosphorus form three or five. Two atoms can share two or three pairs of electrons, forming double or triple covalent bonds.



Covalent bonds are not formed between atoms that differ greatly in their attraction for electrons. In these cases, the atom with the stronger attraction completely removes one or more electrons from the other. The atom that gains electrons becomes a particle with a negative electric charge, and the atom that loses electrons becomes positively charged. The charged particles are called ions, and the electrical attraction between oppositely charged particles is the force called the electrovalent bond. This bond differs from the covalent bond because a positive ion attracts every negative ion in its vicinity. The reverse is also true. Instead of forming molecules in which each bond affects only two nearby atoms, ions of opposite charge pack closely together, forming arrangements in which each kind is surrounded by the largest possible number of the other kind. For any combination of positive and negative ions, the possibilities are limited by their relative sizes and charges.

3. Answer the questions.

1. When did the number of known compounds start to increase?
2. What did many scientists believe?

3. What happened in 1828?
4. What is the difference between inorganic and organic chemistry?
5. What are two main kinds of forces or chemical bonds?

4. How can you define inorganic chemistry? Write down at least 3 sentences.

5. What is the difference between:
chemical reaction
chemical equation

6. Try to read the following reactions.
$S\ (s) + O_2\ (g) \rightarrow SO_2\ (g)$
$HCl\ (aq) + NaOH\ (aq) \rightarrow NaCl\ (aq) + H_2O\ (l)$
$Zn\ (s) + CuSO_4\ (aq) \rightarrow Cu\ (s) + ZnSO_4\ (aq)$
$CaCl_2\ (aq) + 2\ AgNO_3\ (aq) \rightarrow Ca(NO_3)_2\ (aq) + 2\ AgCl\ (s)$

7. What is the meaning of the following abbreviations used in chemical equations in the text?
(s) - _____
(g) - _____
(l) - _____
(aq) - _____

8. What is the meaning of the following words?
oxide _____
nitrate_____
iodide _____
chloride_____
hydroxide_____
fluoride _____
sulfate/sulphate_____
acid _____

9. Write down the name of the following compounds.
e.g.: HCl - hydrochloric acid
HF - _____
H_2SO_4 - _____
H_2SO_3 - _____
HNO_3 - _____
HNO_2 - _____
PI_3 - _____
SO_3 - _____
$Ca(NO_3)_2$ - _____
$Ca(NO_2)_2$ - _____

$NaOH$ - _____
$Ca(OH)_2$ - _____
Fe_2O_3 - _____
FeO - _____
K_2O - _____
$ZnCl_2$ - _____
ZnO - _____

10. Compose a story on one of the topics (up to 100 words).

- Inorganic chemistry
- History of inorganic chemistry

Grammar module

Modal verbs

1. Fill in the gaps with *can* or *can't*.

1. She is a small baby. She ……. eat meat, but she …… drink milk.
2. That dress is not expensive. I ……. buy it.
3. A cat ……. climb up a tree, but a dog …….
4. I'm very tired today. I ……. clean my room.
5. John is very short. He …… play basketball very well.
6. We are very hungry, so we ……. eat a lot of sandwiches.
7. He is very fat. He …… run very fast.
8. We ……. sleep in the bedroom but we …… sleep in the bathroom.

2. Fill in the gaps with *can / can't* or *must / mustn't*.

1. She is ill, so she ……. see the doctor.
2. It's raining heavily. You …… take your umbrella.
3. We ……. (not / pick) the flowers in the park.
4. Mike is nine months old. He …… (not / eat) nuts.
5. I am very tall. So I …… play basketball.
6. I'm sorry but we ……. (not / come) to your party
tomorrow.
7. You are speaking very quietly. I ……. (not / understand) you.
8. ……. I use your phone?
9. We ……. go to the bank today. We haven't got any money.
10. My hands are dirty. I ……. wash them.
11. It's late. I ……. go now.

12. You ……. stop at a red traffic light.
13. You ……. (not / speed) in the city.
14. Tourists …… take their passports when they go abroad.
15. Footballers …… (not / touch) the ball with their hands.
16. …… you play the guitar?
17. I …… (not / come) with you now. Because I'm studying my lessons.

3. Use *must / mustn't / have to* or *(not) have to.*
1. I can stay in bed tomorrow morning because I ……work.
2. Whatever you do, you ……. touch that switch. It's very dangerous.
3. You ……. forget what I told you. It's very important.
4. We …… leave yet. We've got plenty of time.
5. Ann was feeling ill last night. She ……. leave the party early.
6. I ……. go to the bank yesterday to get some money.
7. The windows are very dirty. I ……. clean them.
8. The windows aren't dirty. You …… clean them.
9. We arrived home very late last night. We ……. wait half an hour for a taxi.
10. These cakes are very nice. You …… have one.
11. We ……. take an umbrella. It's not going to rain.
12. This is a secret. You …… tell anybody.
13. You ……. buy a newspaper. You can have mine.
14. This train doesn't go to London. You …… change at Bristol.
15. In many countries men …… do military service.
16. Sarah is a nurse. Sometimes she …… work at weekends.

4. Fill in the gaps using *(not) have to / must (not) / can / could*.
1. George has traveled a lot. He …… speak four languages.
2. I can't sing now but I ……. sing very well when I was a child.
3. She will stay in bed till 10 o'clock this morning. Because she ……. go to work.
4. Many students in Turkey …… wear uniform when they go to school.
5. I'm sorry I couldn't come yesterday. I ……. work late.
6. You've been coughing a lot recently. You ……. smoke so much.
7. You have a bad headache. So you ……. go to bed early.
8. I can't swim very far these days but ten years ago I ……. swim from one side of the lake to the other.
9. You ……. see the sea from our bedroom window.
10. It isn't permitted to speak Turkish during the lessons. So you …… speak Turkish.

5. Use a suitable present or past modal forms.

1. He ……. play chess when he was young.
2. You ……. drive a car when you are 18.
3. …… I ask you a question?
4. She ……. be 25. She looks older than that.
5. His telephone doesn't answer. He ……. (go) to the club.
6. She entered the room carrying a wet umbrella. She ……(walk) in the rain.
7. My car didn't work this morning. So I ……. walk to the office.
8. He …… (be) at home, but we didn't telephone him.
9. She ……... (help) me a lot by giving me a little of his time, but she preferred to go out.
10. He doesn't know the answer. He ……. (study).
11. I can't find the house. I ……. (write) down the address.
12. She is very sleepy. She ……. (stay) up very late last night.
13. I …… go for a walk later. It depends on the weather.
14. The ground is covered with snow. It …… (snow) last night.
15. She …… (be) in a great hurry to leave for the theater because she left all the dinner dishes on the table.
16. That store has just gone bankrupt. I believe they …… (have) a stricter policy about giving people credit.
17. I'm afraid Mr. Smith is deaf. He …… (not / hear) what you say.

6. Draw conclusions using *can't / must / might*.

1. He drives a very expensive car and owns a private plane. (rich)

……

2. He spends all day walking round the town. (job)

……

3. They are asking the way to the city center. (tourist)

……

4. She works for a daily newspaper. She goes to the big football matches. (sports reporter)

……

5. I thought he studied medicine, but he's going to an outdoor job now. (doctor)

……

6. She teaches maths at the university. (stupid)

……

7. A: What happened to your leg?
B: I slipped badly on the ice and broke it.
A: Oh! That ……. hurt a lot.
B: It does.
8. A: Listen! Do you hear a noise like someone shouting?
B: Yes, I do. The new neighbours upstairs …… quarrel again.
9. A: I …….. get a rise in my salary soon.

B: What makes you think so?
A: The boss seemed very pleased with my last project.
10. A: That man over there looks like our district manager.
B: No, he ……. be him. He went to the USA three days ago and hasn't returned yet.

7. Fill in the gaps *must* or *mustn't.*

1. It's cold. You ……. leave without your jacket.
2. You ……. eat fruit and vegetables to stay healthy.
3. I …… go to the post office. I have a letter to send.
4. You ……. speak rudely to your parents.
5. You ……. park here – it's illegal.
6. We ……. hurry or we'll miss the bus.

UNIT 8

1. Look up new words given below in your dictionary and memorise them.

acid	solution
base	numeric value
to interact with	basicity
citric acid	pH scale
lactic acid	trusted way
capable of	to vary from
to donate	litmus paper
to accept an ion	to identify
to put forth	to be owned by
brief description	to immerse

2. Read and translate the text.

Acids and bases

Acids and bases are popular chemicals which interact with each other resulting in the formation of salt and water. The word acid comes from a Latin word ***'acere'*** which means ***'sour'***.

In our everyday lives, we use many compounds which scientists call acids. The orange or grapefruit juice you drink for breakfast contains citric acid (also known as Vitamin C). When milk turns sour, it contains lactic acid. The vinegar used in salad dressing contains acetic acid. According to this, a chemical bond is considered as being made up of an acid-base combination. The properties of a molecule, therefore, can be understood by dividing it into acid and base fragments.

An acid is any hydrogen-containing substance that is capable of donating a proton (hydrogen ion) to another substance. A base is a molecule or ion able to accept a hydrogen ion from an acid.

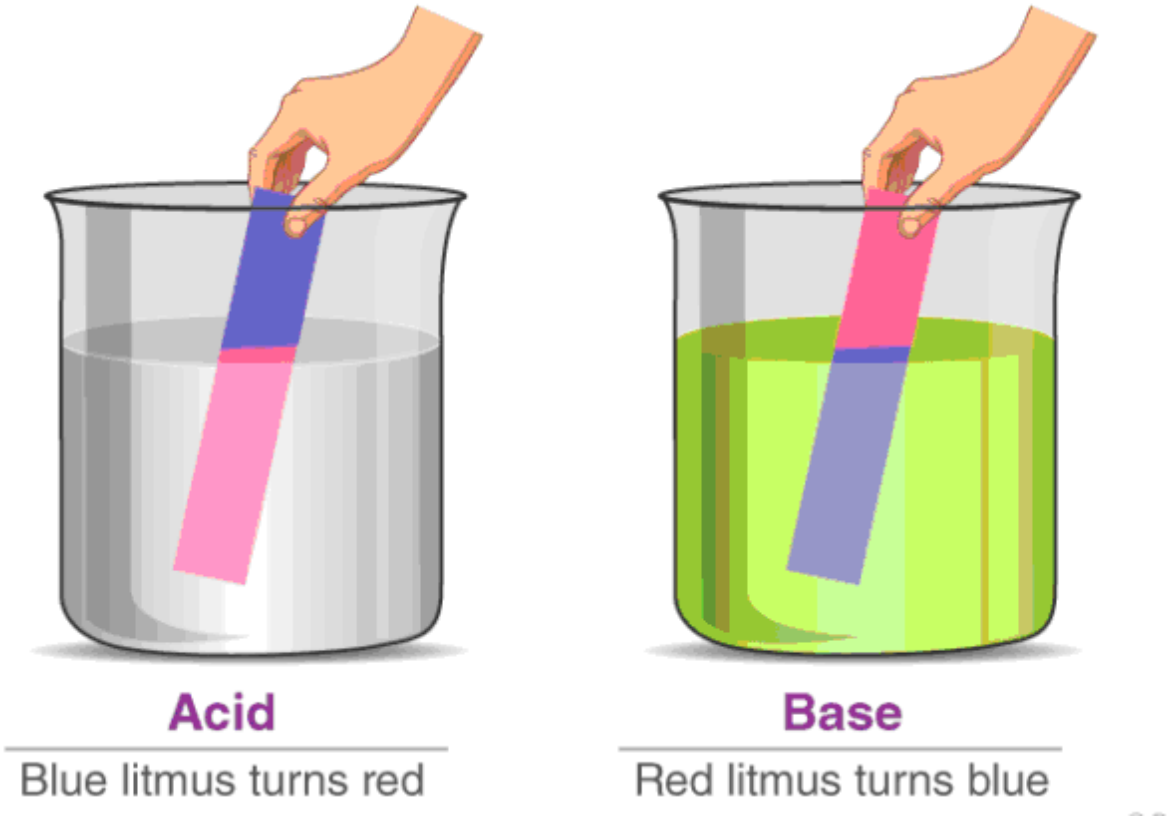
Three different theories have been put forth in order to define acids and bases. These theories include the Arrhenius theory, the Bronsted-Lowry theory, and the Lewis theory of acids and bases. A brief description of each of these theories is provided in this subsection. Acids and bases can be defined via three different theories.

- The **Arrhenius theory** of acids and bases states that "an acid generates H^+ ions in a solution whereas a base produces an OH^- ion in its solution".
- The **Bronsted-Lowry theory** defines "an acid as a proton donor and a base as a proton acceptor".
- Finally, the **Lewis definition** of acids and bases describes "acids as electron-pair acceptors and bases as electron-pair donors".

In order to find the numeric value of the level of acidity or basicity of a substance, the pH scale (wherein pH stands for 'potential of hydrogen') can be used. The pH scale is the most common and trusted way to measure how acidic or basic a

substance is. A **pH scale measure can vary from 0 to 14**, where 0 is the most acidic and 14 is the most basic a substance can be.

Another way to check if a substance is acidic or basic is to use litmus paper. There are two types of litmus paper available that can be used to identify acids and bases – red litmus paper and blue litmus paper. Blue litmus paper turns red under acidic conditions and red litmus paper turns blue under basic or alkaline conditions.



Litmus Test of Acids and Bases

Acidic substances are usually identified by their sour taste. An acid is basically a molecule which can donate an H^+ ion and can remain energetically favourable after a loss of H^+. ***Acids are known to turn blue litmus red.***

Bases, on the other hand, are characterized by a bitter taste and a slippery texture. A base that can be dissolved in water is referred to as an alkali. When these substances chemically react with acids, they yield salts. ***Bases are known to turn red litmus blue.***

Properties of Acids and Bases

Properties of Acids

- Acids are corrosive in nature.
- They are good conductors of electricity.
- Their pH values are always less than 7.

- When reacted with metals, these substances produce hydrogen gas.
- Acids are sour in taste.
- Examples: Sulfuric acid [H_2SO_4], Hydrochloric acid [HCl], Acetic acid [CH_3COOH].

Properties of Bases

Some properties, like a bitter taste, are owned by all bases. The bases feel slippery, too. Dream on what slippery soap looks like. And this is a foundation. Furthermore, when immersed in water, bases conduct electricity because they consist of charged particles in the solution.

- They are found to have a soapy texture when touched.
- These substances release hydroxide ions (OH^- ions) when dissolved in water.
- In their aqueous solutions, bases act as good conductors of electricity.
- The pH values corresponding to bases are always greater than 7.
- Bases are bitter-tasting substances which have the ability to turn red litmus paper blue.
- Examples: Sodium hydroxide [NaOH], milk of magnesia [$Mg(OH)_2$], calcium hydroxide [$Ca(OH)_2$].

3. Answer the questions, giving additional information

1. How do you identify acids and bases?
2. What makes any substance to become an acid or a base?
3. What is a base and give an example?
4. What is an acid and its properties?
5. What is the main difference between an acid and a base?
6. What is the importance of an acid?
7. What is an acid and give an example?
8. How do you identify a base?
9. What are the physical properties of the base?
10. Can acid react with metals?

4. Study the difference between Acids and Bases. Write the sentences in the correct column:

1. Acid/Base gives off hydrogen ions when dissolved in water.
2. It turns red colour litmus paper into blue.
3. Bases/Acids give off hydroxyl ion when dissolved in water.
4. It turns blue colour litmus paper into red.
5. It has a sour taste.
6. It has bitter taste and soapy to touch.
7. Its pH value ranges from 1 to 7.
8. Its pH value ranges from 7 to 14.
9. Example: HCl, H_2SO_4 etc.
10. Example: NaOH, KOH etc.

Acids	Bases
1.	1.
2.	2
3.	3.
4.	4.
5.	5.

5. Make up questions for the given sentences.

1. _____
There are some test-tubes on the table.
2. _____
Any student of chemistry must know the periodic law.
3. _____
There is some litmus paper in the lab.
4. _____
According to Arrhenius, any hydroxy compound giving hydroxyl ions in water solution was called a base.
5. _____
The role of solvent as an ionizing medium for acid-base reactions was stressed in the article.
6. _____
There are few objections to this theory.
7. _____
The protonic theory states that a base is any substance, molecule, or ion, which accepts a proton.
8. _____
There is little chance for the reaction to be completed because the temperature is too low.
9. _____
The subject of acids and bases has long been one of the most controversial in chemistry.
10. _____
In the 17th century acids and bases were defined on the bases of their behaviour.

6. Make up sentences of the words given below.

1. of / into / has / substances / The classification / acids / bases / greatly changed / chemistry/ and.
2. of/ The theory / of ionic / has played / dissociation /a great / in the / development / chemistry / role.
3. The problem / of / is / nomenclature / still / important /in /very /chemistry.

4. substance / must / be handled / explosive /with / Any / care .
5. theory / The atomic / was / contribution to / a great / the science / world's.
6. The / important / is / chemical / property / most / of / oxygen / its / acidity.
7. sulphuric / Pure/ acid / a colourless / liquid/ is / about / as / heavy / twice/ as water.
8. branch / No / of / science / broader in / is / its scope / chemistry/ than.
9. is / the / Water / most / distributed / widely / compound.
10. must/ The data / be / into / account/ in / taken / article /this.

7. Match the left part with the right to make sentences:

Lewis Concept of Acids and Bases

1. The Lewis definition of an acid states	a) atom in its definition of acids and bases
2. A Lewis base is a species that holds a lone pair	b) compounds can be defined as acids or bases by it.
3. This theory does not involve the hydrogen	c) whereas Lewis Bases possess nucleophilic qualities.
4. Lewis acids are electrophilic in nature	d) that it is a species that has a vacant orbital and therefore, has the ability to accept an electron pair.
5. A Lewis acid accepts an electron pair	e) fails to explain the acid-base reactions that do not involve the formation of a coordinate covalent bond.
6. A notable advantage of this concept is that many	f) from a Lewis base, forming a coordinate covalent bond in the process.
7. One of the disadvantages of this theory is that it	g) of electrons and can, therefore, act as an electron-pair donor.

8. Compose a story on one of the topics (up to 100 words)

- Basic concept of acids and bases.
- Main properties of acids and bases.

Grammar module

Present Perfect vs Past Simple

1. Write a suitable sentence using Present Perfect Tense.

1. Ann's hair was dirty. Now it's clean. (wash) …….... Ann has washed her hair ……
2. Tom was 80 kg. Now he's 70. (lose weight) …….
3. Bill played football yesterday. Now he can't walk; his leg is in plaster. (break)….
4. My sister is looking for her pen. (lose) ……
5. Mary is on holiday in France. (go) …….
6. Mr. Hill was in Canada last week. He's back in London now. (be) ……
7. Look! Mrs. Smith has got a lot of packages. (buy) ……
8. I can't eat anything now. (eat too much) ……
9. Mrs. Jenkins is very tired. (clean / house) ……
10. Tony needs a holiday. (work / hard / this year) ……

2. Use Present Perfect Tense after *because*.

Example: She can't go to the party. (catch a cold)
She can't go to the party because she has caught a cold.

1. He can't walk very fast. (hurt / leg)
……
2. I can't get in. (lose / key)
……
3. I know this story very well. (see the film)
……
4. I can't post the letter. (not put / stamp / on it)
……
5. He can't stand up. (eat too much)
……
6. They can't go on holiday. (not save / money)
……
7. I know him. (meet him before)
……
8. We don't know how he is. (not hear from him)
……
9. He won't take a cigarette. (give up smoking)
……
10. She can't get in. (he / lock the door)
……

3. Follow the example and do the same using *already.*

Example: Bring the milk in, please.
- I have *already* brought it in.

1. You must find the tickets soon.
……...
2. Turn the radio down, please. ……
3. Tidy your room. ……..
4. Could you post the letters, please? ……
5. Why don't you see a doctor? ……...
6. You have a bad cough. I think you should stop smoking……...
7. Why don't you clean your shoes? ……..
8. Brush your teeth, will you? ……
9. We have guests today. Shall we make a cake? ……..
10. We should invite Mary to the party. ……

4. Follow the example and do the same using *yet.*

Example: She has been in the shop. (buy anything)
- She has been in the shop but she hasn't bought anything *yet*.

1. I've written to them three times. (not reply)
……...
2. I've asked you again and again. (not do it)
……...
3. I lent him $10 last month. (not give it back)
……...
4. He lost his pen a week ago. (not find it)
……...
5. He borrowed my book last year. (not give it back)
……...
6. She went to New York six months ago. (not return)
……...
7. She gave me $2 a week ago. (not return)
……...
8. I finished reading my library books a long time ago. (not change them)
……...
9. She went to the bus-stop half an hour ago. (the bus / not come)
……...
10. He's still studying that lesson. (not learn it)
……...

5. Fill in the gaps with *already* or *yet.*

1. He hasn't called us ……
2. They have …… sent the letter.
3. John has …… bought the tickets for the football match.
4. We have ……. been to Mexico three times.
5. You haven't visited Tokyo …….
6. Has John bought a new car ……?
7. The plane has …… left.

8. Has she done it ……? No, not ……
9. A: Haven't they arrived ……?
B: Oh, yes. They have …… arrived.
10. Hurry up! The class has …… started.
11. Be careful! They have …… painted the door.
12. Haven't you read the book ……?

6. Ask questions with *how long*.

Example: I am married.
- *How long* have you been married?

1. I know Bob. ……
2. Sue and Alan are married. ……..
3. George is unemployed. ……
4. Those books are here. ……..
5. Mary is at the airport. ……
6. My sister is ill. ……
7. She has got a bad cold. ……
8. Jan has long hair. ……
9. I have a yacht. ……
10. They are in the restaurant. ……
11. My parents are in London. ……
12. The cat is under the table. ……

7. Rewrite the following sentences twice, using *since* and *for*.

Example: I haven't seen you. (Christmas / 3 days)
a) I haven't seen you *since* Christmas.
b) I haven't seen you *for* 3 days.

1. We've been here. (an hour / 4 o'clock)
a) ……
b) ……
2. She hasn't spoken to me. (2 weeks / last week)
a) ……
b) ……
3. They've lived in this street. (1970 / a long time)
a) ……
b) ……
4. I haven't had time to do it. (last Monday / a few days)
a) ……
b) ……
5. We haven't bought a new one. (ages / many years)
a) ……
b) ……

8. Put the verbs in the correct tense. Use Simple Past or Present Perfect.

1. …… Tim …… (finish) his work yet?
2. …… he …… (finish) it yesterday?
3. They …… (just / go) out.
4. They …… (go) out a minute ago.
5. …… Ann …… (study) yesterday afternoon?
6. …… you …… (send) the letters yet?
7. …… she …… (call) him a week ago?
8. They …… (not / see) the film yet.
9. The train …… (just / arrive).
10. …… you …… (ever / be) to a TV studio?
11. …… you and Tom …… (enjoy) the party last night?
12. …… you …… (not / finish) school last year?
13. I …… (lose) my dictionary. I can't find it anywhere.
14. His hair looks short. He …… (have) a haircut.
15. When …… (he / give up) smoking?
16. Jane …… (buy) her car two weeks ago.
17. My bicycle isn't here. Somebody …… (take) it.
18. Why …… (Jim / not want) to play tennis last Friday?
19. The car looks clean. …….. you …… (wash) it?
20. When we were on holiday, the weather …… (be) terrible.

9. Choose the correct variant.

1. A: Mary isn't here. She _____ to Egypt.
B: I _____ to Egypt.
a. has gone / have never gone
b. has gone / have never been
c. went / have never gone

2. I _____ my arm. I _____ it playing with my cousin.
a. 've broken / broke
b. 've broken / 've broken
c. broke / 've broken

3. _____ a ghost?
a. Have you ever seen
b. Did you ever see
c. Have you ever see

4. A: I _____ to China this year.
B: When _____ there?
a. have been / have you been
b. have been / did you go
c. was / have you gone

5. I'm sure I _____ this man before.
a. 've seen
b. saw
c. 've see

6. A: How long _____ a teacher?
B: I _____ teaching a long time ago.
a. were / started
b. have you been / have started
c. have you been / started

7. _____ Titanic?
a. Did you see
b. You have seen
c. Have you seen

8. A: I _____ the keys.
B: Where _____ them?
a. have found / did you find
b. found / have you found
c. found / did you find

9. Here are your shoes. I _____ them.
a. just cleaned
b. 've just cleaned
c. just have cleaned

10. She _____ to be a singer since she _____ a kid.
a. wanted / was
b. has wanted / has been
c. has wanted / was

10. Put the verbs in the correct tense. Use Past Simple or Present Perfect.
1. We (be) together since we (be) teenagers.
2. Since records (begin) in 1880, the global temperature (rise) 0.85 degrees Celsius.
3. Bennet is my best friend. I (meet) him at school, and we (be) friends for 50 years.
4. He (be) so active and sporty at university. But after the accident he (never/be) the same.
5. Yesterday Tom (tell) me that he would be here today, but he isn't here. He (be) away all day.
6. A: I (buy) a new car.
B: Nice! When(you/buy) it?
7. A: (clean) your room yet?
B: No, sorry. I (go) to the library after school.

8. He (read) the Bible 4 times. He was 15 the first time he (read) it.
9. This customer (be) here many times, but he (never/buy) anything.
10. I (stop) smoking two years ago. I (smoke) for 22 years.

UNIT 9

1. Look up new words given below in your dictionary and memorise them.

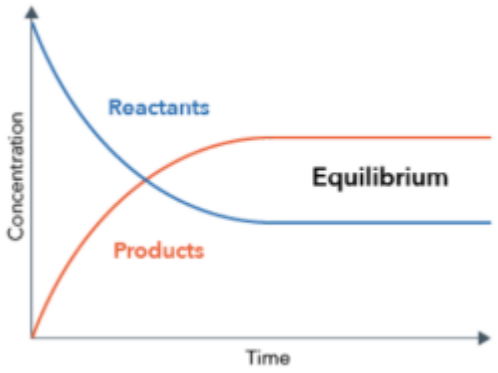
to refer to	homogeneous equilibrium
reactant	heterogeneous equilibrium
to achieve	pressure
rate of reaction	to counteract
to plot	overall transformation
backward reaction	composition
axis	to consume
to convert into	volume
similar conditions	due to
hence	endothermic reactions

2. Read and translate the text.

Chemical Equilibrium

1. _____

Chemical equilibrium refers to the state of a system in which the concentration of the reactant and the concentration of the products do not change with time and the system does not display any further change in properties. When the rate of the forward reaction is equal to the rate of the reverse reaction, the state of chemical equilibrium is achieved by the system. When there is no further change in the concentrations of the reactants and the products due to the equal rates of the forward and reverse reactions, the system is said to be in a state of dynamic equilibrium.



State of Chemical Equilibrium

A graph with the concentration on the y-axis and time on the x-axis can be plotted. Once the concentration of both the reactants and the products stops showing change, chemical equilibrium is achieved.

2. _____

The stage at which the rate of the forward reaction is equal to the rate of backward reaction is called an equilibrium stage. At this point, the number of reactant molecules converting into products and product molecules into reactants are the

same. The same equilibrium can be carried out with the same reactants anywhere with similar conditions with continuous interchanging of molecules hence chemical equilibrium is dynamic.

3. _____

There are two types of chemical equilibrium:

- Homogeneous Equilibrium
- Heterogeneous Equilibrium

In the first type, the reactants and the products of chemical equilibrium are all in the same phase. Homogenous equilibrium can be further divided into two types: Reactions in which the number of molecules of the products is equal to the number of molecules of the reactants. For example,

- $\mathbf{H_2\ (g) + I_2\ (g) \rightleftharpoons 2HI\ (g)}$
- $\mathbf{N_2\ (g) + O_2\ (g) \rightleftharpoons 2NO\ (g)}$

Reactions in which the number of molecules of the products is not equal to the total number of reactant molecules. For example,

- $\mathbf{2SO_2\ (g) + O_2\ (g) \rightleftharpoons 2SO_3\ (g)}$
- $\mathbf{COCl_2\ (g) \rightleftharpoons CO\ (g) + Cl_2\ (g)}$

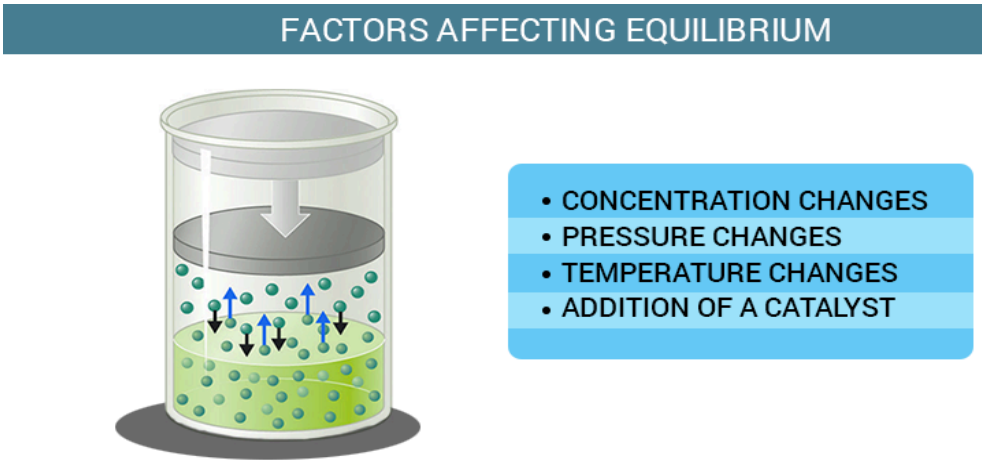
In the second type, the reactants and the products of chemical equilibrium are present in different phases. A few examples of heterogeneous equilibrium are listed below.

- $\mathbf{CO_2\ (g) + C\ (s) \rightleftharpoons 2CO\ (g)}$
- $\mathbf{CaCO_3\ (s) \rightleftharpoons CaO\ (s) + CO_2\ (g)}$

Thus, the different types of chemical equilibrium are based on the phase of the reactants and products.

4. _____

According to Le-Chatelier's principle, if there is any change in the factors affecting the equilibrium conditions, the system will counteract or reduce the effect of the overall transformation. This principle applies to both chemical and physical equilibrium.



5. _____

In chemical reactions, reactants are converted into products by the forward reaction and the products may be converted into reactants by the backward reaction. The two states, reactants and products are different in composition.

After some time of the start of the reaction, the rate of the forward and the backward reactions may become equal. After this, the number of reactants converted will be formed again by the reverse reaction such that the concentration of reactants and products do not change anymore. Hence, the reactants and products are in chemical equilibrium.

- $N2O_4 \rightleftharpoons 2NO_2$
- $PCl_5 \rightleftharpoons PCl_3 + PCl_2$
- $N_2 + H_2 \rightleftharpoons 2NH_3$

3. Match the subtitles with the main ideas of the paragraphs. There is one extra subtitle.

A. Why is Chemical Equilibrium called Dynamic Equilibrium?
B. Examples of Chemical Equilibrium
C. What is Chemical Equilibrium?
D. Types of Chemical Equilibrium
E. **History of creating of Le-Chatelier's principle**.
F. Principle affecting chemical equilibrium

4. Make questions for the given answers.

1. _____

__

With increase in temperature, the equilibrium constant decreases during an exothermic reaction.

2. _____

__

A catalyst has no effect on the chemical equilibrium
3.

_____

There is no effect on chemical equilibrium on addition of inert gas.
4.

_____

A reaction in which the reactants are converted to products only is called a forward reaction.
5.

_____

A reaction in which the products are converted back to reactants is called backward reaction.

5. Match the left part with the right.

1. equilibrium	a) further changes
2. rate of	b) the rate of reaction
3. endothermic	c) constant
4. transition	d) reactions
5. display	e) reaction
6. equal to	f) dynamic equilibrium
7. state of	g) rate
8. the number of	h) a catalyst
9. can be affected	i) reactants
10. addition of	j) by the change in temperature

6. There are several factors like temperature, pressure and concentration of the system which affect equilibrium. Some important factors affecting chemical equilibrium are discussed below. Read the text and choose the correct form of the words.

Factors that affect equilibrium

Change in Concentration:

o The concentration of the *reactants/reactions* or *productivity/products* added is *relieved/relieves* by the reaction which consumes the substance which is *add/added*.

o The concentration of *moved/removed* reactants or products is relieved by the reaction *which/what* is in the direction that *replenish/replenishes* the *substance/substitution* which is removed.

o When the concentration of the reactant or product is changed, there is a *changing/change* in the composition of the *mixing/mixture* in chemical equilibrium.

Change in Pressure: Change in pressure is happen/happens due to the changers/change in the volume. If there is a change in pressure it can effect/affect the gaseous reaction as the total number of gaseous/gas reactants and products are now different/differs. According to Le Chatelier's principle, in heterogeneous chemical

equilibrium, the change of pressure in neither/both liquids and solids must/can be ignored because the volume is dependent/independent of pressure.

Change in Temperature: The effect/affect of temperature on chemical equilibrium is depended /depends upon the sign of ΔH of the reaction and follows Le-Chatelier's Principle.

As temperature was increased/increases, the equilibrium constant of an exothermic reaction decreased/decreases.

In an endothermic reaction the equilibrium constant increases with decrease/ an increase in temperature. Along with/Although the equilibrium constant, the rate of reaction have been/is also affected by the change in/with temperature. As per Le Chatelier's principle, the equilibrium is shifted/shifts towards the reaction/reactant side when the temperature increases in case of exothermic reactions, for endothermic reactions the equilibrium shifts/shifted towards the product side with an increase in temperature.

Effect of a Catalyst: A catalyst don't/does not affect the chemical equilibrium. It only speeds up/down a reaction. In fact, catalyst equally speeds up the towards/forward as well as the reverse reaction. This results/resulted in the reaction reaching its equilibrium faster/more fast.

The same amount of reactants/ingredients and products will be presenting/present at equilibrium in a catalysed or a non-catalysed reaction/reactions. The presence of a catalyst only facilitates the reaction to proceed through a lower-energy transition state/condition of reactants to products.

Effect of Addition of an Inert Gas: When an inert gas like argon is added/will added to a constant volume it does not take/will not take part in the reaction so the equilibrium remains undisturbed.

7. Speak on one of the topics (up to 100 words):

- Types of chemical equilibrium
- Factors affecting equilibrium

Grammar module

Past Perfect

1. Put in the verbs in brackets into the gaps and form sentences in Past Perfect.

1. She ... in Sweden before she went to Norway. (to live)
2. After we ... the cornflakes, Henry came in. (to eat)
3. Before Ken ran to Kerry's house, he ... him. (to phone)
4. After they ... their backpacks, they rode away on their bikes. (to pack)
5. Gerry helped his grandma in the house because his father ... him so. (to tell)
6. The cat hid under the chair because the children ... so loud. (to be)
7. Before the students started to write, the teacher ... their mobile phones. (to collect)
8. After Max ... his breakfast, he left the flat. (to finish)

9. Laura repaired her glasses because her brother ... them. (to break)
10. By the time the show began, all friends ... (to arrive)

2. Open the brackets using Past Perfect.
1. When I arrived at the cinema, the film (start).
2. She (live) in China before she went to Thailand.
3. After they (eat) the shellfish, they began to feel sick.
4. If you (listen) to me, you would have got the job.
5. Julie didn't arrive until after I (leave).
6. When we (finish) dinner, we went out.
7. The garden was dead because it (be) dry all summer.
8. He (meet) her somewhere before.
9. We were late for the plane because we (forget) our passports.
10. She told me she (study) a lot before the exam.
11. The grass was yellow because it (not rain) all summer.
12. The lights went off because we (not pay) the electricity bill.
13. The children (not do) their homework, so they were in trouble.
14. They (not eat) so we went to a restaurant.
15. We couldn't go into the concert because we (not/bring) our tickets.
16. She said that she (not visit) the UK before.
17. Julie and Anne (not meet) before the party.
18. I (not have) breakfast when he arrived.
19. He (not use) email before, so I showed him how to use it.
20. You (not study) for the test, so you were very nervous.

3. Choose the correct variant.
1. Mum was angry because when I sat down to watch TV, I _____ my dinner.
a. hadn't finished
b. didn't finish
c. hadn't finish

2. I couldn't open the door because I _____ the keys at work.
a. 'd forget
b. 'd forgotten
c. forgot

3. When Rita travelled to France, she_____ the Louvre.
a. 'd visited
b. 'd visit
c. visited

4. There were no cookies in the cookie jar. Somebody _____ them all.
a. had eaten
b. 'd eat

c. ate

5. I saw some cookies in the cookie jar and I _____ them all.
a. 'd eaten
b. 'd eat
c. ate

6. I locked the door and then I _____ home.
a. 'd left
b. left
c. 'd leave

7. When I got home I saw that I _____ the door.
a. hadn't locked
b. hadn't lock
c. didn't lock

8. The house was dirty because nobody _____ it.
a. 'd clean
b. had cleaned
c. cleaned

9. She gave me back my book because she _____ reading it.
a. 'd finish
b. 'd finished
c. finished

10. When she finished the book, she _____ it back to me.
a. 'd given
b. 'd give
c. gave

4. Complete the sentences using the words in brackets in Past Simple or Past Perfect.

1. I was worried because Jim (not call) yet.
2. I was so worried that I (call) Jim.
3. I couldn't find the trousers that I (buy) in Camden market.
4. I couldn't find my favourite trousers so I (decide) to wear a skirt.
5. I lied to them and they (get) furious.
6. They were angry, but why? (I/make) a terrible mistake?
7. John asked me if I (see) his dog.
8. John didn't have his dog. Apparently, the dog (run) away during some fireworks.
9. I couldn't find the keys. Where (I/put) them?
10. My boss was upset, so I (try) to talk to him.

5. Open the brackets using Past Perfect or Past Simple.

1. After Fred ... (to spend) his holiday in Italy he ... (to want) to learn Italian.
2. Jill ... (to phone) Dad at work before she ... (to leave) for her trip.
3. Susan ... (to turn on) the radio after she ... (to wash) the dishes.
4. When she ... (to arrive) the match already ... (to start).
5. After the man ... (to come) home he ... (to feed) the cat.
6. Before he ... (to sing) a song he ... (to play) the guitar.
7. She ... (to watch) a video after the children ... (to go) to bed.
8. After Eric ... (to make) breakfast he ... (to phone) his friend.
9. I ... (to be) very tired because I ... (to study) too much.
10. They ... (to ride) their bikes before they ... (to meet) their friends.

6. Fill in Past Simple or Past Perfect Tense.

1. After they ... (open) the window, it ... (become) colder.
2. After we ... (see) the movie, we ... (go) to bed.
3. After he ... (leave), she ... (start) to cry.
4. As soon as it ... (start) to rain, she ... (take) her umbrella.
5. He ... (play) cards after he ... (do) his homework.
6. Before she ... (thank) me, she ... (take) my present.
7. We ... (see) the robbers after they ... (leave) the bank.
8. He ... (comb) his hair after he ... (brush) his teeth.
9. Before we ... (go) out, we ... (put) on our new shoes.
10. They ... (go) swimming after it ... (stop) raining.
11. When we ... (arrive) there, the ceremony ... (already start).
12. Father ... (start) to wash the car after mother ... (go) out.
13. After she ... (get) her new dress, she ... (show) it her parents.
14. He ... (fall) from the balcony after he ... (take) away the railing.
15. He ... (eat) the cake after he ... (ask).

7. Use a suitable Past Simple or Past Perfect Tense.

1. I ……. (worry) a lot about her before I ……. (hear) that she was safe.
2. I didn't like the flat. It ……. (be) much smaller than I ……. (think) at first.
3. He told us he ……. (shoot) a big tiger.
4. They ……. (drink) tea after they ……. (finish) dinner.
5. She ……. just ……. (fold) the pink apron and placed it in a table drawer when the door ……. (open) and Joe ……. (enter).
6. The police wanted to know why he ……. (bring) a gun to school.
7. After he ……. (work) at the hospital for two years he ……. (decide) to give up the job.
8. When I ……. (arrive) at the party John ……. already ……. (go) home.

9. We …… (wait) until the match ……. (finish).
10. They …… (leave) the room before the meeting ……(finish).
11. I ……. (buy) a new camera before I ……. (go) to London.
12. I ……. just …… (turn off) the lights when the telephone ……(ring).

8. Use a suitable Past Simple or Past Perfect Tense.

1. ……. he ……. (know) her for a long time before they ……(get) married?
2. He ……. (drive) down the hotel where they ……. (spend) their honeymoon years ago.
3. When we …… (get) to the station the train ……. (already / leave).
4. He ……. (sit) at a table by the window where he ……. (have) a meal with Jane.
5. Why ……. he …… (not / ask) her to wait and think again before she ……. (leave) Paris.
6. He was wondering why he …… (let) her leave so easily.
7. He knew he …… (earn) that money with a great difficulty.
8. After they …… (go), he ……. (sit) down and …… (light) a cigarette.
9. He ……. (have to) go to work by bus because his car ……. (break) down.
10. He …… (angry) before he …… (hear) my offer.

UNIT 10

1. Look up new words given below in your dictionary and memorise them.

wide-ranging topic	on the other hand
to overlap	durable
besides	to occur
starch	charcoal
to divide into	lubricant
in addition to	rust
to be composed of	sublimation point
dye	linear pattern

2. Read and translate the text.

Organic chemistry

Organic chemistry is the study of compounds that contain the element carbon. This is a wide-ranging topic that overlaps with other sciences like biochemistry, medicine, and materials science. Organic chemists study the properties, structure, and chemical reactions of organic compounds.

Carbon is the central element to all living organisms. It is the basis to all life on earth. By studying carbon and organic compounds, scientists can learn more about life, the human body, and how it works.

Most organic molecules are made up of long rings or chains of carbon atoms with atoms of other elements attached. Common elements besides carbon (C) that are found in organic compounds include hydrogen (H), oxygen (O), nitrogen (N), phosphorus (P), and sulfur (S). Some examples of organic molecules include:

- Carbohydrates - Carbohydrates consist only of carbon, hydrogen, and oxygen. They include starches and sugars and play an important role in our daily lives.
- Lipids - Lipids include fats and waxes. They are used for long term storage of energy in life forms.
- Proteins - Proteins are made up of long chains of amino acids. Proteins play an important role in nearly every process that takes place in cells.
- Nucleic Acids - Nucleic acids make up long chains of components such as DNA and RNA. DNA carries information such as genes for protein molecules to use. The RNA helps to move the DNA code from storage to where it can be used.

1._____

There are a number of types of organic compounds. Scientists divide these up into functional groups based on the type of element common to the group in addition to carbon. These groups have similar properties because they have similar molecules.

2._____

Hydrocarbons form a functional group of organic compounds that are composed of only hydrogen and carbon atoms. Within the group of hydrocarbons are

other groups such as alkanes. Alkanes include ethane, propane, methane, and butane. A lot of these compounds are used for heating and cooking. Other groups of hydrocarbons are alkenes, and alkynes.
Other elements that carbon combines with to form organic compounds include oxygen, nitrogen, sulfur, phosphorus, and boron.

Organic synthesis is the process of making organic compounds. Many of the products we use everyday are made from organic compounds produced in large factories. Examples of these include plastics, alcohols, rubber, and dyes.

3._____

We learned that organic chemistry is the study of compounds containing carbon. Biochemistry, on the other hand, is the study of chemical processes in biological systems. These two sciences often overlap as organic compounds play an important role in many chemical processes.

4._____

- Carbon occurs in its pure form in nature as graphite and diamond.
- Around 18 percent of the human body is carbon atoms.
- Charles Goodyear found that combining rubber with sulfur allowed the rubber to be more durable across temperatures.
- Synthetic dyes made from organic compounds have allowed the manufacture of dyes rather than using plants for dyes.
- DNA molecules are very long. If you stretched one out it would be about three feet long.

3. Put the subtitles in the correct place in the text. There is one extra subtitle.

A. Hydrocarbons
B. Interesting Facts about Organic Chemistry
C. Organic chemistry vs Inorganic chemistry
D. Types of Organic Compounds or Functional Groups
E. What is the difference between organic chemistry and biochemistry?

4. True or False. Correct the false ones.

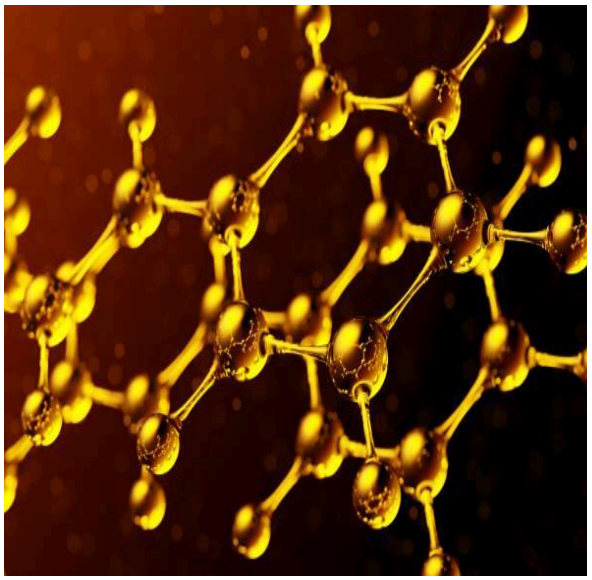
1. Hydrogen is the central element to all living organisms
2. Organic chemistry overlaps with other sciences like inorganic chemistry, physics and physical education
3. By studying organic compounds, people can learn more about the human body and how it works.
4. Lipids include fats and starches

5. Proteins are made up of short chains of amino acids, but they play an important role in nearly every process that takes place in cells.
6. Alkanes include ethyne, propyne, butyne, pentyne.
7. More than half of all atoms of human organism is carbon ones.
8. Synthetic dyes made from organic compounds save the plants.

5. What classes of organic compounds do you know? Enumerate them and write down chemical formula for each of them.

6. Fill in the gaps. There is one extra word.

Hydrocarbons forms saturated arranged single allow bonds tetrahedral



Hydrocarbons

The simplest organic compounds are hydrocarbons. 1. _____ contain only two elements, hydrogen and carbon. A 2. _____ hydrocarbon or alkane is a hydrocarbon in which all of the carbon-carbon 3. _____ are single bonds. Each carbon atom 4. _____ four bonds and each hydrogen forms a 5. _____ bond to a carbon. The bonding around each carbon atom is 6. _____, so all bond angles are 109.5°. As a result, the carbon atoms in higher alkanes are 7. _____ in zig-zag rather than linear patterns.

7. Match the left part with the right.

1. Carbon is the basis for organic chemistry	a) forming nearly ten million compounds.
2. Carbon is a nonmetal that can bond with itself and many other chemical elements,	b) The German and French words for charcoal are similar.
3. Elemental carbon can take the form of one of the hardest substances (diamond)	c) hydrogen, helium, and oxygen are found in higher amounts, by mass.
4. Carbon is made in the interiors of stars,	d) and has been known since prehistoric time.
5. Carbon compounds have limitless uses. In its elemental form, diamond is a gemstone and used for drilling/cutting; graphite is used in	e) as it occurs in all living organisms.

pencils, as a lubricant, and to protect against rust;	
6. Carbon has the highest melting/sublimation point of the elements. The melting point of diamond is ~3550°C,	f) though it was not produced in the Big Bang.
7. Pure carbon exists free in nature	g) or one of the softest (graphite).
8. The origin of the name 'carbon' comes from the Latin word carbo, for charcoal;	h) although inhalation of fine particles, such as soot, can damage lung tissue.
9. Pure carbon is considered non-toxic,	i) while charcoal is used to remove toxins, tastes, and odors.
10. Carbon is the fourth most abundant element in the universe, though	j) with the sublimation point of carbon around 3800°C.

8. Make questions for the given answers.

1. _____

The ocean stores approximately 50 times more actively cycled carbon than the atmosphere, making it the largest carbon reservoir.

2._____

Carbon is provided to the soil in the form of molecules produced by photosynthetic organisms such as plants**.**

3. _____

Carbon in the atmosphere is usually in the form of carbon dioxide (CO_2), or methane (CH_4).

9. Match the systematic and trivial names of the following carboxylic acids.

Acid	Trivial name
1. methanoic acid	A. propionic acid
2. ethanoic acid	B. formic acid
3. propanoic acid	C. butyric acid
4. butanoic acid	D. acetic acid
5. pentanoic acid	E. valeric acid
6. dodecanoic acid	F. stearic acid
7. hexadecanoic acid	G. lauric acid
8. octadecanoic acid	H. palmitic acid

10. Write down the chemical formula for each acid from the previous task. Find out where it can be used (1-3 sentences).

1. methanoic acid -

2. ethanoic acid -
3. propanoic acid -
4. butanoic acid -
5. pentanoic acid -
6. dodecanoic acid -
7. hexadecanoic acid -
8. octadecanoic acid -

11. Compose a story on one of the topics (up to 100 words).

- The simplest organic compounds
- Organic chemistry

Grammar Module

Future forms

1. Make sentences with *will be –ing.*

1. I'm going to watch television from 9 until 10 o'clock this evening.
So at 9.30 I …….
2. Tomorrow afternoon I'm going to play tennis from 3 o'clock until 4.30.
So at 4 o'clock tomorrow I …….
3. Jim is going to study from 7 o'clock until 10 o'clock this evening.
So at 8.30 this evening he …….
4. We are going to clean the flat tomorrow. It will take from 9 until 11 o'clock.
So at 10 o'clock tomorrow morning …….
5. Tom is a football fan and there is a football match on television this evening. The match begins at 7.30 and ends at 9.15.
So at 8.30 this evening …….
6. Don't phone me between 7 and 8. ……. (we / finish) dinner then.
7. A: Can we meet tomorrow afternoon?
B: Not in the afternoon. …… (I / work).
8. Do you think ……. (you / still / do) the same job in ten years' time?
9. If you need to contact me, ……. (I / stay) at the Hilton Hotel until Friday.
10. A: ……. (you / see) Laura tomorrow?
B: Yes, probably. Why?
A: I borrowed this book from her. Can you give it back to her?

2. A gang of criminals have a plan to steal millions of pounds from a London bank and leave the country. They're talking about what they will be doing a week from now, after the robbery.

1. We / live / in luxury …… *We'll be living in luxury*. …….
2. We / relax / at our villa …….
3. I / sit / by the pool ……
4. The sun / shine …….
5. We / enjoy / ourselves ……
6. The police / look for us ……
7. But / we / laugh / at them ……

3. Make sentences with *will be –ing.*

1. I'm playing tennis now. (this afternoon)
…… *I'll be playing tennis this afternoon*. ……
2. He is sleeping now. (at eleven o'clock)
…….
3. We're working very hard. (at this time next month)
…….
4. They are traveling. (all night)
…….
5. She's doing the washing up. (in an hour's time)
…….
6. He's still mending his car. (at dinner time)
…….
7. I am driving a BMW. (in two years' time)
…….
8. I'm studying English. (from 8 to 10)
……..
9. I'm having an interview now. (at 2 o'clock this afternoon)
……..
10. We're listening to pop music. (at this time tomorrow)
……..

4. What will life be like in the year 2100? Complete the sentences using *will have* + past participle form.

Example: By 2100, the world's population…. *will have increased* …… (increase) to around 30.000 million.

1. Life ……. (become) more automated by then.
2. Computers …… (take over) many of the jobs that people do today.
3. The earth's supplies of oil, coal and gas …… (run out).
4. ……. (scientists / find) other sources of energy?
5. How …… education ……. (change)?
6. …… (we / find) a way to feed all the people in the world?

5. Use *will have* + past participle form.

1. Tom and Ann are going to the cinema. The film begins at 7.30 and it is already 7.20. And

it will take them 20 minutes to get there.
When they get there, …… (the film / already / start)
2. Jim always goes to bed at 11 o'clock. Tom is going to visit him at 11.30 this evening.
When Tom arrives, ……. (Jim / go / to bed)
3. Tom is on holiday. He has very little money and he is spending too much too quickly.
Before the end of his holiday, ……. (he / spend / all his money)
4. Chuck came to Britain from the US nearly three years ago. Next Monday it will be exactly three years since he arrived.
Next Monday …… (he / be / here / exactly three years)
5. Next year is Ted and Amy's 25th wedding anniversary. They ……. (be married) for 25 years.
6. Jane is from New Zealand. She is traveling around Europe at the moment. So far she has traveled about 1.000 miles. By the end of the trip, ……. (she / travel) more than 3.000 miles.

6. Use Future Perfect Tense.
1. By next February I …… (write) my third book.
2. I hope you ……. (not / forget) my name by tomorrow.
3. By next week we ……. (redecorate) the house.
4. Next July she …… (be) dead for ten years.
5. I hope I …… (not / make) a lot of mistakes in this exam when I finish it.
6. By the end of this year I …… (drive) more than one hundred thousand kilometers with this car.
7. I hope it ……. (stop) raining before the match starts.
8. I ……. (have) an operation when you turn back.
9. By this time next week I ……. (marry).
10. If nothing is done one million species that are alive today …… (become) extinct in twenty years.
11. The tropical rain forests ……. (disappear) in thirty years.

7. Fill in the gaps using Future Perfect Continuous Tense.
1. By the end of June I ……. (live) in this flat for thirteen years.
2. I …… (fly) to London for an hour at this time tomorrow.
3. At this time next week I ……. (work) for this company for 20 years.
4. When the bell rings I …… (teach) for eight hours today.
5. I …… (wear) these glasses for five years next week.
6. I …… (drive) this car for six years tomorrow.
7. At this time tomorrow I ……. (take) a test for an hour.
8. At this time next year I ……. (have) a holiday in Antalya for a week.
9. At this time next year I ……. (live) in Istanbul for ten years.

10. By the time we get home they ……. (play) football for half an hour.
11. She ……. (dance) for an hour at nine o'clock.
12. I ……. (learn) English for ten years by the end of this year.

UNIT 11

1. Look up new words given below in your dictionary and memorise them.

pharmacology
mode
drugs
to affect
cells
to fail
to treat
treatise
herbal plant
to purify
crude plant
vast array
chemical synthesis
to become aware of
to seek
medical compounds
to engage in
administer drugs
to carry out
vast expansion

2. Read and translate the text.

Pharmacology

Pharmacology is more than the study of the mode of action of drugs. It is a science which uses the basic concepts of biology and chemistry to determine how drugs affect the organism; it gives a unique perspective in understanding how cells, organ systems, and organisms function. Unlike other basic science fields, pharmacology is a special field in which one can systematically investigate the mechanism for a biological event--from the molecular level to the whole animal. Pharmacology also allows us to study how biological systems fail to function, providing information on the etiology of disease. Pharmacologic research is essential for the development, testing and clinical use of drugs to treat disease.

The first Western pharmacological treatise, a listing of herbal plants used in classical medicine, was made in the 1st century AD by the Greek physician Dioscorides. A truly scientific pharmacology developed only after advances in chemistry and biology in the late 18th century enabled drugs to be standardized and purified. By the early 19th century, French and German chemists had isolated many active substances—morphine, strychnine, atropine, quinine, and many others—from their crude plant sources.

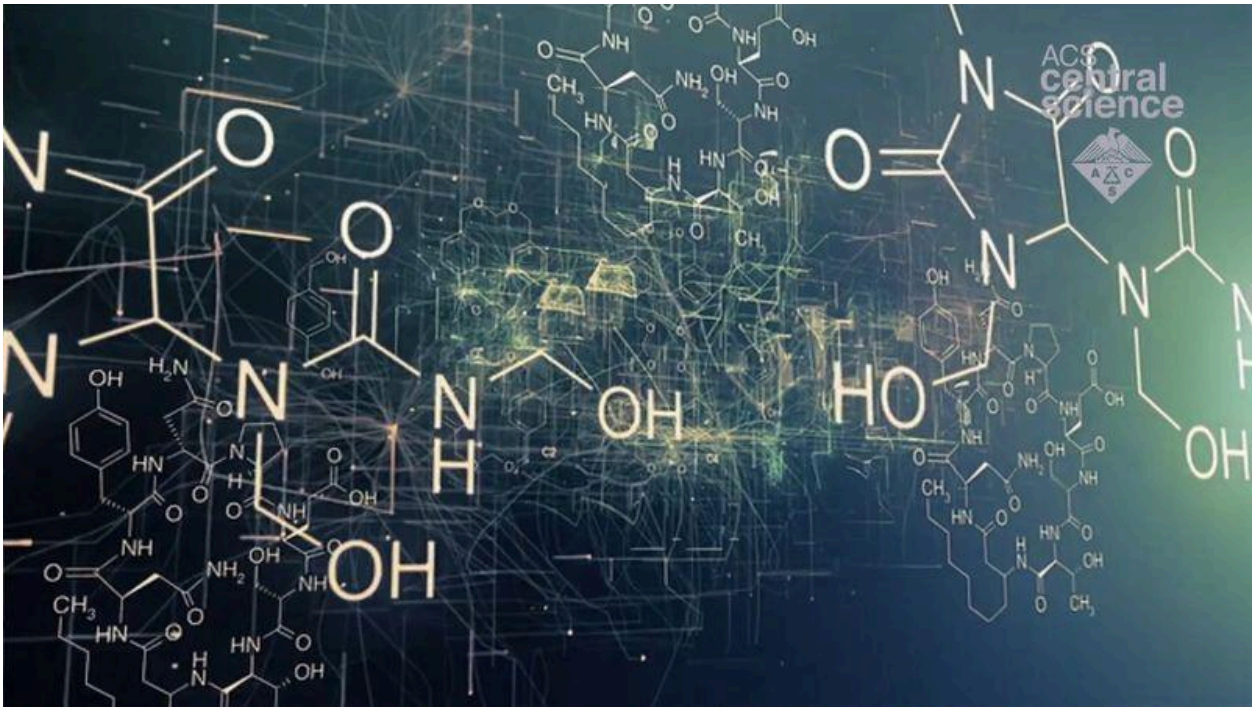
Pharmacology was firmly established in the later 19th century by the German Oswald Schmeiderberg (1838–1921). He defined its purpose, wrote a textbook of pharmacology, helped to found the first pharmacological journal, and, most importantly, headed a school at Strasbourg that became the nucleus from which independent departments of pharmacology were established in universities throughout the world.

In the 20th century, and particularly in the years since World War II, pharmacological research has developed a vast array of new drugs, including antibiotics, such as penicillin, and many hormonal drugs, such as insulin and cortisone. Pharmacology is presently involved in the development of more effective versions of these and a vast array of other drugs through chemical synthesis in the

laboratory. It also seeks more efficient and effective ways of administering drugs through clinical research on large numbers of patients.

During the early 20th century, pharmacologists became aware that a relation exists between the chemical structure of a compound and the effects it produces in the body. Since that time, increasing emphasis has been placed on this aspect of pharmacology, and studies routinely describe the changes in drug action resulting from small changes in the chemical structure of the drug. Because most medical compounds are organic chemicals, pharmacologists who engage in such studies must necessarily have an understanding of organic chemistry.

Important basic pharmacological research is carried out in the research laboratories of pharmaceutical and chemical companies. After 1930 this area of pharmacological research underwent a vast and rapid expansion, particularly in the United States and Europe.



3. Answer the questions:

1). What is pharmacology?
2). What concepts does pharmacology use?
3). What is the difference between pharmacology and other sciences?
4). Does pharmacology provide information on the etiology of disease?
5). When was the first western pharmacological treatise made?
6). What had happened by the early 19th century?
7). What did Oswald Schmeiderberg do?
8). What achievements have been made since World War II?
9). What did pharmacologists become aware of during the 20th century?
10). What area of pharmacological research underwent a vast and rapid expansion after 1930?

4. Make up sentences from the given words.

1). of/ Pharmacology/ drugs/ study/ is/ the

2). professional / Pharmacy/ program/ students/ become/ licensed/ pharmacists/ wishing/ for a/ to/ is.

3). This/ treatment/ algorithm/ used/ medical / can/ improve/ be/ to.

4). not / test / The pharmacologist/ does/ drugs/ effects/ patients/ the/ on/ of.

5). is / the / Constant / products/ testing/ required/ routine/ control /drug / for/ of.

6). required /A license/ is/ to/ drugs/ dispense/ legally.

7). Pharmacology / biological / mechanisms/ investigates/ molecular/ from / the / to / the / whole / level / animal.

8). studies/ A pharmacologist/ medicine/ works/ how/ actually.

9). A pharmacist/ a / health/ care /provider/ who/ at/ a /pharmacy is/ works .

10). new / Physicians / clinical / effectiveness / drugs / determine / the / of.

5. Give synonyms for the following.

Word	**Synonym**
capacity	
limit	
to place	
principally,	
to be accompanied by	
because,	
carry out	
consequently	

6. Give antonyms for the following.

Synonym	**Antonym**
constant	
saturated	
at first	
always	
easy	
decrease	
near	
minimum	
seldom	
limited	

7. Insert prepositions*: in, on, by, with, for, after , of, from.*

1. The capacity ____a solvent to dissolve a given solute is often limited though there

are many pairs _____ substances which can be mixed _____any proportions.
2. ____ order to control our environment, the first purpose ____ science must be to study and understand it.
3. To answer the question "What are the uses ____ sulphuric acid?" fully, one would need to write a book.
4. The alkali metals are usually stored ____ oil so as to exclude air.
5. ___ order for two molecules to react ____ each other, they must, first ____ all, be ___ the presence _____ each other.
6. ___ hydrogen to be obtained ____water, electrolysis may be used.
7. Sodium is a white metal soft enough to be easily cut ____ a knife and light enough to float ____ water.
8. The minerals ____ which aluminum occurs, are too numerous to recite.
9. The vapour pressure _____ many pure liquids or solids is very low, ____ fact, so low as to be immeasurable ____ direct means.
10. The catalytic substance can be recovered unchanged _____ the reaction is completed.
11. As the temperature is raised, the rate ____ evaporation increases.
12. Once the validity _____ a hypothesis has been tested _____ all possible experiments and is found to be in harmony _____ all the facts, it assumes the status _____ a theory.

8. Complete the gaps with the words.

predict deals routine test clinical observations

The work of pharmacologists in industry 1. _____ also with the exhaustive tests that must be made before promising new drugs can be introduced into medical use. Detailed 2. _____ of a drug's effects on all systems and organs of laboratory animals are necessary before the physician can accurately 3. _____ both the effects of the drug on patients and their potential toxicity to humans in general. The pharmacologist does not himself 4. _____ the effects of drugs in patients; this is done only after exhaustive tests on animals and is usually conducted by physicians to determine the 5. _____ effectiveness of new drugs. Constant testing is also required for the 6. _____ control and standardization of drug products and their potency and purity.

9. Speak on one of the topics (up to 100 words):

- Pharmacology in the history of the mankind.
- Pharmacology as a science.

Grammar module

Perfect Continuous

1. Write sentences in the correct form. Use Present Perfect Continuous.

1. She (work) here for five years.
2. I (study) all day.
3. You (eat) a lot recently.
4. We (live) in London for six months.
5. He (play) football, so he's tired.
6. They (learn) English for two years.
7. I (cook) so I'm really hot.
8. She (go) to the cinema every weekend for years.
9. It (rain) the pavement is wet.
10. You (sleep) for twelve hours.
11. I (not/work) today.
12. You (not/eat) well recently.
13. We (not/exercise) enough.
14. She (not/study).
15. They (not/live) here for very long.
16. It (not/snow).
17. He (not/play) football for five years.
18. We (not/drink) enough water - that's why we feel tired.
19. I (not/sleep) I was reading.
20. They (not/watch) TV much recently.

2. Use Present Perfect Continuous Tense to fill in the gaps.

1. I'm tired, because I …… *have been working* ……. (work) very hard.
2. He …… (write) letters all morning.
3. Catherina is getting fatter because she …… (eat) too much.
4. My mother ……. (peel) the potatoes all afternoon.
5. Cathy …… (attend) a cookery course since March.
6. How long …… you ……. (learn) English?
7. Where are my eye-glasses? I ……. (look) for them for an hour.
8. Charles ……. (escape) from the police for years.
9. How long …… you …… (use) a computer?
10. Elizabeth ……. (live) with Mike for three years.
11. She ……. (earn) quite a lot of money for the last two years.
12. It ……. (rain) for six hours.

3. Choose Present Perfect or Present Perfect Continuous.

1. I've *bought / have been buying* a new pair of shoes.
2. *Have you finished / Have you been finishing* reading that book yet?
3. *They've eaten / have been eating* fruit all afternoon, ever since they came from school.
4. *I've been reading / have read* this book now, so you can have it back.
5. *I've been writing / have written* eight pages already.
6. Your exam paper is completely blank! What *have you been doing / have you done* for an hour?

7. Oh, no! There's nothing to eat. My sister *has been eating / has eaten* everything I left in the kitchen.
8. Oh, no! There's no wine to drink. They *have drunk / have been drinking* all the wine.
9. No wonder your eyes hurt. You'*ve been playing / have played* computer games ever since you had your breakfast.
10. *I haven't seen / haven't been seeing* you for ages.
11. God! Hakan *has scored / has been scoring.*
12. They *have danced / have been dancing* for an hour.
13. I *have been waiting / have waited* for you for ages.
14. I*'ve finished / 've been finishing* my work.
15. I*'ve been writing / have written* this letter for an hour.
16. He *has visited / has been visiting* ten museums this week.
17. I'm very tired. Because I *have travelled / have been travelling* around Istanbul all day.
18. She *has found / has been finding* a good job.
19. I'm hot because I *have been running / have run.*
20. I *have written / have been writing* letters for weeks.

4. Choose Present Perfect simple or Present Perfect Continuous to complete the sentences below.

1. I _____ the book you lent me and it's great. I'll give it back to you when I finish it.
a. 've read
b. was read
c. 've been reading

2. Bruce _____ tennis since he was a child. He _____ many trophies.
a. has been playing / has won
b. is playing / has won
c. has played / has been winning

3. You _____ too much time playing that stupid game!
a. 've spent
b. 've spending
c. 've been spending

4. You _____ tennis since 10 o'clock. How many sets _____?
a. have played / have you been playing
b. have been playing / have you played
c. are playing / have you played

5. He _____ since he was a little boy. Choose TWO correct options
a. is fishing

b. has fished
c. has been fishing

6. He _____ to me since we met last summer. He _____ over 100 emails.
a. 's been writing / 's sent
b. 's written / 's been sending
c. is writing / 's sent

7. _____ any fish today?
a. Have you caught
b. Have you been catching
c. Have you catching

8. A: He _____ hundreds of job applications, but he's got no answers yet. B: How long _____ for a job?
a. 's been sending / has he been looking
b. 's sent / has he looked
c. 's sent / has he been looking

9. Now that I _____ tidying the house, I'm going to clean it.
a. have finished
b. have been finishing
c. am finishing

10. We _____ this TV for ages. I think it's time to buy a new one.
a. have
b. 've had
c. 've been having

5. Complete the dialogues below with Present Perfect Simple or Present Perfect Continuous of the verbs in brackets. If both tenses are possible, use Present Perfect Continuous.

1. A: I'm very tired. We (walk) too fast.
   B: Maybe you are right, we (walk) 10 kilometers in only one hour and a half.
2. A: You (drink). You can't take the car.
   B: But I (only drink) a couple of beers!
   A: That isn't true; you (drink) four beers.
3. I (wait) for you all morning! Where (you be) all this time?
4. I (teach) in this school for 20 years, and I (meet) thousands of students from hundreds of different countries.
5. A: It smells fantastic!
   B: Yeah, I (make) cookies all afternoon.
   A: Let me see. Wow! You (make) a lot of cookies!
6. A: Someone (call) all morning. They (call) at least ten times.

B: Well, you (sit) next to the phone all this time. You could have picked it up.
7. I (work) here for over a month and I (not meet) the manager yet.
8. I (lose) my keys and I (try) to contact my wife all morning, but she isn't answering her phone.
9. What's the matter with you? You (say) anything since this morning.
10. Look, I (wash) my car. Doesn't it look new now?

6. Use Past Simple or Present Perfect Tense to fill in the gaps.

1. What …… (you / learn) since you ……. (come) here? How many friends ……. (you / make)? I hope you ……... (already / meet) a lot of interesting people.
2. Last night my roommate and I ……. (have) some free time, so we ……. (go) to a show.
3. I ……. (just / have) lunch, but I …… (not / have) lunch yesterday.
4. Who ……. (write) the play "Hamlet"?
5. How many games …… (the team / win) so far this season?
6. I don't know Carol's husband. I ……. (never / meet) him.
7. It …… (rain) a lot last week, but it …… (not / rain) much so far this week.
8. How many letters ……. (you / write) since the beginning of the month?
9. When we were on vacation, the weather …… (be) terrible.
10. In her whole lifetime, Mary …… (never / see) snow.
11. I don't know where Ammy is. ……(you / see) her?
12. When I ……. (get) home last night, I …….. (be) very tired and I …… (go) straight to bed.
13. Your car looks very clean. ……. (you / wash) it?
14. George …….. (not / be) very well last week.
15. Mr. Clark …… (work) in a bank for 15 years. Then he gave it up.

7. Write sentences with Past Perfect Continuous.
What had they been doing?

1. John / wait for us.
2. What she / read?
3. The ducks / swim.
4. We / not drink much.
5. it / snow all night?
6. the baby / cry?
7. The girls / not run.
8. I / look for you.
9. They / not watch TV.
10. Why he / laugh?

8. Put the verbs into the correct form (Past Perfect Continuous).

1. We (sleep) for 12 hours when he woke us up.
2. They (wait) at the station for 90 minutes when the train finally arrived.
3. We (look for) her ring for two hours and then we found it in the bathroom.
4. I (not walk) for a long time, when it suddenly began to rain.
5. How long (learn she) English before she went to London?
6. Frank Sinatra caught the flu because he (sing) in the rain too long.
7. He (drive) less than an hour when he ran out of petrol.
8. They were very tired in the evening because they (help) on the farm all day.
9. I (not work) all day; so I wasn't tired and went to the disco at night.
10. They (cycle) all day so their legs were sore in the evening.

9. Make Past Simple or Past Perfect Continuous.

1. I (wait) for hours so I was really glad when the bus finally (arrive).
2. Why (be) the baby's face so dirty? He (eat) chocolate.
3. I (see) John yesterday, but he (run) so he was too tired to chat.
4. It (rain) and the pavement (be) covered with puddles.
5. When I (arrive) it was clear she (work). There were papers all over the floor and books everywhere.
6. They (study) all day so when we (meet) they were exhausted.
7. The boss (talk) to clients on Skype for hours so she (want) a break.
8. I (drink) coffee all morning. By lunchtime, I (feel) really strange!
9. Lucy (hope) for a new car, so she was really pleased when she (get) one.
10. I (dream) about a holiday in Greece. I couldn't believe it when my husband (book) one as a surprise!

10. Open the brackets using Past Continuous, Past Perfect Simple or Past Perfect Continuous.

1. I was exhausted at the end of the exam. I (write) for over two hours.
2. When thieves stole my favourite leather jacket, I was really upset. I (have) it for over ten years.
3. Please step out of the car, Mr. Jones. Do you realise you (drive) at over 90 mph?
4. We didn't really want to go and see the musical again. We (already see) it twice - so we said "no" and we went to a restaurant instead!
5. I arrived over an hour late to the office and everyone was working. Actually, they (work) for over two hours on the new project and I felt really guilty.
6. The kitchen was full of steam when we arrived. Joan was in the kitchen and she (cook) a huge meal for everyone at the party.
7. It was a bit embarrassing to arrive at their house and find Mary looking so sad. I think she (cry) before we got there.
8. No-one even noticed when I got home. They (all watch) the big game on TV.

UNIT 12

1. Look up new words given below in your dictionary and memorise them.

to reduce	to prevent
side effects	abuse
addiction	absorption
renal	distribution
intracellular metabolism	excretion
intracellular regulation	to get rid of
health care provider	bile
to be considered	to be often licensed
harmful effects	over-the-counter

2. Read and translate the text.

Pharmacology and pharmacy

Pharmacology is the science of drugs and their effect on living systems, or, in other words,it is the study of how medicine and other things have an effect on living organisms and change how they function. Pharmacology could also be defined as the study of how medicine actually works.

You can find pharmacology everywhere, when you visit the dentist and when you take any type of medicine. Pharmacology is responsible for painkillers, caffeine drinks and antibiotics. Without pharmacologists we wouldn't be able to:

- discover new medicines to help fight diseases
- improve their effectiveness and reduce unwanted side effects
- understand why people have different responses to medicines, and why some work better for some people than others
- understand why some drugs cause addiction

A variety of topics involved with pharmacology, including neuropharmacology, renal pharmacology, human metabolism, intracellular metabolism, and intracellular regulation.

Mind that pharmacology is not exactly the same as pharmacy, and a pharmacologist is not exactly the same as a pharmacist. A pharmacologist is a scientist who studies how medicine actually works, and usually works in a science lab. Pharmacologists work in a team with biochemists, geneticists, microbiologists, toxicologists and pharmacists to run clinical tests on how drugs work.

A pharmacist is a health care provider who usually works at a pharmacy. However, there is an overlap between these two fields. A pharmacist could be considered a type of pharmacologist. While in school, pharmacists do take many classes in pharmacology.

If something can be used as a medicine, it is called a pharmaceutical. Pharmacology includes how drugs are made, how they interact with living organisms, what harmful effects they could have, how they can be used as medicines, and if they can be used to prevent illness.

The development of drugs is very important to medicine, but it also has strong economical and political uses. To protect people and prevent abuse, some countries try to control the way in which drugs are made, sold, and administered.

When a pharmacologist is talking about pharmacokinetic properties of a chemical, they are interested in four things: ADME.

- **Absorption** - How is the medication absorbed (through the skin, the intestine, the mouth)?
- **Distribution** - How does it spread through the organism?
- **Metabolism** - Is the medication converted chemically inside the body, and into what. Are these new substances active? Could they be toxic?
- **Excretion** - How does the organism get rid of the chemical (through the bile, urine, breath, skin)?

Drugs that are given to people to help cure them of a medical condition or help reduce the symptoms are often licensed. They can be divided into two groups: over-the-counter, where anybody can buy the drug from a shop; prescription-only medicine, where a doctor has to say that a person is allowed to take a drug; and in some countries, pharmacy medicines, where only a registered pharmacy can sell a drug. Most over-the-counter medication will not hurt a person if they take a bit more than they are meant to. Medications are often produced by pharmaceutical companies and are often patented. Drugs that are not patented are called generic drugs.

3. What is the difference between the pharmacy and pharmacology?

4. Give definition of a side effect. What are possible side effects?

5. What is the difference between a side effect and an adverse effect? Find out additional information.

6. What is the difference between pharmacokinetics and pharmacodynamics?

7. Fill in the gaps with the words given below.

Drug interactions.

prevent
interactions
negative
side effects
food
avoided
milk

Drug - drug interactions can be positive or 1. _____. For example – many drugs negatively interact with one another. One drug can 2. _____ the metabolism of another drug, increasing the risk of 3. _____ and toxic reactions. Some drugs prevent the mechanism of action of other drugs. There are too many drug interactions to list here and you are not expected to know all these 4. _____. However, it is important you are aware of how drugs can interact with one another.
Similarly, drugs can interact with 5. _____. The antibacterial drug class, tetracyclines, for example, interacts with calcium ions. This means that, if the patient takes 6. _____ along with their tetracycline drug, it interacts with and prevents the antibacterial drug from working. For this reason, milk must be 7. _____ before/after the patient takes the drug. There are hundreds of other food-drug interactions.

8. What other cases of drug – food interaction do you know?

9. Is there any difference between generic and patented drugs?

10. Compose a story on one of the topics (up to 100 words).

- Pharmacology as a science of drugs.
- The difference between the pharmacy and pharmacology.

Grammar module

Comparatives and Superlatives

1. Fill in the gaps with the adjectives in brackets.

1. Tom is …… his brother. (old)
2. This problem is …… that problem. (easy)
3. John is …… boy in our class. (tall)
4. My friend is …… my sister. (fat)

5. My room is …… room in our house. (small)
6. Konya is …… city in Turkey. (large)
7. The Kızılırmak is …… river in Turkey. (long)
8. Madonna is …… Sandra. (popular)
9. My English is …… your English. (good)
10. The weather today is …… the weather yesterday. (bad)
11. This garden is …… that garden. (large)
12. Elizabeth is …… girl in our group. (beautiful)
13. I am …… girl in the class. (short)
14. What is …… film on TV today? (funny)
15. Who is …… girl in your class? (pretty)

2. Fill in the gaps as in the example.

I went on holiday last year but it was a disaster! My hotel room was … *smaller than* … (small) the one in the photograph in the brochure.

I think it was …… (small) room in the hotel. The weather was terrible too. It was …… (cold) in England. The beach near the hotel was very dirty – it was …… (dirty) of all the beaches on the island. The food was …… (expensive) I expected and I didn't have enough money. One day I went shopping in a big department store and I broke a vase. It was …… (expensive) vase in the whole shop. But …… (bad) thing of all was that I lost my passport and I couldn't go back home. It was …… (horrible) holiday in all my life.

3. Complete the sentences.

	David	Tom	George
Age	25	30	35
Weight	70 kg	72 kg	75 kg
Height	1.68	1.72	1.80
Salary	800 $/month	1000 $/month	1500 $/month
House	3 rooms	4 rooms	5 rooms

1. (young) David is … *younger than* … Tom and George.
2. (old) George and Tom are …… David.
3. (heavy) George is the …… all.
4. (light) Tom is …… George.
5. (tall) Tom is …… David.
6. (tall) George is …… all.
7. (old) George is …… Tom.
8. (little) David gets …… money …… Tom.
9. (much) George gets …….. money …… Tom.
10. (small) David's house is …… Tom's.
11. (big) George's house is ……... all.
12. (big) Tom's house is ……... David's.

4. Read the passage and complete the sentences.

Mr. and Mrs. Smith are now flying to Canada. Miss Bennet is their stewardess. She is very
talkative and friendly. She is showing Mr. and Mrs. Smith some pictures of her family and her
best friend.

Miss Bennet: This is my best friend. Her name is Tina.
Mrs. Smith: She is very pretty. Is she older or younger than you?
Miss Bennet: She is one year younger.
Mrs. Smith: Aren't you thinner than she is?
Miss Bennet: Yes, I am. Tina loves to eat very much.
Mrs. Smith: So do I. I hope it will be time for lunch soon.

	Age	Height	Weight
Miss Bennet	21	1.73	57 kg
James Bennet	23	1.82	76 kg
Tina Robbins	20	1.68	61 kg

Look at chart. Compare Miss Bennet with her brother and her best friend Tina Robbins:

Example: (Miss Bennet / tall / Tina Robbins)
Miss Bennet is taller than Tina Robbins.

1. (Miss Bennet / short / her brother James)
……..
2. (James / tall / his sister)
…….
3. (Miss Bennet / old / her best friend)
…….
4. (Her best friend / young / Miss Bennet)
…….
5. (Miss Bennet / short / her brother)
…….
6. (Her brother / tall / Miss Bennet)
…….
7. (Miss Bennet / fat / Tina)
……
8. (Tina / slim / Miss Bennet)
……
9. (Miss Bennet / slim / her brother)
……
10. (Her brother / fat / Miss Bennet)
……

5. Use *as* … *as* in the gaps.

1. Jack's English is worse than Sonia's.
Jack's English isn't ……. Sonia's.
2. Alper's bag is 3 kg. Ahmet's bag is 5 kg.
Alper's bag isn't ……. Ahmet's bag.
3. An orange is sweeter than a lemon.
A lemon isn't ……. an orange.
4. Terry is 1.70 cm tall. Jason is 1.70 cm tall too.
Terry is …… Jason.
5. Chinese is more difficult than French.
French isn't ……. Chinese.
6. Science fiction films and soap operas are very exciting.
Science fictions are ……. soap operas.
7. Chemistry is more difficult than drawing.
Chemistry isn't …… drawing.
8. Jane's car is Mercedes, but Sue's car is Opel.
Sue's car isn't ……. Jane's car.
9. July is hotter than May.
May isn't …… July.

6. Choose the correct variant.

1. This tea tastes a bit _____ the other.
a. bitterest than
b. more bitter than
c. more bitter that

2. She seems _____ since she got divorced.
a. happier
b. more happy
c. more happier

3. Could you speak _____, please? I don't understand you.
a. slowlier
b. most slowly
c. more slowly

4. Choose the two correct sentences.
a. Your car isn't any cheaper than ours.
b. Your car isn't as cheaper as ours.
c. Your car is no cheaper than ours.

5. The economy is getting _____.
a. more and more worse
b. every day badder

c. worse and worse

6. Which two sentences mean the same?
a. Tom is more intelligent than David.
b. David is more intelligent than Tom.
c. David isn't as intelligent as Tom.

7. I'm trying to do it _____ I can.
a. as fast as
b. as faster as
c. faster as

8. He has more talent than _____. (Choose TWO correct options)
a. me
b. I do
c. I

9. He is _____ .
a. the most boring teacher I've ever met
b. the most boring teacher I've never met
c. the boringest teacher I've never met

10. It was the best day _____ my life.
a. of
b. in
c. than

7. Complete the sentences with the comparative or superlative forms of the words in brackets.
1. This exam was ... (easy) than the exam in May.
2. You should drive ... (slowly) or you'll have an accident.
3. My new home is ... (near) from work than the old one.
4. The test wasn't as ... (difficult) as I thought.
5. This is the ... (far) place I've ever travelled to.
6. You look much ... (thin) than the last time I saw you.
7. My new computer is a bit ... (good) than the old one.
8. September is the ... (busy) month of the year for us.
9. There are ... (few) people today because it's been raining a lot.
10. The ... (tricky) part of the exam was the listening.

8. Open the brackets.
1. It was just the *most crowded* time of the day. (crowded)
2. Nothing could be *more desolate* than those shores. (desolate)
3. It was *earlier* than he had thought. (early)

4. A conference is ... than a conversation. (formal)
5. A girl should be ... than a man. (small)
6. He looked even ... than he felt. (good)
7. I have not the ... idea in the world. (slight)
8. It is the ... hill in the whole country. (high)
9. It was ... than he had expected. (bad)
10. Nothing could be ... than their time. (favourable)
11. Nothing is ... than this rational conclusion. (plain)
12. He is the ... thing in my life. (big)
13. He is ... than an eldest son. (bad)
14. He is the ... of men. (critical)
15. They are far ... than we are. (conventional)
16. I sent the ... woman I could command. (good)
17. He must do the ... he can. (good)
18. Nothing can be ... than such an impression. (dangerous)
19. They were the ... time of my whole life. (miserable)
20. They were much ... than he had fancied. (near)

UNIT 13

1. Look up new words given below in your dictionary and memorise them.

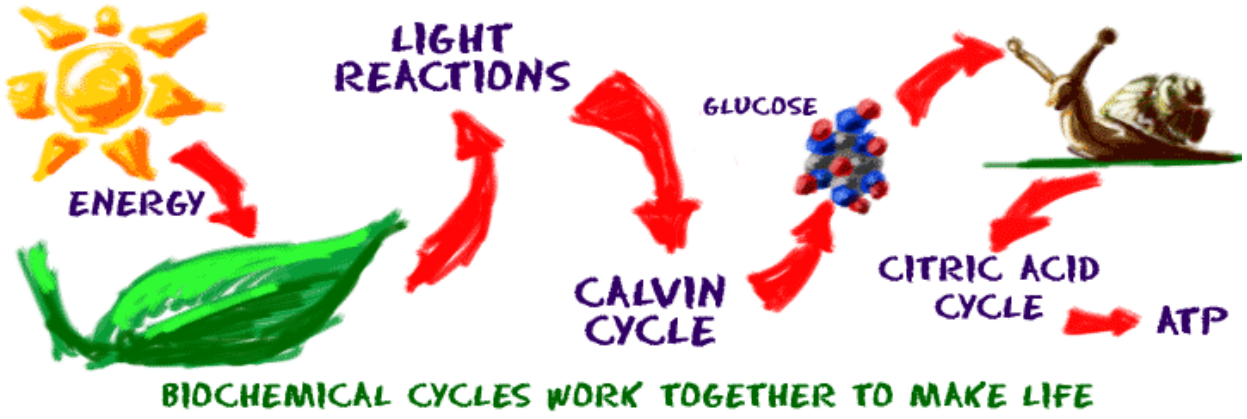
crossover fields	plenty of
single-celled	pathway
to survive	to digest
to rely on	cornerstones
reactant	substrate
eventually	to grab on
citric acid	to pick up
breakdown	clot

2. Read and translate the text.

Biochemistry

Biochemistry is one of the crossover fields of chemistry. Biochemists have to understand both the living world and the chemical world. Even if you don’t want to become a biochemist, you'll still have to understand atoms and molecules as a biologist. You'll also have to know about organic chemistry, a much bigger area of chemistry.

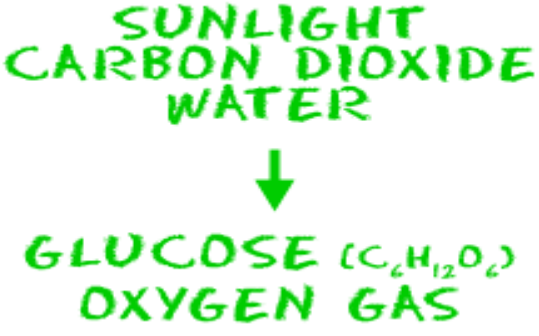
The key thing to remember is that biochemistry is the chemistry of the living world. Plants, animals, and single-celled organisms all use the same basic chemical compounds to live their lives. Biochemistry is not about the cells or the organisms. It's about the smallest parts of those organisms, the molecules. It's also about the cycles that create those biological compounds.



You can probably guess that biochemical cycles repeat over and over. Those cycles allow living creatures to survive on the Earth. It could be the constant process of photosynthesis that creates sugars in plants or building complex proteins in the cells of your body.

Every cycle has a place, and each one is just a small piece that helps an organism survive. In each cycle, molecules are used as reactants and then transformed into products. Life is one big network of activity where each piece relies on all of the others. A compound, such as an herbicide, may only break one part of one cycle in a plant. However, because everything needs to work together, the whole plant eventually dies. Environmental chemists look at the way chemical compounds affect living things and the world around you.

We may have been talking about cycles. However, we think it's important that you understand the different types of molecules you will find in biochemistry. We aren't going to go into the citric acid cycle and its ten steps. We won't even look at the eleven steps involved in the breakdown of glucose. At your level of understanding, it's enough to know the difference between a steroid, an amino acid, and a carbohydrate. There will be plenty of time for you to memorize the pathways and the movement of molecules during each step of a cycle.



Metabolism is such a big word to explain a simple idea. We all need energy to survive. Whether we are plants, animals, or bacteria, we all need energy. Energy doesn't just float around in a form we can use to survive. We need to eat (mainly sugars) and digest food. That process of chemical digestion and its related reactions is called metabolism. Metabolism is the total of all the chemical reactions an organism needs to survive. Sounds a lot like biology. Why is it here in biochemistry? There are two main chemical processes that make our world go round, involving two simple chemical reactions. The first is called glycolysis. That's the breakdown of sugars. The second process is called photosynthesis. That is the series of reactions that builds sugars. You need to remember that the overall

metabolism of an organism includes thousands of chemical reactions. The reactions in glycolysis and photosynthesis are just the cornerstones to life.

3. What is biochemistry? Explain using the main ideas from the text.

4. Complete the sentences.

1. Plants, animals, and single-celled organisms all use ….
2. Biochemical cycles that repeat over and over allow ….
3. Life is one big network of activity where ….
4. Metabolism is the total of all …
5. There are two main chemical processes - …

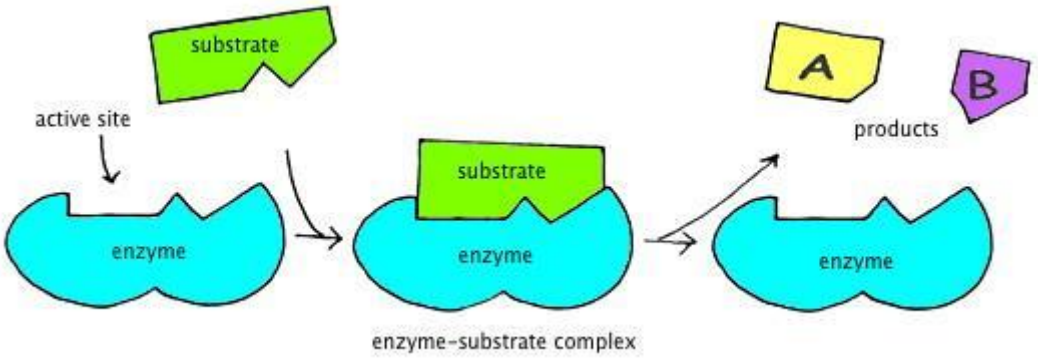
5. True or False.

1. Biochemists have to understand only the living world and molecules construction.
2. Just the simplest organisms use basic chemical compounds to live.
3. Biochemistry is a science about the cells.
4. Biochemical cycles rely on enzymes and other proteins.
5. Photosynthesis is the total of all the chemical reactions an organism needs to survive..

6. Fill in the gaps.

molecule pick up enzymes combined grab ready bonds

Four Steps of Enzyme Action



1. The enzyme and the substrate are in the same area.
Some situations have more than one substrate 1. _____ that the enzyme will change.

2. The enzyme grabs on to the substrate at a special area called the active site.
The combination is called the enzyme/substrate complex. 2. _____ are very, very specific and don't just 3. _____ on to any molecule. The active site is a specially shaped area of the enzyme that fits around the substrate. The active site is like the grasping claw of the robot on the assembly line. It can only 4._____ one or two parts.

3. A process called catalysis happens.
Catalysis is when the substrate is changed. It could be broken down or 5. _____ with another molecule to make something new. It will break or build chemical 6. _____. When done, you will have the enzyme/products complex.

4. The enzyme releases the product.
When the enzyme lets go, it returns to its original shape. It is then 7. _____ to work on another molecule of substrate.

7. Choose the correct variant. Find additional information if you need.

1. Exercise usually _____ the rate of your metabolism.
Increases
Decreases
Does Not Change

2. You will usually find carbohydrates in...
Proteins
Starches .
Nucleotides
Waxes

3. The process of photosynthesis depends on which molecule?
Hemoglobin
Chlorophyll
Both Molecules
Neither Molecule

4. Changes in the pH can change the progress of certain metabolic reactions.
True
False
5. In animals, if an organism eats too many carbohydrates, those carbohydrates can be converted into...
Fats .
Amino Acids
Enzymes
None of the Above

6. DNA can be used to code RNA which is then used to create...
Lipids
Carbohydrates
Proteins
None of the Above

7. Some proteins can be made without DNA instructions.
True
False

8. All catalysts are enzymes and all enzymes are catalysts.
True
False

9. Most metabolic processes have many steps.
True
False

10. Purines and pyrimidines are types of...
Sugars
Nucleotides
Phospholipids
None of the Above

8. This is a review of the topic Metabolism. Choose the correct answer and explain why you think so. Find additional information if you need.

1. Metabolism is the process that only converts nutrients into more complex compounds.
True
False

2. All organisms need to breathe oxygen to survive.
True
False

3. Life on Earth could exist without enzymes.
True
False

4. Metabolism is a constant process. It does not matter if an organism needs more or less energy.
True
False

5. Lipids are found in every cell on Earth.
True
False

6. While too many steroids are bad for your body, you need some to survive.
True
False

7. All fats are lipids, but not all lipids are fats.
True.
False

8. Are all of the known amino acids found in human proteins?
Yes
No

9. Structural proteins can be easily dissolved in water.
True
False

10. Which of these is not a protein?
Hemoglobin
Insulin
Myosin
All are Proteins

11. Proteins can be found...
In the Cell Membrane
Inside the Cell
Outside of the Cell
All of the Above

12. There is no way to control the action of an enzyme once it is created.
True
False

13. The acidity of the environment can activate an enzyme.
True
False

14. Where do you find enzymes?
Digestive System
Blood Clots
Liver
All of the Above

15. Enzymes are always very small molecules attaching to and working to break down very large molecules.

True
False

16. While enzymes are important, you can live your life just fine without them.
True
False

17. Which of these can destroy or permanently deactivate an enzyme?
Poison
Extreme Temperatures
High Acidity
All of the Above

9. Compose a story on one of the topics (up to 100 words).

- Biochemistry as a science
- Biochemical lifecycles in the world.

Grammar module

Passive Voice (part 1)

1. Fill in Passive in the appropriate tense.

1. (TV / invent / Baird) ……. *TV was invented by Baird* ……
2. (Pyramids / build / Egyptians) ……
3. (milk / produce / cows) ……...
4. (coffee / grow / in Brazil) ……
5. (chopsticks / use / in China) ……
6. (plants / water / every day) ……
7. (the thief / arrest / policeman / yesterday) …….
8. (the injured man / take to a hospital / two days ago) …….
9. (the car / repair / tomorrow) ……
10. (the letter / send / last week) …….

2. Put the verbs in brackets into Present Simple Passive.

There is a chimpanzee which … *is called* …… (call) "Bubbles". It …… (own) by Michael Johnson. It …… (keep) in his home. It …… (feed) every day by Michael Johnson himself. It …… (always dress) in funny clothes. It …… (say) that "Bubbles" is Michael Johnson's only friend.

3. Look at the Hotel Information table and write sentences as in the example.

Hotel Information

Breakfast In Pierrot's Restaurant 7-9:30 am	Rooms Maid Service daily
Dinner In Main Restaurant 8-10 pm	Hot water 24 hours a day
Newspapers – Telephone calls At the Reception Desk	Hotel Cinema Film every night at 10 pm

1. Breakfast / serve – where and when?
Breakfast is served in Pierrot's Restaurant between 7 and 9:30 am.
2. Dinner / serve – where and when?
……
3. Newspapers / sell – where?
……
4. Telephone calls / can make – where?
……
5. Rooms / clean – who by and how often?
……
6. Hot water / supply – when?
……
7. Films / show – where and when?
……

4. Put the verbs in brackets into Past Simple Passive.

Two men *were seen* (see) breaking into a house in my street last night. The police …… (call) and they arrived very quickly. One man …… (catch) immediately. The other escaped, but he …… (find) very soon. Both men …… (take) to the police station where they …… (question) separately by a police officer. The two men …… (charge) with burglary.

5. Choose the correct variant.

1. Harry Potter and the Goblet of Fire _____ by J. K. Rowling.
   a. was written
   b. written
   c. wrote

2. J.K. Rowling _____ Harry Potter and the Goblet of Fire.
   a. was written
   b. written
   c. wrote

3 The judge _____ Smith to five years in prison.
   a. was sentenced
   b. sentenced
   c. sentence

4. Smith _____ to five years in prison.
a. was sentenced
b. sentenced
c. sentence

5. Over a million dollars in cash _____ from a bank in Los Angeles.
a. was stolen
b. stole
c. stolen

6. Thieves _____ over a million dollars in cash from a bank in Los Angeles.
a. stolen
b. were stolen
c. stole

7. The gold _____ in a cave near the top of the mountain.
a. was discovered
b. discovered
c. discover

8. Archaeologists _____ the gold in a cave near the top of the mountain.
a. were discovered
d. was discovered
c. discovered

9. VW cars _____ in Germany and the Czech Republic.
a. made
b. are made
c. make

10. Many shops _____ at around nine in the morning.
a. opens
b. are opened
c. is opened

11. Your letter _____ yesterday morning.
a. was arrived
b. arriving
c. arrived

12. Helmets must _____ on the site.
a. wear
b. are worn

c. be worn

13. Vehicles parked in front of these gates will _____
a. remove
b. be removed
c. are removed

14. We will _____ any vehicles parked in front of these gates.
a. be removed
b. remove
c. have removed

15. It _____ if you could reply as soon as possible.
a. is appreciated
b. appreciate
c. appreciated

16. I would very much _____ it if you could reply as soon as possible.
a. be appreciated
b. appreciate
c. appreciates

17. All bills must _____ promptly.
a. settle
b. be settle
c. be settled

6. Open the brackets.
1. Rose … (scare - past) by the snake.
2. Many cars … (make - present) in Japan.
3. The cinema … (close - past) by the police.
4. The work … (do - present) three times a day.
5. The pictures … (paint - past) by Picasso.
6. The cheese … (eat - past) by the mice.
7. These knives … (use - present) to cut up food.
8. They … (ask - past) the question two times.
9. Our house … (build - past) in 1902.
10. Computers … (use - present) all over the world.
11. An ovation … (give - present) to the actors.
12. A bicycle … (steal - past) from her garage.

7. Find passive sentences in the text and transform them into active.

The Fourth State of Matter

There are three classic states of matter: solid, liquid, and gas; however, plasma is considered by some scientists to be the fourth state of matter. The plasma state is not related to blood plasma, the most common usage of the word; rather, the term has been used in physics since the 1920s to represent an ionized gas. Lightning is commonly seen as a form of plasma. Plasma is found in both ordinary and exotic places. When an electric current is passed through neon gas, it produces both plasma and light. Lightning is a massive electrical discharge in the atmosphere that creates a jagged column of plasma. Part of a comet's streaming tail is plasma from gas ionized by sunlight and other unknown processes. The Sun is a 1.5-millionkilometer ball of plasma. It is heated by nuclear fusion. Scientists study plasma for practical purposes. In an effort to harness fusion energy on Earth, physicists are studying devices that create and confine very hot plasmas in magnetic fields. In 39 space, plasma processes are largely responsible for shielding Earth from cosmic radiation, and much of the Sun's influence on Earth occurs by energy transfer through the ionized layers of the upper atmosphere.

UNIT 14

1. Look up new words given below in your dictionary and memorise them.

to occur	apparent
chemical species	research body
soil	nutrients
aquatic chemistry	to leach
analytical chemistry	eutrophication
uncontaminated environment	impervious surfaces
to release	hydrocarbon compound
substance	sediment
sophisticated	organometallic compound
harmful effect	liquefaction
approach	factional distillation

2. Read and translate the text.

Environmental chemistry

Environmental chemistry is the scientific study of the chemical and biochemical phenomena that occur in natural places. It can be defined as the study of the sources, reactions, transport, effects, and fates of chemical species in the air, soil, and water environments; and the effect of human activity on these. This is an interdisciplinary science that includes atmospheric, aquatic and soil chemistry, as well as analytical chemistry.

Environmental chemistry starts by understanding how the uncontaminated environment works. It identifies the chemicals that are present naturally and studies the concentration and effects of those chemicals. Then, it accurately studies the effects humans have on the environment through the release of chemicals.

This branch of science is closely connected with contamination. A contaminant is a substance present in nature at a level higher than typical levels or that would not otherwise be there. This may be due to human activity. The term contaminant is often used interchangeably with pollutant, which is a substance that hurts the surrounding environment. While a contaminant is sometimes defined as a substance present in the environment as a result of human activity, but without harmful effects, it is sometimes the case that toxic or harmful effects from contamination only become apparent at a later date.

Environmental chemistry is used by the Environment Agency (in England and Wales), the Environmental Protection Agency (in the United States) the Association of Public Analysts, and other environmental agencies and research bodies around the world to detect and identify the nature and source of pollutants. These can include:

- Heavy metal contamination of land by industry. These can then be transported into water and be taken up by living organisms.

- Nutrients leaching from agricultural land into water, which can lead to algal blooms and eutrophication.
- Urban runoff of pollutants washing off impervious surfaces (roads, parking lots, and rooftops) during rain storms. Typical pollutants include gasoline, motor oil and other hydrocarbon compounds, metals, nutrients and sediment (soil).
- Organometallic compounds.

Quantitative chemical analysis is a key part of environmental chemistry, since it provides the data that frame most environmental studies.

Common analytical techniques used for quantitative determinations in environmental chemistry include classical wet chemistry, such as gravimetric, titrimetric and electrochemical methods. More sophisticated approaches are used in the determination of trace metals and organic compounds.

Other parameters often measured in environmental chemistry are radiochemicals. These are pollutants which emit radioactive materials, such as alpha and beta particles, posing danger to human health and the environment.

3. Answer the questions.

1. What does environmental chemistry study?
2. What does this science include?
3. What is a contaminant?
4. How do we start the study of environmental chemistry?
5. What is this branch of science closely connected with?
6. What environmental agencies use this branch of science?
7. What is a key part of environmental chemistry? Why?

4. Define the part of speech of each word. Write derivatives and translate them.

contamination _____
pollution _____
surround _____
emit _____
dangerous _____
environment _____
identify _____

5. Fill in the gaps: *into, from, in, on, of, by, until, to.*

1. The academic year is divided ____ two terms.
2. Priestley recognized that the gas which he had discovered plays an important role _____ combustion.
3. ____the basis ____the experimental results Priestley, and others, as well as some very fine experimental work ____his own, ____1777 the brilliant French chemist Lavoisier established the modern concept ____ the combustion ____a substances with a new gas.
4. The yield ____ the reaction is greatly affected ___ temperature.
5. There is no suitable technique _____ now.

6. Attention was drawn ___the valance ____substances.
7. Much attention has been given recently ____ the study ____this group ____ oxides.
8. Probably 95 per cent ____the huge volume ___ oxygen used today is obtained _____the air _____a process which was developed _____Dr. Carl von Linde.
9. This method is based ____the liquefaction ____ air and its factional distillation.
10. Evaporation continues _____no liquid is left.

6. Fill in the gaps with articles where necessary.

1. Let us analyse what happens when ... liquid is placed in ... closed evacuated container.
2. As long as ... temperature remains constant, ... evaporation continues at ... constant rate.
3. As ... pressure of ... vapour grows, ... number of... gas molecules returning to ... liquid also increases.
4. .. time dependence of ... evaporation and condensation rates should be considered.
5. At equilibrium, … evaporation and … condensation do not stop.

7. Give synonyms for the following.

magnitude	
mention	
substantial	
fraction	
remain	
place	
primarily	
vapour	

8. Translate the sentences paying attention to the meanings of the word *case*:

1. We shall first limit ourselves to the case of ideal solutions.
2. ln case a solute and its solution reach equilibrium, a saturated solution may result.
3.A homogeneous material has the same properties throughout, it is far from the case with heterogeneous materials.
4. According to their properties the halogens should be very reactive, and this is really the case.
5. Reacting with oxygen, an element forms an oxide in which case the process is known as oxidation.
6. Phosphorus is very active chemically, but this is not the case with nitrogen.
7. During oxidation, heat and light are often liberated, in this case the process is called combustion. 8. It was supposed that oxidation of copper could be prevented under low temperatures, and such was the case.
9. One cannot expect that gas molecules would always behave in the same way as is the case with liquid molecules.

10. lf there are several ways of doing something. one should know all of them so that he could choose anyone. as the case may be.

9. Compose a story on one of the topics (up to 100 words).

- Environmental chemistry as a science.
- Contamination of the Earth

Grammar module

Passive Voice (part 2)

1. Write an active sentence and a passive sentence for each subject. Choose an appropriate tense.

Active: The test has 12 questions**.**
Passive: The test will be given in a large auditorium.
1. Active: My textbook _____
Passive: My textbook _____
2. Active: My best friend _____
Passive: My best friend _____
3. Active: Some students _____
Passive: Some students _____
4. Active: I _____
Passive: I _____

2. Fill in the gaps with Passive Voice of the verb in brackets. Choose an appropriate tense.

Example: Hollywood *was built* in the early 1900s. (build)
1. Most American movies _____ in Hollywood. (make)
2. Let's get some popcorn. It's fresh. It _____ right now. (make)
3. Movie listings _____in the newspaper. (can find)
4. Children _____ to see some movies. (not allow)
5. Hurry! The winners _____ in ten minutes. (announce)
6. In 1929, only fifteen Oscars_____. (present)
7. Before 1941, the winners' names _____ in newspapers the night before the ceremony. (publish)
8. A new theater near my house _____ at this time. (build)
9. We can't get into the movie theater because all the tickets _____ already. (sell)
10. Did you see the movie Harry Potter? Where _____it _____? (film)
11. I went to the lobby to buy popcorn, and my seat _____. (take)
12. No one knows why the award _____ "Oscar." (call)
13. *Slumdog Millionaire*_____ as the best film of 2009. (choose)
14. In a movie theater, coming attractions_____ (show) before the feature film begins.

15. Sound _____to movies in 1927. (add)
16. The Kodak Theatre, where the awards _____(present) each year, _____ in 2001. (build)

3. Define the tense. Change the sentences to Passive Voice.

1. The Browns have built the large house.
2. A jellyfish stung her while she was swimming.
3. They gave her a nice present.
4. Jane is singing the new song.
5. The storm destroyed the house.
6. People spent a lot of money on the first shopping Saturday.
7. How do you write that word?
8. She watered the flowers every day.
9. The headmaster called his parents to the office.
10. Ben will direct the show.
11. The dog has broken the window pane.
12. You must pay the bill first.
13. They were interviewing her for the job.
14. The professor told him not to talk in class.
15. You shouldn't speak to your neighbor.
16. Do not leave your bicycle in the hall.
17. Can you learn French easily?
18. Your impolite tone surprises me.
19. James will repair the car.
20. An unknown author wrote the book.
21. They forced him to steal the money out of his dad's room.
22. Our neighbors have invited us to dinner.
23. Why are they tearing down the old theatre?
24. I will present my ideas at the conference tonight.
25. She would have told you.

4. Make sentences in Passive Voice using the tenses in brackets. Add words where necessary.

1. Great motorcycles - make – Japan. (Present Simple)

_____

2. The lawn – not mow – last week. (Present Perfect Simple)

_____

3. The postman – not see – recently. (Present Perfect Simple)

_____

4. The Gothic cathedral – build – 10th century. (Past Simple)

_____

5. Many languages – speak – in the EU. (Present Simple)

_____

6. The schoolhouse – repair – today. (Present Continuous)

_____

7. The prize – award – tomorrow. (Future Simple)

_____

8. After the accident – Harry – take – to a doctor. (Past Simple)

_____

9. When I came in – the fridge – repair. (Past Continuous)

_____

10. The jewels – find – in the basement. (Past Simple)

_____

11. After the shop – close – it – sell. (Past Perfect Simple – Past Simple)

_____

12. Special technology – use. (Present Continuous)

_____

13. The thief – not find – by the police. (Present Perfect Simple)

_____

14. The shop – close – next month. (Future Simple)

_____

15. The cat – call – Sissy. (Present Simple)

_____

5. Fill in the gaps with Active or Passive Voice of the verb in brackets. Use the tense indicated.

I *saw* an old movie on TV last night. *(past: see)*
The movie *was filmed* in black and white. *(past: film)*
It *will be shown* again on TV tonight. *(future: show)*

1. Many movies _____ in Hollywood. (present: make)
2. Steven Spielberg _____ many movies. (present perfect: make)
3. We _____ a DVD this weekend. (future: rent)
4. Vera Wang _____ beautiful dresses. (present: design)
5. The actress _____a dress that _____ by Ralph Lauren. (past continuous: wear) (past: design)
6. Who _____ the music for the movie? The music _____ by Randy Newman. (past: write) (past: write)
7. The first Academy Awards presentation _____ 250 guests. (past: have)
8. I _____ Star Wars. (present perfect: never see)
9. Computer animation _____ in many movies. (present: use)
10. Movie reviewers _____ predictions weeks before the Oscar presentation. (present: make)
11. Oscar winners _____ the people who helped them. (present: always thank)

6. Fill in the gaps using the correct tense and voice.

1. Listen! An old tune ……. (play) on the radio.

2. Nobody ……. (help) Mr. Green while the garage …… (paint).
3. Mary ……. (have) a bath before she …… (call) by one of her friends yesterday.
4. The accountant …… (look) sad because the bills ……. (pay) yet.
5. He felt sorry when he ……. (realize) that his stamp collection ……. (steal).
6. If I …… (meet) him next week, I …… (not treat) him like that.
7. If she ……. (see) me, she ……. (get) angry with me.
8. He ……. (stop smoking) since he …… (have) a heart attack.
9. As soon as she ……. (finish changing) the baby's nappy, she ……. (take) the children to school.
10. He said his car ……. already ……... (mend).
11. She said she …… (open) her first exhibition the following month.
12. Mary and Joe want …… (go) to the shore which ……. (sound) like a good idea to me.
13. He ……. (not wake up) on time unless he ……. (use) an alarm clock.

7. Use the correct tense and voice.

1. I …… (play) the piano since I …… (be) six.
2. …….. (not look) behind you. I think, someone ……. (follow) us.
3. A: Have you heard about the accident?
B: No, what …… (happen)?
A: A cyclist …… (hit) by a taxi driver in front of the post office.
B: OK, then?
A: Someone ……. (call) an ambulance and the cyclist …… (take) to the City Hospital.
B: ……. he …… (have) an operation?
A: No, he …… but it …… (say) that he ……... (have to stay) in hospital for about two weeks.
B: ……. his parents …… (inform) about the accident yet?
A: They …… (already phone) from the hospital.
B: ……. (be) his friends in hospital now?
A: No, his friends ……. (not allow) ……. (see) him. They ……. (wait) right in front of the hospital ……. (hear) a piece of news, at the moment.
4. Before Christmas all the shops and houses ……. (decorate) with cards and Christmas trees. Presents ……. (buy) for the relatives and friends.
5. Linda ……. (look) very happy now, because her boyfriend …… ……. (just give) her an engagement ring.
6. Dinner …… (must cook) before we …… (go) out.
7. April 23rd …… (give) as a holiday to the Turkish children

by Mustafa Kemal Atatürk.
8. The old man …… (be) in prison for twenty years, by the time he ……. (die) last year.
9. When Jane …… (arrive) late for the interview, she ……. (realize) that the Director ……. (leave).
10. …….. you …… (see) Ann this morning? (It's still morning.)
11. …….. you …… (see) Ann this morning? (It's evening.)
12. I …… (try) to learn English for three years but I ……. (not succeed) yet.

UNIT 15

1. Look up new words given below in your dictionary and memorise them.

mixture	qualitative analysis
pure substance	specimen
chemical identity	to overlap
to obtain	demand
composition of	to rely on
sample	to maintain
to reveal	sophisticated device
to impart	to ensure
to ignite	to verify
impurity	compliance
quantitative analysis	regulatory requirements

2. Read and translate the text.

Analytical Chemistry

Most of the materials that occur on Earth, such as wood, coal, minerals, or air, are mixtures of many different chemical substances. Each pure chemical substance (e.g., oxygen, iron, or water) has a characteristic set of properties that gives it its chemical identity. Iron, for example, is a common silver-white metal that melts at 1 535° C, readily combines with oxygen to form the common substances hematite and magnetite. The detection of iron in a mixture of metals, or in a compound such as magnetite, is a branch of analytical chemistry. So we can define analytical chemistry as a science of obtaining, processing, and giving information about the composition and structure of matter. In other words, it is the art and science of determining what matter is and how much of it exists.

Over the years, chemists have discovered chemical reactions that indicate the presence of such elemental substances by the production of easily visible and identifiable products. Iron can be detected by chemical means if it is present in a sample to an amount of 1 part per million or greater. Some very simple qualitative tests reveal the presence of specific chemical elements in even smaller amounts. The yellow colour imparted to a flame by sodium is visible if the sample being ignited has as little as one-billionth of a gram of sodium. Such analytic tests have allowed chemists to identify the types and amounts of impurities in various substances and to determine the properties of very pure materials.

Qualitative analysis characterizes the identity of a specimen, while quantitative analysis examines its mass or concentration. Techniques used in qualitative analysis include chemical tests, spectroscopy, spectrometry, microscopy, flame tests, and bead tests. Quantitative analysis employs analytical balances, gravimetric analysis, volumetric analysis, and separation techniques, such as filtration, centrifugation, and chromatography. There is overlap of techniques used between the two branches, especially since samples may require purification in order to characterize them.

The importance of analytical chemistry has never been greater than it is today. The demand in modern societies for a variety of safe foods, affordable consumer goods, abundant energy, and labour-saving technologies has a great impact on the environment. Pollution problems have increased with the growth of global population. The techniques of analytical chemistry are relied on heavily to maintain a clean environment. The undesirable substances in water, air, soil, and food must be identified, their point of origin fixed, and safe, economical methods for their removal or neutralization developed.

Today's sophisticated devices—as well as increasing regulatory requirements—have created new opportunities for analytical chemists in a variety of areas:

- Quality assurance specialists ensure that laboratories follow documented and approved procedures.
- Quality control experts ensure the quality of the products that laboratories produce.
- Chemists with good technical and computer skills develop and use complex analytical techniques.
- Government agencies need analytical chemists to verify compliance with regulatory requirements.

3. Answer the questions.

1. How can most materials that occur on the Earth be define?
2. Can you give examples of a pure chemical substance?
3. What is analytical chemistry?

4. What reveals the presence of specific chemical elements in even small amounts of a product?
5. What allows chemists to identify the types and amounts of impurities in various substances and to determine the properties of very pure materials?
6. What is the difference between qualitative and quantitative analysis?
7. What methods are used in qualitative analysis and in quantitative analysis?
8. Why is analytical chemistry of great importance today?
9. How is analytical chemistry used in different areas of our society?

4. Make derivatives of the following words.

Verb	*Adjective*	*Noun*
	affordable	
		purity
require		
indentify		
	reliable	
		increase
differ		
		removal

5. Give the synonyms for the following words.

to help	
to show	
more	
a fact	
to take notice of	
amount	
demand	
to begin	
a kind of	
an example	

6. Give the antonyms for the following words.

first	
contrary to	
inexperienced	
regular	
to take into account	
insufficient	
the same	

simple	
after	
to finish	

7. Fill in the gaps with an appropriate word.

chemists techniques narrow analytical material components identify accurate billion instrument

Sophisticated analytical instruments have improved the accuracy with which 1. _____can identify substances and have lowered detection limits. An 2. _____ technique in general use is gas chromatography, which separates the different 3. _____ of a gaseous mixture by passing it through a long, 4. _____ column of absorbent material. The different gases interact differently with this absorbent 5. _____ and pass through the column at different rates. As the separate gases flow out of the column, they can be passed into another analytical 6. _____ called a mass spectrometer, which separates substances. A combined gas chromatograph–mass spectrometer can rapidly 7. _____ the individual components of a chemical mixture which concentrations may be no greater than a few parts per 8. _____. Similar or even greater sensitivities can be obtained under favourable conditions using 9. _____ such as atomic absorption, polarography, and neutron activation. The rate of instrumental innovation is such that analytical instruments often become outdated within 10 years. Newer instruments are more 10. _____ and faster and are employed widely in the areas of environmental and medicinal chemistry.

8. Compose a story on one of the topics (up to 100 words).

- Analytical chemistry as a science
- Qualitative and quantitative analysis in analytical chemistry.

Grammar module

Conditionals (zero, 1st, 2nd, 3rd)

1. Put the verbs in brackets into the correct tenses.

1. If it doesn't ... (rain), plants cannot grow.
2. If I ... (try) to cook, I ruin the food.
3. If you smoke, your skin ... (age) more quickly.
4. If you heat ice, it ... (melt).
5. I feel good if you ... (visit) me regularly.
6. Water evaporates if you ... (boil) it.
7. Deren ... (cycle) to work if the weather is good.
8. I feel sick if I ... (eat) too much chocolate.
9. You need to take my sister to the hospital if she ... (drink) milk as she is allergic to it.
10. If Andy ... (go) to bed late, he cannot wake up early.

2. Choose the correct form of each verb to complete each sentence.

1. If you don't put so much sugar in your coffee, you _____ so much weight!
   a. won't put on
   b. don't put on

2. If we don't protect the elephant, it _____ extinct.
   a. becomes
   b. will become

3. You _____ heart disease if you eat too much meat.
   a. will get
   b. get

4. You _____ better if you turn on the lamp.
   a. will be able to see
   b. are able to see

5. You won't pass the course if you _____.
   a. won't study
   b. don't study

6. You'll pay higher insurance if you _____ a sports car.
   a. buy
   b. will buy

7. If you _____ an apple every day, you'll be very healthy.
   a. will eat
   b. eat

8. She _____ completely different if she cuts her hair.
   a. looks
   b. will look

9. If a deer _____ into your garden, it _____ all your plants.
   a. gets / will eat
   b. will get / eats

10. If I _____ some eggs, how many _____?
   a. will cook / do you eat
   b. cook / will you eat

3. Put the verbs in brackets into the correct tenses.

1. If I see him, I ... (give) him a lift.

2. The table will break if you ... (sit) on it.
3. If he ... (eat) all that, he will be ill.
4. If I find your passport, I ... (telephone) you.
5. The police ... (arrest) him, if they catch him.
6. If he ... (read) in bad light, he will ruin his eyes.
7. Someone ... (steal) your car if you leave it unlocked.
8. What will happen if my parachute ... (not open)?
9. If he ... (wash) my car, I'll give him $10.
10. If she ... (need) a radio, she can borrow mine.
11. If you ... (not go) away, I'll call the police.
12. I'll be very angry if he ... (make) any more mistakes.
13. If he ... (be) late, we'll go without him.
14. She will be absolutely furious if she ... (hear) about this.
15. If you put on the kettle, I ... (make) some tea.
16. If you give my dog a bone, he ... (bury) it.
17. If we leave the car here, it ... (not be) in anybody's way.
18. He'll be late for the train if he ... (not start) at once.
19. If you come late, they ... (not let) you in.
20. If he ... (go) on telling lies, nobody will believe a word he says.
21. Unless he ... (sell) more, he won't get much commission.
22. If I lend you $10, when you ... (repay) me?
23. We'll have to move upstairs if the river ... (rise) any higher.
24. If he ... (work) hard today, can he have a holiday tomorrow?
25. Ice ... (turn) to water if you heat it.
26. If the house ... (burn) down, we can claim compensation.
27. If you ... (not like) this one, I'll bring you another.
28. Unless you are more careful, you ... (have) an accident.
29. Tell him to ring me up if you ... (see) him.
30. If I tell you a secret, you ... (promise) not to tell it to anyone else?
31. If you ... (not believe) what I say, ask your mother.
32. If he ... (like) the house, will he buy it?
33. If you kindly sit down, I ... (make) enquiries for you.
34. Unless I have a quiet room, I ... (not be able) to do any work.
35. She won't open the door unless she ... (know) who it is.
36. Should you require anything else, please ... (ring) the bell for the attendant.

4. Complete with the correct form of the verbs.

Example: If I ___ to the party, I _____ back before midnight. (go, come)
If I *go* to the party, I *will come* back before midnight.

1. If she … a new washing machine, she … less money in the laundromat. (buy, spend)
2. Please, … Louise to meet me in the restaurant if you … her. (tell, see)
3. If you … water, it … into ice. (freeze, turn)
4. If you … the car, the alarm … off. (touch, go)

5. If you don't …, I … the police. (leave, call)
6. If it …, we … home. (rain, stay)
7. He … the test if he … (pass, study)
8. She … to sell the car if she doesn't … a job. (have, find)

5. Put the verbs in brackets into the correct tenses.

1. If Alex ... (sell) his old mobile, he ... (buy) a new MP3 player.
2. We ... (come) to the party if it ... (start) at 8 o'clock.
3. The boy ... (be) on the Olympic team if he ... (train) harder.
4. If you ... (click) the red button, you ... (cancel) the download.
5. If they ... (be) old enough, they ... (play) in the school basketball team.
6. Maria ... (understand) the text if her teacher ... (mark) the important sentences.
7. Joe ... (get) better marks if he ... (improve) his grammar.
8. If we ... (recycle) these cans, we ... (reduce) rubbish.
9. If you ... (change) your money at a bank, you ... (save) commission.
10. If it ... (snow) during the night, I ... (go) snowboarding the next morning.

6. Put the verbs in brackets into the correct tenses in 2nd Conditional.

1. They *wouldn't go* back home if you *paid* them. (not go) (pay)
2. But I *could bear up* better if it … for press comments. (bear) (not be)
3. Of course I ... I hadn't taken it if I ... - and I didn't take it, indeed I didn't. (not say) (have)
4. They ... it if you ... them of the best. (not touch) (give)
5. He ... worthy of hate his whole life long, if he ... her once more! (be) (not seek)
6. If she ... it, it ... (write) (passive: not print)
7. If I ... in private the same submissive wife that I appear to others, he ... confidence in himself. (not remain) (lose)
8. He ... happy if he ... (not be) (not be)
9. If he ... this task, we ... him. (do) (not believe)
10. If I ... a dog, he ... the things for me. (have) (carry)
11. If I ..., I ... mischief. (do) (make)
12. He knew that if he ..., he ... everything. (laugh) (spoil)
13. If it ... the man himself I ... (be) (not mind)
14. If sentiment ... too fast, she ... a quarrel over a word, or when words flagged behind her thoughts, she appealed to the feelings. (go) (raise)
15. Honestly believing that his affection was returned, Caesar was offering her the highest honor in his power; if she ... from him, he ... every right to complain of having been basely deceived, and to call her a heartless wanton. (flee) (have)
16. If you ... at his hand, you ... it. (look) (see)
17. How one ... if it ... true! (laugh) (be)
18. Folks ... him if he ... that. (not know) (leave)
19. John never knew that noise to cease, and he doubted not, if he ... here a thousand years, that same loud murmur ... the air. (stay) (fill)
20. If they ..., they ... and out. (do) (get up)

7. Put the verbs in brackets into the correct tenses in 1st or 2nd Conditionals.

1. He wouldn't sell it if you *were* around. (be)
2. And if he *loves* her, he will marry her. (love)
3. He will kill you if he *puts* himself in a passion. (put)
4. If he ... me he'll shout. (want)
5. If it ... a bear he will come again. (be)
6. If he ... she would not hear him. (do)
7. If you ... it, I'll kill you. (not/tell)
8. I'll let you in, if you ... (wish)
9. If he ..., he would kill me. (know)
10. He'll make us trouble if we ... (stay)
11. If you ..., I will go with you. (go)
12. If she ... he would run after her. (run)
13. If I ..., it will be my own fault. (fail)
14. If they ... the authority, he would obey. (have)
15. If the war ... again, I will help. (begin)
16. What would she think if she ... me? (see)
17. If you ... in this way, you'll die. (continue)
18. If you ... so, I'll marry. (say)
19. They would not know you if they ... here. (stand)
20. If you ... that way I'll ride. (feel)

8. Put the verbs in brackets into the correct tenses in 3rd Conditional.

1. If it ... (be) warmer, we ... (go) swimming.
2. My parents ... (buy) this house if the man ... (not sell) it to someone else.
3. If he ... (not fail) his driving test, his parents ... (lend) him their car.
4. If my uncle ... (tell) me the way to his office, I ... (not arrive) so late.
5. She ... (be) at the airport if she ... (read) the message carefully.
6. Lucy ... (not hurt) her foot if she ... (not drop) the old box on it.
7. If you ... (use) a sharp knife, you ... (not cut) yourself.
8. If Victoria ... (celebrate) her birthday at home, I ... (bring) her some flowers.
9. We ... (take) the train to Edinburgh if it ... (run) on time.
10. If Max ... (not forget) his schoolbag, he ... (give) you your USB flash drive.

9. Put the verbs in brackets into the correct tenses in 2nd or 3rd Conditionals.

1. If we *had gone* another step they would have seen us. (go)
2. She would be nice if she *had* a heart. (have)
3. What would he think if I .... him? (refuse)
4. They would be happier if he ... dead. (be)
5. The curate sometimes contradicted him, sometimes agreed with him, for if he ... this precaution he would have been unable to bring him to reason. (not observe)
6. If we ... the law, we could have it. (wish)
7. If they ... in London they would have been even more furious, I expect. (live)

8. I'm sure they must have some of my animals hidden away in the hills, for I would have heard of it if they ... them around here. (sell)
9. If she ... ever so little for him, she would not have avoided him this first evening. (feel)
10. If he ..., he wouldn't tell. (do)
11. If I ... it myself, I would not have believed it. (not witness)
12. After all, it never would have happened if I ... you. (not meet)
13. And if Lucy ... there, Maggie was sure he would have made friends with her sooner. (not be)
14. He would be so disappointed if I .... (refuse)
15. If she ... me it was a joke I would have laughed. (tell)
16. Where would I be if I ...? (not kill)
17. Mother and daughter did not put entire confidence in him, as they would have done if he ... his honor; and he felt this. (not lose)
18. I wouldn't have a new car if I ... much money. (earn)
19. If they ... me they would not believe it. (love)
20. If I ... he would pay me back. (think)

10. Put the verbs in brackets into the correct tenses in 1st, 2nd, 3rd Conditionals.
1. If I *had* a secret, I would not tell you. (have)
2. But you will not find them if you *go*. (go)
3. If you *hadn't consented*, it could not have commenced. (not consent)
4. If she ... I will see her. (come)
5. If he ... them, they would have killed him. (not kill)
6. If it ... one thing, it's another. (not be)
7. If it ... for him it wouldn't have happened. (not be)
8. If you ..., you will be paid. (work)
9. You won't believe me if I ... you. (tell)
10. If I ..., it's in Virginia. (remember)
11. If they ... me, they'll do it. (catch)
12. You'll remember if you ... a minute. (think)
13. If he ..., I would have been faithful. (die)
14. If he ..., he would leave her. (do)
15. If he ..., he succeeds alone. (succeed)
16. If she ... him she'll get him. (want)
17. If love ... a child, passion is a man. (be)
18. If he ..., it is war. (refuse)
19. If you ... him, he will come. (ask)
20. I would have stopped him if he .... (try)

KEYS READING MODULES

UNIT 1

3. 1. Chemistry is the study of matter and the changes that material substances undergo.
2. geology, oceanography, engineering, physic, astronomy, biology, medicine, pharmacology, nutrition, toxicology
3. Chemistry can help us to understand, monitor, protect and improve the environment around us. Chemists are developing tools and techniques to make sure that we can see and measure air and water pollution. They have helped to build the evidence that shows how our climate has changed over time.
4. A living cell contains a large collection of complex molecules that carry out thousands of chemical reactions, including those that are necessary for the cell to reproduce.
5. Biological phenomena such as vision, taste, smell, and movement result from numerous chemical reactions.
6. Medicine, pharmacology, nutrition, and toxicology focus specifically on how the chemical substances that enter our bodies interact with the chemical components of the body to maintain our health and well-being.

5. 1b, 2c, 3a

6. 1e; 2 a; 3 f; 4 b; 5 c; 6 d

7. 1. You should also **(-)** know there is a difference between mass and weight. Mass **is** a measure of the matter in an object while weight **is** a measure of gravity's pull on an object.(3 mistakes)
2. Words such as big, little, long, or short are **used** to describe**s** volumes. (2 mistakes)
3. What are the main **states** of matter? Everyone **knows** about solids, liquids, gases, and plasmas.(2 mistakes)
4. **What** is a physical change in matter? Molecules can **move** from one physical state **to** another and not change their atomic structure**.** (3 mistakes)
5. Generally, the basic chemical structure **does** not change when there **is** a physical change. (2 mistakes)

UNIT 2

3. 1. Chemists usually investigate matter.
2. Matter refers to anything that occupies space and has mass—in other words, the "stuff" that the universe is made of. All matter is made up of substances called elements, which have specific chemical and physical properties and cannot be broken down into other substances through ordinary chemical reactions.

Chemists use special equipment to study those little units of matter. Scientists theorize all of the matter we can observe makes up about 5% of the Universe. The rest is made of dark matter and dark energy.

3. Matter takes up space. Matter also has a mass.

4. Mass is an amount of matter that is the same everywhere in the Universe. Weight is based on the gravity of the environment.

5. Atoms are the smallest and most basic units of matter that have the properties of an element.

4. Na – 22.9, Si – 28.0, Ag – 107,8, Br – 79.9, Pb – 207.2, Au – 196.9, Cu – 63.5, Mg – 24.3.

5. Atoms are the smallest and most basic units of matter that have the properties of an element. All atoms have the same basic parts (electrons, protons, and neutrons), but they are arranged in different ways. Electrons are smaller than atoms and there are subatomic particles that are smaller than electrons. But those tiny particles don't have the properties of an element. When the small parts are combined into atoms, chemists can start to see properties and patterns in their behavior.

6. Elements are **pieces** of matter where all of the atoms have the same **chemical** properties. Elements are made **of** similar atoms. We want to say the atoms are exactly the same, but that's not quite true. An **element** is made of atoms that have the same number of **protons**. If you have a batch of atoms and they all have the same number of protons, they are all one element.

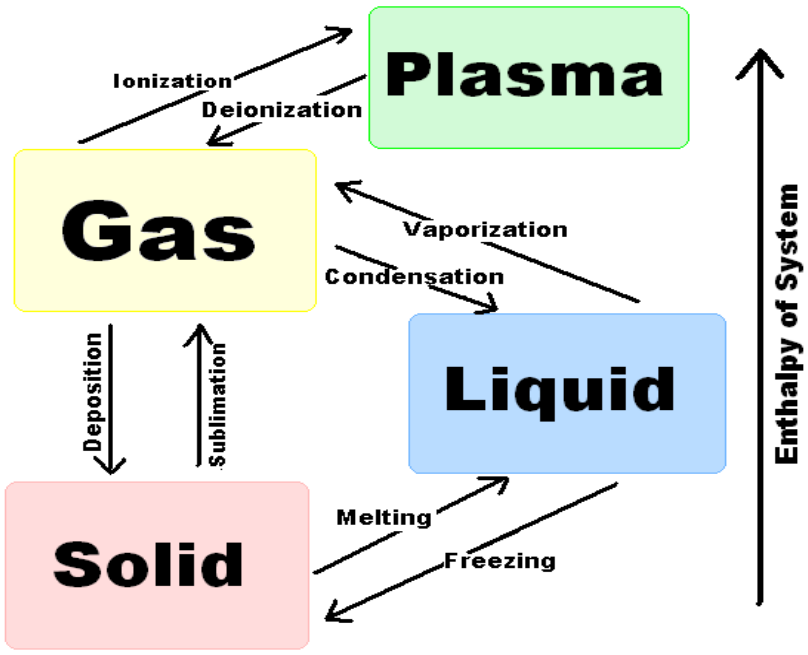
For example, if the atoms all have four protons, they are beryllium (Be) atoms. Some of those **atoms** may have four electrons (neutral). Some atoms may have three electrons, leaving the atom with a positive charge (ions). Those ions are still considered beryllium atoms. Neutrons **work** the same way. You may have four neutrons, but you might also have three or five neutrons. Atoms with the same number of protons and different numbers of neutrons **are called** isotopes of an element. Isotopes and ions are still the same element even though they have different numbers of neutrons and electrons.

7. Atom – atomic, to atomize
Chemistry – biochemistry, chemist, chemical
Compare–comparison, comparable
Measure – measurement, measureless, measured, measuring
Acid – acidity, acidly, acidic

8.
F Chemistry is the study of matter.
T Matter takes up space and has a mass.
T Mass is the amount of matter in an object or substance.

F Atoms are made of small pieces of matter (electrons, protons, and neutrons).
F Atoms are the most basic pieces of an element.
T Elements are made of the same types of atoms (based on the number of protons).
F Matter can change physical states without having a chemical reaction.
T Chemical reactions occur when matter interacts and transforms (changes in chemical bonds).

UNIT 3
3.



4 .
1. How many states of matter are discussed in the text? Name them.
Five (We cover five states of matter. You will find solids, liquids, gases, plasmas, and the Bose-Einstein condensate. Each state has its own physical traits and ways of interacting with the world of chemistry. Depending on your definitions, there can be over a dozen states of matter.)
2. Atoms in a liquid are farther apart than the atoms in a gas.
False (Atoms in a gas are farther apart than the atoms in a liquid. Solids are the densest of the three main states of matter (solids liquids, and gases). Gases are the least dense and have atoms that are the most spread out.)
3. Which has the least energetic molecules?
Solids (Solids have the least energetic molecules. When you think about the different states of matter, you need to remember that energy is very important. Plasmas and gases have the most energetic atoms.)
4. What force pulls liquids towards the ground?
Gravity(Gravity is the right answer to that question. The other choices affect liquids, but do different things. Gravity is the one force that pulls every object towards the surface of the Earth.)
5. When a substance goes from being a solid to a liquid, it is a...

Physical Change(When a substance moves from one state to another, it is a physical change. Physical changes usually happen because you add or take away energy. If one substance combines with another to make a new compound, you have a chemical change. Examples of physical changes include melting, boiling, freezing, and condensation.)

6. You may find plasma in a star.

True(Plasma is what makes a star a star. There are very high temperatures and high energies in stars. That energy super-excites the molecules and creates plasmas. High-energy, charged particles create the stellar plasma that makes a star glow. Solar winds are high-energy particles blown off the sun that eventually create the aurora borealis and aurora australis.)

7. Which of these choices will NOT change the state of matter?

Crushing a Crystal(All of the choices, except the crushing of a crystal into smaller pieces, will change the state of matter. A hammer could change the shape of a substance, but it does not add energy to a system that will change its physical state.)

8. If you leave water in a glass and some molecules turn into a gas, it is called...

Evaporation(Evaporation happens in systems where some liquid molecules gain enough energy to become a gas. Remember that even though molecules are becoming a gas, evaporation is not boiling. Evaporation in water can happen because of low humidity at room temperature. Rubbing alcohol can also evaporate quickly if you leave it on a counter.)

9. Which of these choices is NOT an example of a plasma?

Incandescent Light Bulb(It is an incandescent light bulb. It generates light by sending a current of electricity through a wire. The others are examples of energy running through ionized gas.)

10. What is usually the total charge of a plasma?

Neutral(Usually, the total charge of plasma is neutral. As the atoms are energized, electrons are released into the system. That release leaves a bunch of positive and negative charges. All of those charges cancel each other out and leave you with plasma that has neutral charge.)

11. What is the term used to describe the phase change as a liquid becomes a solid?

freezing

12. What term is used to describe the phase change of a solid to a liquid?

melting

13. What is the term used to describe the phase change of a liquid to a gas?

boiling

14. What is the densest state of matter?

solids

5.

What is a physical change in matter? Molecules **can** move from one physical state to another (phase change) and not change their **atomic** structure. Oxygen (O_2) gas **has** the same chemical **properties** as liquid oxygen. The liquid state is colder and denser

(less energy), but the **molecules** are the same. Water (H_2O) is another example. A water molecule is **made up** of two hydrogen (H) atoms and one oxygen (O) atom. It has the same molecular **structure** whether it is a gas, liquid, or solid. Although its physical state may change because of different amounts of energy, its atomic structure remains **the same**.
So what is a chemical change in matter? Let's start with that glass of pure water. If the **formula** of water were to change, that would be a **chemical** change. If you could add a second oxygen atom to a water (H_2O) molecule, you would have **hydrogen peroxide** (H_2O_2). The molecules would not be "water" anymore. In reality, there are a **variety** of steps that go into creating hydrogen peroxide from water.

6.
melting point - The melting point (sometimes called liquefaction point) is the temperature and pressure at which a solid becomes a liquid
boiling point - the temperature at which a liquid becomes a gas
freezing point - The freezing point is the temperature at which a liquid changes to a solid.

8.
Physical changes are changes in the formation or state of molecules and atoms. The arrangement of the molecules and atoms is different after the change but the chemical composition of the reactants and produces are the same.
Chemical changes are changes in the chemical bonds and composition of the atoms and molecules. The chemical composition and formulas of the reactants and the products are different.

UNIT 4
3.
1. The atomic number of an atom is the number of _____ in the atom's nucleus.
e. Protons
2. What do elements in the same column of the Periodic Table have in common?
b. The same number of electrons in the outermost shell
3. What are the horizontal rows of the Periodic Table called?
d. Periods
4. What family of elements is in the right-most column of the Periodic Table?
e. Noble gases
5. What family of elements is in the left-most column of the Periodic Table?
a. Alkali metals
6. Elements in the Periodic Table are listed in order of their _____.
a. Atomic number
7. Which of the following is the abbreviation for the element gold?
c. Au
8. What scientist is usually credited with inventing the Periodic Table?
d. Dmitri Mendeleyev

9. What is the abbreviation used in the Periodic Table for hydrogen?
b. H
10. What is the name of the family of elements that has a full outer shell of electrons?
e. Noble gases

4. Mind the difference between *consist*, *contain* and *include*.

Consist of = describes what something is made of, usually you list all the things.
"My breakfast consisted of eggs, bacon, and toast."
"Water consists of hydrogen and oxygen."

Include = for listing some of the things, or additional things, but not necessarily all of the things.
"My breakfast also included a glass of orange juice."
"This history book includes sections about George Washington and Abraham Lincoln."

Contain = same as include, but not the "additional/also" part.
"This book contains sections on Washington and Lincoln."
Contain can also mean "hold" or "carry." We use it for boxes, crates, bottles, and other things that can be opened and closed. We often call small boxes "containers."
Also contain can also mean to trap a dangerous thing, and prevent it from escaping.
"The animal is being contained in that room."
"We need to contain the virus before it infects more people."

1. The classic symptoms of exposure to toxic chemicals **include** headaches, sore throats, vomiting, etc.
2. The trees **contain** between 460-800 billion tones of carbon.
3. The local fauna **includes/consists of** wolves, snakes and a wide range of unpleasant insects.
4. The graphs do not **contain** information about the use of the cell.
5. Other greenhouse gasses **include/consist of** carbon dioxide, methane and chlorofluorocarbons.
6. Does the price **include** the tax?
7. The tour **includes** a visit to the Science museum.
8. The committee **consists of** ten members.
9. Her report **contains** several inaccuracies.
10. The diet **consists** largely **of** vegetables.
11. You should **include** some examples in your essay.
12. This drink doesn't **contain** any alcohol.

5.

1. renowned **a famous** b unknown
2. raise a lower **b elevate**

3. use	**a employ**	b enable
4. deteriorate	a strengthen	**b weaken**
5. expand	a excite	**b increase**
6. equilibrium	**a balance**	b liquid
7. terminate	a begin	**b end**
8. substantial	**a massive**	b less

6.

Metalloid:

- Metalloids belong to p-block elements and it is placed on the right side of the periodic table.
- Metalloids exhibit the properties of both metals as well as non-metals.
- There are six commonly recognized metalloids in the periodic table. The metalloids are depicted below:

1. Boron (B)
2. Silicon (Si)
3. Germanium (Ge)
4. Arsenic (As)
5. Antimony (Sb)
6. Tellurium (Te)

- While some elements are frequently recognized such as Polonium and Astatine.

Properties of Metalloids:

- The elements that show the properties of both metals and non-metals are known as metalloids.
- Mostly, metalloids have a metallic appearance.
- They are fair conductors of electricity.
- Chemically, metalloids behave as non-metals.

Metals:

- Metals are a group of substances distinguished by strong electrical and thermal conductivity, as well as malleability, ductility, and high light reflectance.
- Metals are naturally occurring compounds under the Earth's surface.
- The majority of metals are lustrous or glossy.
- Metals are inorganic, which implies they are formed of nonliving components.
- Examples of metals are:
- Lithium (Li)
- Magnesium (Mg)
- Aluminum (Al)
- Titanium (Ti)
- Iron (Fe)
- Cobalt (Co)
- Nickel (Ni)
- Copper (Cu)
- Zinc (Zn)
- Silver (Ag)

Non-metals:

- Non-metals are those that lack all metallic properties.
- They are excellent heat and electricity insulators.
- They are usually gases and occasionally liquids.
- Non-metals are elements that absorb or acquire electrons to generate negative ions.
- Nonmetals often have four, five, six, or seven electrons in their outermost shell.
- Examples of non-metals are:
- Hydrogen (H)
- Helium (He)
- Iodine (I)
- Argon (Ar)
- Oxygen (O)
- Neon (Ne)
- Nitrogen (N)
- Carbon (C)
- Sulphur (S)
- Bromine (Br)

7. Fun facts about the Periodic Table

- **Carbon** is unique in that it is known to form up to 10 million different compounds. Carbon is important to the existence of life.
- **Astatine** is the rarest element on earth. There are probably no more than a few ounces of it on earth at any given time.
- The only letters not in the periodic table are the letters **J and Q**.
- The country Argentina is named after the element …. .**silver (symbol Ag- it is argentum in Latin)**.
- Although there is **helium** on Earth, it was first discovered by observing the sun.

8. Possible answers:

1. Dmitri Mendeleyev is the inventor of the modern periodic table

Dmitri Mendeleyev presented his periodic table of the elements based on increasing atomic weight on March 6, 1869, at the Russian Chemical Society. Though he is often cited as the inventor of the modern periodic table, did you know that his table wasn't the first attempt to organize the elements according to periodic properties? In 1864, Lothar Meyer published a periodic table that described the placement of 28 elements.

2. Scientists used battery polarity to weigh the elements

In order to determine the weight of each of the 63 known elements at the time, scientists passed currents through several solutions to break them up into the atoms of specific elements.

Batteries were used to separate the atoms — their polarity would make atoms of one element go in one direction and others in another. The atoms were then collected in separate containers and weighed.

3. The periodic table reflects its creator's love for card games

Dmitri Mendeleyev was very fond of card games. That's why he wrote the weight of each element on a separate index card and sorted them as they would be organized in solitaire.

Elements with similar properties then formed a "suit" and were placed in columns that were ordered by ascending atomic weight.

4. It was used to correctly predict elements that hadn't been discovered

When Mendeleyev put his original periodic table together there were several blank spaces in it. By estimating their properties relative to other elements near the spaces on the table, Mendeleyev was able to correctly predict the discovery of a few elements.

He correctly predicted the weights and chemical behaviors of gallium, scandium, and germanium before they were discovered.

5. It was also used to incorrectly deny the existence of certain elements

Despite impressively predicting the existence of a few elements, Mendeleyev also used his table to incorrectly deny the existence of a few other elements after they had been discovered.

He denied the existence of Argon after it was discovered in 1894 as it didn't fit into his columns, and he did the same after the discovery of helium, neon, krypton, xenon, and radon.

6. The periodic table is periodically revised

The International Union of Pure Applied Chemistry (IUPAC) is responsible for maintaining and updating the periodic table, in the case that any scientific discoveries call for changes.

The most recent revision of the periodic table was published in December 2018.

7. Technetium was the first artificially produced element

Today, there are 118 confirmed elements in the periodic table. 90 of those elements are commonly found in nature, others are largely synthetically made.

Technetium was the first element to be synthesized. It was first produced in 1937. Today there are 24 other elements that are primarily produced synthetically.

8. The modern periodic table is designed in the order of increasing atomic number

Mendeleyev's periodic table was designed in the order of increasing atomic weight while. The modern periodic table has one key difference.

The modern periodic table was designed according to increasing atomic number.

9. Four of the elements in the table were only recently named

On 28 November 2016, the International Union of Pure and Applied Chemistry approved the name and symbols for four elements that were previously dubbed elements 113, 115, 117, and 118.

The elements were named nihonium (Nh), moscovium (Mc), tennessine (Ts), and oganesson (Og).

10. The majority of the elements are metals

Almost 75 percent of the periodic table is composed of metals.

The alkali metals, alkaline earth, basic metals, transition metals, lanthanides, and actinides are all groups of metals.

11. Some elements are named after famous scientists, planets, or mythological figures

Einsteinium is named after Albert Einstein, while germanium, americium, and gallium were named after the places in which they were discovered. Uranium was named shortly after the discovery of Uranus.

The names of some elements come from mythology. For example, thorium is named after the Scandinavian god of thunder, Thor. Titanium, meanwhile, is named after the Greek Titans.

12. Others elements are given the Greek word that best describes them

Then there are the elements named with the Greek word that best describes its properties. Argon is taken from the Greek word "Argos", meaning “lazy” or “idle.” Bromine, which produces a horrible smell, is accurately named after the Greek word "bromos", meaning 'stench.'

13. Opposites of the table attract

If you take the modern periodic table, cut out the complicated middle columns and fold it once along the middle of the Group 4 elements, the groups that "kiss" are the ones that can be stably fused together.

These elements have complementary electron structures that will allow for a combination of the two. So romantic.

14. Carbon is king

Carbon atoms, from Group 4, can form four covalent bonds with other elements and also with itself. This means that carbon atoms can combine with other carbon atoms to form a very wide variety of compounds with a high molecular weight. It also means that the molecules formed can exist in a huge variety of three-dimensional structures, including rings and lattices. This flexibility makes them a key molecule in our very existence.

Did you know that we are around 20 percent carbon, and that the majority of known compounds contain carbon? It is also the fourth most-abundant element in the entire universe.

15. The periodic table might not be able to extend to 137 elements

The physicist Richard Feynman predicted that, if it exists, we will never be able to observe the 137th element.

That's partly because, theoretically, element 137's electrons would orbit at the speed of light. Hypothetically speaking, element 139's electrons would orbit faster than the speed of light, making it impossible given today's scientific knowledge.

UNIT 5

3.

1.Hydrogen

2. This process needs gases that can burn very hot. In welding, electricity splits hydrogen molecules and when the atoms recombine, huge amounts of heat are released.

3. Helium

4. Lithium is never found alone in nature. It is always bonded to other elements.

5. Medicine, batteries, nuclear reactor, air conditioner.

4.

1. Magnesium – https://www.ducksters.com/science/chemistry/magnesium.php
2. Platinum - https://www.ducksters.com/science/chemistry/platinum.php

3. Sulfur - https://www.ducksters.com/science/chemistry/sulfur.php
4. Uranium - https://www.ducksters.com/science/chemistry/uranium.php
5. Silicon - https://www.ducksters.com/science/chemistry/silicon.php

5. https://www.ducksters.com/science/chemistry/tin.php

- **Tin -** Symbol: Sn
- Atomic Number: 50
- Atomic Weight: 118.71
- Classification: Post-transiti on Metal
- Phase at Room
- Temperature: Solid
- Density (white): 7.365 grams per cm cubed
- Melting Point: 231°C, 449°F
- Boiling Point: 2602°C, 4716°F
- Discovered by: Known about since ancient times

Tin is the fourth element of the fourteenth column of the periodic table. It is classified as a post-transition metal. Tin atoms have 50 electrons and 50 protons with 4 valence electrons in the outer shell.

Characteristics and Properties

Under standard conditions tin is a soft silvery-gray metal. It is very malleable (meaning that it can be pounded into a thin sheet) and can be polished to a shine.

Tin can form two different allotropes under normal pressure. These are white tin and gray tin. White tin is the metallic form of tin we are most familiar with. Gray tin is non-metallic and is a gray powdery material. There are few uses for gray tin.

Tin is resistive to corrosion from water. This allows it to be used as a plating material to protect other metals.

Where is it found on Earth?

Tin is found in the Earth's crust primarily in the ore cassiterite. It is generally not found in its free form. It is around the 50th most abundant element in the Earth's crust.

The majority of tin is mined in China, Malaysia, Peru, and Indonesia. There are

estimates that the minable tin on Earth will be gone in 20 to 40 years.

How is tin used today?

The majority of tin today is used to make solder. Solder is a mixture of tin and lead that is used to join pipes and to make electronic circuits.

Tin is also used as a plating to protect other metals such as lead, zinc, and steel from corrosion. Tin cans are actually steel cans covered with a plating of tin.

Other applications for tin include metal alloys such as bronze and pewter, the production of glass using the Pilkington process, toothpaste, and in the manufacture of textiles.

How was it discovered?

Tin has been known about since ancient times. Tin was first heavily used starting with the Bronze Age when tin was combined with copper to make the alloy bronze. Bronze was harder than pure copper and was easier to work with and cast.

Where did tin get its name?

Tin gets its name from the Anglo-Saxon language. The symbol "Sn" comes from the Latin word for tin, "stannum."

Interesting Facts about Tin

- When a bar of tin is bent, it will make a screaming sound called a "tin cry". This is due to the breaking of the crystal structure of the atoms.
- Pewter is a tin alloy that is at least 85% tin. Other elements in pewter generally include copper, antimony, and bismuth.
- White tin will transform into gray tin when the temperature falls below 13.2 degrees C. This is prevented by adding small impurities to white tin.
- Bronze typically consists of 88% copper and 12% tin.

Potassium -

- Symbol: K
- Atomic Number: 19
- Atomic Weight: 39.0983
- Classification: Alkali metal
- Phase at Room Temperature: Solid
- Density: 0.86 grams per cm cubed
- Melting Point: 63.38°C, 146.08°F
- Boiling Point: 759°C, 1398°F
- Discovered by: Sir Humphry Davy in 1807

Potassium is the fourth element in the first column of the periodic table. It is classified as an alkali metal. Potassium atoms have 19 electrons and 19 protons with one valence electron in the outer shell. Potassium is considered chemically similar to sodium, the alkali metal above it on the periodic table.

Characteristics and Properties

Under standard conditions potassium is a soft silvery-white metal. It is so soft that it can be easily cut with a knife. When cut, the exposed metal tarnishes quickly and forms a dull oxide coating.

Potassium has a very low melting point such that even a candle can cause it to melt. When it burns, it produces a pale purple colored flame. Potassium also has a very low density and is the second least dense metal after lithium. It is so light that it can float in water.

Chemically, potassium is a very active metal. It reacts violently when coming into contact with water, producing heat and hydrogen gas. It also reacts with many other elements and substances such as oxygen, acids, sulfur, fluorine, and nitrogen.

Where is potassium found on Earth?

Because potassium reacts so readily with water, it is not found in its elemental form in nature. Instead it is found in various minerals such as sylvite, carnallite, langbeinite, and kainite. Most minerals that contain potassium are referred to as potash.

Making up about 2.1% of the weight of the Earth's crust, potassium is the eighth most abundant element in the crust. It can also be found in ocean water where it is also about the eighth most abundant element.

How is potassium used today?

The largest use of potassium is potassium chloride (KCl) which is used to make fertilizers. This is because potassium is important for plant growth.

Industrial applications for potassium include soaps, detergents, gold mining, dyes, glass production, gunpowder, and batteries.

Potassium also plays a vital role in our bodies. It is used in muscle contraction, fluid and pH balance, bone health, and helps to prevent kidney stones. It is about the eighth most abundant element in the human body by weight.

How was it discovered?

Potassium was first isolated by English chemist Sir Humphry Davy in 1807. He used electricity to separate the element from the salt potash.

Where did potassium get its name?

Potassium gets its name from the salt potash from which potassium was first isolated. The K symbol for the element comes from the Latin word "kalium", which means potash.

Isotopes
There are three isotopes of potassium that occur naturally: K-39, 40, and 41. The majority (93%) of potassium found in nature is K-39.

Interesting Facts about Potassium

- Potassium chloride (KCl) is sometimes used as a substitute for table salt.
- The USDA recommends that adults consume 4.7 grams of potassium each day.
- A small amount of potassium can taste sweet. A higher concentration can taste bitter or salty.
- Potassium bicarbonate is the chemical name for baking soda. It is used in fire extinguishers, baking powders, and antacids.
- Some good sources of potassium in our diet include bananas, avocados, nuts, chocolate, parsley, and potatoes.

Sodium

- Symbol: Na
- Atomic Number: 11
- Atomic Weight: 22.99
- Classification: Alkali metal
- Phase at Room Temperature: Solid
- Density: 0.968 grams per cm cubed
- Melting Point: 97.72°C, 207.9°F
- Boiling Point: 883°C, 1621°F
- Discovered by: Sir Humphry Davy in 1807

Sodium is an alkali metal located in the first group or column of the periodic table. The sodium atom has 11 electrons and 11 protons with one valence electron in the outer shell.

Characteristics and Properties

Sodium in its pure form is very reactive. It is a very soft metal that can be easily cut with a knife. It is silvery-white in color and burns with a yellow flame.

Sodium will float on water, but it will also react violently when coming into contact with water. When sodium reacts with water it produces sodium hydroxide and hydrogen gas.

Sodium is most famous for its many useful compounds such as table salt (NaCl), sodium nitrate (Na_2CO_3), and baking soda ($NaHCO_3$). Many of the compounds that sodium forms are water-soluble, meaning they dissolve in water.

Where is sodium found on Earth?

Sodium is the sixth most abundant element on Earth. It is never found in its pure form because it is so reactive. It is only found in compounds such as sodium chloride (NaCL) or table salt. Sodium chloride is found in ocean water (salt water), salt lakes, and underground deposits. Pure sodium can be recovered from sodium chloride through electrolysis.

How is sodium used today?

Sodium is primarily used in the form of compounds with other elements.

The average person uses sodium every day in the form of table salt in their food. Table salt is the compound sodium chloride (NaCl). Table salt is needed for animals to survive, but most people use it for adding flavor to their food.

Another popular use of sodium is in baking soda which is the chemical compound sodium bicarbonate. Baking soda is used as a leavening agent in cooking foods like pancakes, cakes, and breads.
A lot of soaps are forms of sodium salts. Sodium hydroxide is a key ingredient when making soaps.

Other applications include de-icing, medicine, organic chemistry, street lights, and cooling nuclear reactors.

How was it discovered?

Sodium was discovered by English chemist Sir Humphry Davy in 1807. He isolated sodium by applying electrolysis to caustic soda.

Where did sodium get its name?

Sodium gets its name from the English word soda. This is because Sir Humphry Davy used caustic soda when isolating the element. The symbol Na comes from the Latin word natrium.

Interesting Facts about Sodium

- Sir Humphry Davy discovered sodium only a few days after he discovered potassium.
- Sodium comprises around 2.6% of the Earth's crust.
- It helps to maintain the proper fluid balance in the body's cells and also helps us to digest our food.
- Our bodies lose sodium when we sweat. However, most people eat far more sodium than their bodies actually need. If the body runs low on sodium, it can cause the muscles to cramp.
- Sodium is considered non-toxic, but too much of it can cause high blood pressure.

Mercury – Hg

- Symbol: Hg
- Atomic Number: 80
- Atomic Weight: 200.59
- Classification: Transition metal
- Phase at Room Temperature: Liquid
- Density: 13.534 grams per cm cubed
- Melting Point: -38.83°C, -37.89°F
- Boiling Point: 356.7°C, 674.1°F
- Discovered by: Known about since ancient times

Mercury is the third element in the twelfth column of the periodic table. It is classified as a transition metal. Mercury atoms have 80 electrons and 80 protons with 122 neutrons in the most abundant isotope.

Characteristics and Properties

Under standard conditions mercury is a shiny, heavy, silvery liquid. It is the only metal that is liquid at room temperature. It will evaporate into the air at room temperature.

Mercury is very poisonous and can be absorbed by humans through the air, skin, or by eating food with mercury. Too much mercury can kill a person.

When mercury comes into contact with other metals, it dissolves them and forms a new substance called an amalgam. Iron is one of the few exceptions and, as a result, is often used to store mercury.

Where is it found on Earth?

Mercury is a very rare element found in the Earth's crust. It is sometimes found in

its free state, but is usually found in ores such as cinnabar, livingstonite, and corderoite. Most mercury today is produced from the mining of cinnabar, a bright red ore.

For many years Spain and Italy were the largest producers of mercury. Spain mined mercury in order to use it in their mining process for silver in South America. Today, the majority of mercury is mined in China and Kyrgyzstan.

How is mercury used today?

Mercury is used in a variety of applications, but is being phased out of some of them due to health issues. Due to its high density and thermal expansion characteristics, it is used in measuring instruments such as thermometers and barometers. A major application today is fluorescent lamps and mercury vapor lamps.
Other applications for mercury include dental fillings, telescopes, cosmetics, and vaccines.

How was it discovered?

Mercury has been known about since ancient times and was used by civilizations such as Ancient Egypt and Ancient China. The first emperor of China, Qin Shi Huang, believed that mercury was part of the Elixir of Life that would help him to live forever. Unfortunately, mercury is toxic and consuming mercury is likely what killed him.

For many years, alchemists thought that mercury was the "prima materia" and that all other metals could be made from mercury. They thought they could use mercury to make gold.

Where did mercury get its name?

Mercury gets is name from the planet Mercury which was named after the swift messenger of the Roman gods, Mercury. It was given this name because it flowed swiftly in its liquid form. The symbol Hg comes from the Latin word "hydragyrum" meaning "liquid silver."

Isotopes

Mercury has seven stable isotopes. The most abundant in nature is Mercury-202 which comprises around 30% of all mercury.

Interesting Facts about Mercury

- Despite being the only metal that is liquid at room temperature, mercury has the smallest liquid range of any metal. It becomes a solid at -38.83°C and a gas at 356.7°C.
- Some fish, such as swordfish and shark, can contain high levels of mercury.
- The use of mercury in manufacturing has been banned in several countries including Norway, Sweden, and Denmark.
- The term "mad as a hatter" comes from hat makers who went crazy breathing in mercury vapors from chemicals they used in making hats.
- Never hold mercury in your bare hands as it can seep through the skin and poison you. Mercury should not be left out in the open as it will evaporate into the air and can poison you through breathing it.

Gold

- Symbol: Au
- Atomic Number: 79
- Atomic Weight: 196.966
- Classification: Transition metal
- Phase at Room Temperature: Solid
- Density: 19.282 grams per cm cubed
- Melting Point: 1064°C, 1947°F
- Boiling Point: 2856°C, 5173°F
- Discovered by: Known about since ancient times

Gold is the third element in the eleventh column of the periodic table. It is classified as a transition metal. Gold atoms have 79 electrons and 79 protons with 118 neutrons in the most abundant isotope.

Characteristics and Properties

Under standard conditions gold is a shiny yellow metal. It is very dense and heavy, but also fairly soft. Gold is the most malleable of the metals meaning that it can be pounded into a very thin sheet. It is also one of the most ductile metals and can be easily stretched into a long wire.

Gold is more than just a beautiful metal. It is an excellent conductor of electricity and heat. It is also one of the most resistant metals to corrosion and rust when exposed to air and water.

Where is it found on Earth?

Gold is an extremely rare element on Earth. Because it doesn't react with very many other elements, it is often found in its native form in the Earth's crust or mixed with other metals like silver. It can be found in veins underground or in small fragments in sandy riverbeds.
Gold is also found in ocean water. However, the process for retrieving gold from

ocean water costs more than the gold itself.

How is gold used today?

Gold has been used for thousands of years to make jewelry and coins. Today it is still used for jewelry and for some collector's edition coins. Gold is also considered an important and reliable investment.

When gold is used as jewelry or for coins, it is generally not pure gold. Pure gold is called 24 karat gold and it is very soft. Generally gold is alloyed with other metals such as copper or silver in order to make it harder and more durable.

Gold is used a lot in the electronics industry because of its good electrical conductivity and resistance to corrosion. Many electrical contacts and connectors are plated with gold for protection and reliability.

Other applications for gold include heat shielding, dental work, cancer treatment, and decoration such as gold thread and gold plating.

How was it discovered?

Gold has been known about since ancient times. Civilizations such as Ancient Egypt used gold over 5000 years ago. It has long been a substance of value and wealth.

Where did gold get its name?

Gold gets its name from the Anglo-Saxon word "geolo" for yellow. The symbol Au comes from the Latin word for gold, "aurum."

Isotopes

Gold has only one naturally occurring stable isotope: gold-197.

Interesting Facts about Gold

- A single ounce of gold can be pounded into a sheet 300 feet wide by 300 feet long. That's bigger than a football field! That same ounce can form a wire nearly 100 kilometers long.
- South Africa used to be the largest supplier of the world's gold, but today China and Australia produce the most gold.
- Gold flakes were sometimes sprinkled on the food of the wealthy during the Middle Ages.

- Many people traveled to California during the Gold Rush in the late 1840s when gold was discovered at Sutter's Mill.
- Gold can be pounded thin enough to allow light to shine through.
- If all the gold ever discovered by man was melted down it would form a cube with sides of about 25 meters each.

6. Choose the correct variant.

1. About how many known elements are in the periodic table?

   100. There are about 118 known elements in the periodic table. As scientists continue to experiment with particle accelerators and cyclotrons, they will be able to make more elements. Many of the manmade elements in the table only exist for a few milliseconds before they break apart.

2. Elements in the periodic table are arranged by...

   Atomic Number. The elements in the periodic table are organized by atomic number. Hydrogen (H) and helium (He) make up the top row of the periodic table at numbers one and two, respectively. The atomic number represents the number of protons and electrons in a neutral atom. You may also hear the term ‘proton number’ used instead of ‘atomic number’.

3. Which of these things are NOT listed in the periodic table?

   Atomic Orbital Radius. You will not find information about the atomic radius of an atom in the periodic table. The square for each element will have the atomic number, atomic weight, name, and symbol for each element.

4. Which scientist came up with the concept of a periodic table?

   Dmitri Mendeleev. Dmitri Mendeleev gets the credit for designing the modern periodic table. Jason Priestly is an actor. Joseph Priestly and Antoine Lavoisier were both chemists. Albert Einstein developed theories about atomic particles.

5. The rows of the periodic table are called periods.

   True. The rows of the periodic table are called periods. The columns of the periodic table are called groups. Periods are loosely organized by the number of atomic orbitals found in each element. For example, hydrogen (H) in the first row has only one orbital. Lithium (Li) in the second row has electrons in two orbitals. Francium (Fr), in row seven, has electrons in seven orbitals.

6. Which of these choices is NOT a family of elements?

   All are Families of Elements. All of these choices are different types and families of elements. Inert gases can be found on the far right of the periodic table in group VIIIA. Halogens are just to the left in VIIA. Metals make up the center and left side of the table in a variety of groups.

7. Where are halogens found on the periodic table?

Right Side. The halogen family of elements is found on the right side of the periodic table. They are in the seventeenth group, next to the noble gases. They are a very reactive family of elements and can be found in many compounds. Halogens include fluorine (F), chlorine (Cl), bromine (Br), iodine (I) and astatine (At).

8. Halogens are very...

Reactive. Halogens are very reactive elements. They are found in many compounds from simple table salt (NaCl) to strong acids such as hydrogen bromide (HBr).

9. Which of these is a noble gas?

Neon (Ne). The far right column of the periodic table is the home of the noble gases. Of the choices, only neon (Ne) is located in that column. Noble gases are also known as inert gases and generally have no color or odor. The family includes helium (He), neon (Ne), argon (Ar), krypton (Kr), xenon (Xe) and radon (Ra).

10. Which of these is NOT a gas found in the Earth's atmosphere?

Gold (Au). Gold (Au) was the right answer. Gold is a metal that you will usually find inside of the Earth. You will probably never see gold as a gas. Nitrogen (N), oxygen (O), and argon (Ar) are all found in the atmosphere. Nitrogen is the most common element found in our atmosphere.

11. All of the following are in the same rows/periods of the periodic table EXCEPT...
Sodium(Na),Carbon(C), Chlorine(Cl)
The correct answer was "Sodium (Na), Carbon(C), Chlorine(Cl)" because carbon is in the second row while sodium and chlorine are in the third row. As far as chemistry is concerned, that means they have different numbers of atomic orbitals.

12. You might find boron (B) in the soap in your bathtub.
True. Boron (B) can be found in many soaps. Boron is often found in the compound known as borax and refined for other uses.

13. You can find lots of phosphorus in fireworks.

True. (Yes, when phosphorus gets hot it burns really brightly. The bright sparks and flashes are usually because of that phosphorus.)

14. Scientists describe the …. states of carbon.
Three. (Scientists describe the three states of carbon as diamond, amorphous, and graphite. It is the same graphite you find in pencils.)

15. Much amount of potassium can be found in …

Bananas

7. Ti - Titanium

- Symbol: Ti
- Atomic Number: 22
- Atomic Weight: 47.867
- Classification: Transition metal
- Phase at Room Temperature: Solid
- Density: 4.506 grams per cm cubed
- Melting Point: 1668°C, 3034°F
- Boiling Point: 3287°C, 5949°F
- Discovered by: William Gregor in 1791. First pure titanium produced by M. A. Hunter in 1910.

Titanium is the first element in the fourth column of the periodic table. It is classified as a transition metal. Titanium atoms have 22 electrons and 22 protons.

Characteristics and Properties

Under standard conditions titanium is a hard, light, silvery metal. At room temperature it can be brittle, but it becomes more malleable at higher temperatures.

One of titanium's most valuable qualities is its high strength-to-weight ratio. This means it is both very strong, but also very light. It is twice as strong as aluminum, but only weighs 60% more. It is also as strong as steel, but weighs much less.

Titanium is fairly inactive and is very resistant to corrosion from other elements and substances like acids and oxygen. It has a relatively low electrical and thermal conductivity.

Where is titanium found on Earth?

Titanium is not found as a pure element in nature, but is found in compounds as part of minerals in the Earth's crust. It is the ninth most abundant element in the Earth's crust. The most important minerals for mining titanium are rutile and ilmenite. The top producing countries of these ores are Australia, South Africa, and Canada.

How is titanium used today?

The majority of titanium is used in the form of titanium dioxide (TiO_2). Titanium dioxide is a very white powder that has a number of industrial uses including white paint, paper, plastics, and cements.

Titanium is used to alloy with different metals such as iron, aluminum, and manganese where it helps to produce strong and lightweight alloys for use in spacecraft, naval ships, missiles, and as armor plating. Its resistance to corrosion

makes it especially useful in sea water applications.

Another valuable characteristic of titanium is that it is biocompatible. This means that it will not be rejected by the human body. This quality, coupled with its strength, durability, and light weight, make titanium an excellent material for medical use. It is used in various applications such as hip replacements and dental implants. Titanium is also used in jewelry to make rings and watches.

How was it discovered?
Titanium was first recognized as a new element by Reverend William Gregor in 1791. The English clergyman enjoyed studying minerals as a hobby. He named the element menachanite. The name was later changed to titanium by German chemist M.H. Kalproth. The first pure titanium was produced by American chemist M. A. Hunter in 1910.

Where did titanium get its name?
Titanium gets its names from the Titans who were Greek gods.

Isotopes
Titanium has five stable isotopes including titanium-46, 47, 48, 49, and 50. The majority of titanium found in nature is in the form of the isotope titanium-48.

Interesting Facts about Titanium

- It is the only element that will burn in pure nitrogen gas.
- Titanium oxide is often used with graphite to make high-end golf clubs and tennis rackets.
- Titanium containers are used to store nuclear waste.
- It is found in meteorites, on the Moon, and in some types of stars.
- The Guggenheim Museum in Bilbao, Spain is covered with titanium plated tiles.

Pt – Platinum

- Symbol: Pt
- Atomic Number: 78
- Atomic Weight: 195.084
- Classification: Transition metal
- Phase at Room Temperature: Solid
- Density: 21.45 grams per cm cubed
- Melting Point: 1768°C, 3215°F
- Boiling Point: 3825°C, 6917°F
- Discovered by: Peoples of South America

Platinum is the third element of the tenth column in the periodic table. It is classified as a transition metal. Platinum atoms have 78 electrons and 78 protons with 117 neutrons in the most abundant isotope. It is considered to be a precious metal along with silver and gold.

Characteristics and Properties

Under standard conditions platinum is a shiny, silvery metal. It is very ductile, meaning that it can be easily stretched into a wire. It is also malleable, meaning it can be pounded into a thin sheet.

Platinum is resistant to corrosion when it comes into contact with air. It is also very dense (one of the highest of the elements) and has a high melting point.

Platinum is fairly inactive, but it will dissolve in hot alkalis and aqua regia.

Where is it found on Earth?

Platinum is a rare metal and difficult to find. This is what makes it such a valuable metal. Platinum can be found in its pure form, but is most often found together with other metals from the platinum group. The majority of platinum is mined in South Africa with Russia coming in a distant second.

How is platinum used today?

Being a precious metal, platinum is often used as currency and as an investment. It is also used in coins and to make jewelry such as rings, earrings, and watches.

Despite being a popular metal for jewelry, platinum is most often used as a catalyst in chemical reactions. It is used as a catalyst for the automobile and petroleum industries.

Other applications for platinum include alloys for special metals, super strong magnets, medical instruments, and dental work.

How was it discovered?

Platinum was first found by the peoples living in South America prior to the arrival of the Spanish. They produced a platinum and gold alloy that they used in their artwork and jewelry.

The first scientist to isolate platinum in its pure element form was English chemist

William Hyde Wollaston in 1803.

Where did platinum get its name?

Platinum gets its name from the Spanish word "platina" which means "silver."

Isotopes

There are six naturally occurring isotopes. The most abundant of these is Platinum-195.

Interesting Facts about Platinum

- William Hyde Wollaston also discovered the elements palladium and rhodium.
- It is the most ductile of the pure metals. Only gold is more malleable.
- The group of metals that platinum is part of in the periodic table is sometimes called the platinum group.
- Its malleability allows it to be pounded into a sheet as thin as 100 atoms.
- The word "platinum" is often associated with wealth and value. Sometimes awards called "platinum" are considered higher than "gold."

I – Iodine

- Symbol: I
- Atomic Number: 53
- Atomic Weight: 126.904
- Classification: Halogen
- Phase at Room Temperature: Solid
- Density: 4.933 grams per cm cubed
- Melting Point: 113.7°C, 236.66°F
- Boiling Point: 184.3°C, 363.7°F
- Discovered by: Bernard Courtois in 1811

Iodine is the fourth element in the seventeenth column of the periodic table. It is classified as a halogen and a non-metal. Iodine atoms have 53 electrons and 53 protons with 7 valence electrons in the outer shell.

Characteristics and Properties

Under standard conditions iodine is a dark blue-black solid. Iodine crystals can sublimate directly from a solid to a gas. As a gas, iodine is a purple vapor.

Iodine is a fairly active element, but is somewhat less active than the other halogens above it in the periodic table which include bromine, chlorine, and fluorine. Iodine can form compounds with many elements. Some of its most

common compounds are formed with sodium and potassium.

Pure iodine can be dangerous to handle causing the skin to burn and damage to the eyes.

Where is it found on Earth?
Iodine is fairly rare, but is found in both the Earth's crust and in ocean water. There is actually a higher concentration of iodine in the ocean than in the Earth's crust. Some ocean plants such as seaweed have a high concentration of iodine. It is also found in underground brines near oil and natural gas reserves.

How is iodine used today?

Iodine has a number of uses. It is used in sanitation systems and as an antiseptic to kill germs and bacteria. It is also used in its radioactive form to enable doctors to diagnose medical issues and diseases.

Other applications include animal feed, cloud seeding, dyes, and photography.

Iodine is also an essential element for life. It plays an important role in the thyroid gland that controls the body's growth rate. Too little iodine can cause a person to have stunted growth and slower cognitive development (less intelligent). To make sure that people get enough iodine, it is often added to salt in what is called iodized salt.

How was it discovered?

Iodine was first discovered and isolated by French chemist Bernard Courtois in 1811. Courtois stumbled across iodine when running experiments on seaweed. It was French chemist Gay-Lussac who first named iodine as a new element and suggested the name.

Where did iodine get its name?

Iodine gets its name from the Greek word "iodes" which means "violet."

Isotopes

Iodine has one stable isotope that occurs naturally, iodine-127.

Interesting Facts about Iodine

- Many people get the iodine they need in their diets from eating seaweed.
- It is the heaviest element that is essential for human life and health.

- Foods rich in iodine include fish, diary products (milk, cheese, yogurt), some fruits and vegetables, and iodized salt.
- Pregnant women need more iodine than the average person. They can get this through dietary supplements.
- Too much iodine is harmful and can make a person very sick. Never take iodine unless instructed by a doctor.

P - Phosphorus

- Symbol: P
- Atomic Number: 15
- Atomic Weight: 30.97376
- Classification: Nonmetal
- Phase at Room Temperature: Solid
- Density: white: 1.823 grams per cm cubed
- Melting Point: white: 44.1°C, 111°F
- Boiling Point: white: 280°C, 536°F
- Discovered by: Hennig Brandt in 1669

Phosphorus is the second element in the fifteenth column of the period table. It is classified as a nonmetal. Phosphorus atoms have 15 electrons and 15 protons with 5 valence electrons in the outer shell.

Characteristics and Properties

Phosphorus is a highly reactive element and, as a result, is never found on Earth as a free element. Elemental phosphorus comes in various allotropes (different crystal structures) including white, red, violet, and black phosphorus. The two major forms of phosphorus are white and red.

White phosphorus is very reactive and unstable. White phosphorus is yellowish in color and is highly flammable. It will spontaneously ignite when it comes into contact with air. White phosphorus glows in the dark and is also very toxic.

Red phosphorus is generally more stable than white. It is also less toxic and doesn't spontaneously ignite when coming into contact with air. Red phosphorus is made by heating white phosphorus.

Where is phosphorus found on Earth?

Phosphorus is not found in its pure elemental form on Earth, but it is found in many minerals called phosphates. Most commercial phosphorus is produced by mining and heating calcium phosphate. Phosphorus is the eleventh most abundant element in the Earth's crust.

Phosphorus is also found in the human body. It is the sixth most abundant element in the human body.

How is phosphorus used today?

The primary use of phosphorus in industry is in the manufacture of fertilizers. This is because phosphorus is a key element in the growth of plants.

Red phosphorus is used in making pesticides and safety matches.

Other applications for phosphorus include baking powder, the alloy phosphor bronze, flame retardants, incendiary bombs, and LEDs (light emitting diodes).

Phosphorus is an important element in the functioning of the human body and is essential for life. It is used in the DNA molecule and is a main ingredient in our bones and teeth. We get phosphorus from foods such as beans, nuts, eggs, fish, milk, and chicken.

How was it discovered?

Phosphorus was discovered by German alchemist Hennig Brandt in 1669. He was hoping to create a legendary substance called the philosopher's stone. He stumbled across phosphorus while conducting experiments with urine.

Where did phosphorus get its name?

Phosphorus gets its name from the Greek word "phosphoros" meaning "bringer of light." Henning Brandt picked this name because the element glowed in the dark.

Isotopes

The only stable phosphorus isotope is phosphorus-31. It has twenty-three known isotopes.

Interesting Facts about Phosphorus

- It used to be a major ingredient in detergents, but the phosphates caused algae to grow in rivers and lakes, killing many fish. Few detergents still use phosphates today.
- Touching white phosphorus can cause severe burns.
- Similar to the cycles of oxygen, carbon, and nitrogen, there is also a phosphorus cycle that is important to plant and animal life.
- Hennig Brandt was the first person to be given credit for discovering an element.

- Black phosphorus looks like graphite powder and conducts electricity even though it is not a metal.
- The majority of phosphate rock mined in the United States comes from Florida and North Carolina.

Cu – Copper
- Symbol: Cu
- Atomic Number: 29
- Atomic Weight: 63.546
- Classification: Transition metal
- Phase at Room Temperature: Solid
- Density: 8.96 grams per cm cubed
- Melting Point: 1084°C, 1984°F
- Boiling Point: 2562°C, 4644°F
- Discovered by: Known about since ancient times

Copper is the first element in the eleventh column of the periodic table. It is classified as a transition metal. Copper atoms have 29 electrons and 29 protons with 34 neutrons in the most abundant isotope. Copper was one of the first metals to be used by man.

Characteristics and Properties

Under standard conditions copper is a soft orange-colored metal. It is an excellent conductor of electricity and heat. It is also very ductile allowing it to be easily bent and stretched into a wire.

Copper is not a very reactive element, but it will react slowly to air and water. When exposed to air, it will eventually tarnish to a brownish color. If water is also present, it will corrode to form a green carbonate called verdigris. This is what makes the Statue of Liberty green.

Where is copper found on Earth?

Copper is found in the Earth's crust. Because copper is slow to react, it is often found in its pure form. This was how many ancient cultures were able to take advantage of the metal. Today, most copper is extracted from minerals such as copper sulfides or copper carbonates.

The world-wide demand for copper has increased dramatically in recent years. This has caused an increase in the price of copper. Fortunately, copper is 100% recyclable and large percentage of copper each year comes from recycling. The number one producer of mined copper is Chile who produces around 33% of the world's mined copper.

How is copper used today?

Copper is used mostly in its metal form. About 60% of the copper produced is used for electrical wiring and cable. Copper is an excellent material for wiring because of its electrical conductivity, ductility, corrosion resistance, low thermal expansion, and tensile strength.

Copper is also used in plumbing, roofing, industrial machinery, integrated circuits (computer chips), cookware, coins, and electric motors. Around 5% of copper is used to make metal alloys such as brass (mixed with zinc) and bronze (mixed with tin).

How much copper is in a penny?

We often think of the U.S. penny as being made of copper. This is true for pennies made before 1982 when they were 95% copper and 5% zinc. Since 1982, pennies have been made from 97.5% zinc and 2.4% copper. This is because the copper was worth more than the penny.

How was it discovered?

Copper has been known about since ancient times as far back as 10,000 years ago. People first began to smelt copper from ore around 5,000 BC. The Copper Age lasted up until the Bronze Age about 3600 BC when people learned that by mixing tin with copper they could make the harder metal bronze.

Where did copper get its name?

The name comes from the word "Cuprum", which is the Latin name for the island of Cyprus. Cyprus is an island in the Mediterranean Sea where the Romans mined much of their copper. This is where the symbol Cu also comes from.

Isotopes

Copper has two stable isotopes that make up naturally occurring copper: copper-63 and copper-65.

Interesting Facts about Copper

- Silver is the only element with a higher electrical conductivity than copper.
- It is one of the few metals that is not gray or silver in color. The others are gold (yellow), cesium (yellow), and osmium (blue).
- The compound copper sulfide is used to kill fungi and algae in rivers and ponds.
- The largest single piece of native copper ever found weighed over 520 tons.
- Most copper ore that is mined only contains about 1% of the metal.

8. Selenium

Selenium is one of the most **versatile** elements of the periodic table. You can **find** it in many forms (allotropic forms) including reddish **crystals** and metallic gray. It was named after the moon when discovered in 1817 by the **scientist** Berzelius. While rare, selenium is normally **found** in minerals.

Of the lesser members in the sulfur family, selenium is the most abundant in **nature**, often found in copper and lead mining. Tellurium and polonium are other members in the same family (and found in the same column of the periodic table).

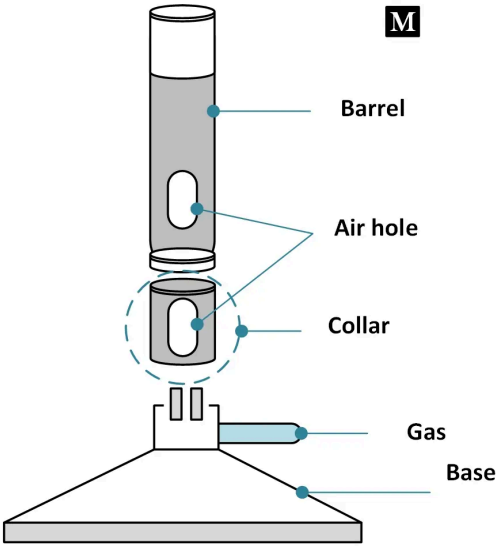
Large amounts of selenium will act as a poison but you need **trace** amounts of this mineral to survive. You usually get selenium in your diet when you eat **meat**.

Probably one of the most well-known uses for selenium is its **use** in solar cells. Selenium has photovoltaic **properties**. That term means that it can convert light into energy. It just makes sense that selenium is an important part of any equipment design to **convert** the Sun's energy into electricity.

UNIT 6

3. 1. A spatula (G); 2. Tongs (A) 3. Pipettes (C) 4. A petri dish (B) 5. A dropper (D) 6. Burettes (F) 7. Ring stands, rings, and clamps (E)

4. 1. B 2.A 3.C 4.E 5D



5. 1. Test tubes (A) 2. Beakers (C) 3. A dropping funnel (D) 4. Erlenmeyer flask (B) 5. Funnels(E)

6 .

1. A digital balance is a device 1. **used/using** to measure the weight of 2. **chemical** reagents in the chemistry lab. They are highly sensitive and can even 3. **weigh** 0.001 gm of a substance. For this reason, they are 4. **periodically** calibrated and usually kept inside glass walls. When weighing the substances, the walls should be 5. **kept** close to reduce any error in the measurement.

2. A melting point apparatus is a device used to 1. **determine** the melting point of the chemical compounds. The above-discussed thiele tube is one of the 2. **melting** point apparatus. Other types may include the Fischer-Jhon apparatus, Gallenkamp melting-point apparatus, and automatic melting-point apparatus. Unlike the thiele tube, these apparatus do not 3. **require** oil or any other chemical to determine the melting point of the 4. **given** substance, instead, the sample is placed 5. **directly** inside the apparatus with the help of a capillary tube.

3. A digital colorimeter is a device used in a chemistry lab to determine the 1. **concentration** of a known solution by 2. **measuring** the absorbance of a particular wavelength of light by a given solution. Digital Colorimeter works on the principle of Beer-Lambart's law, which states that the 3. **absorbance/absorption** of light by a solution is directly 4. **proportional** to the concentration of the solution. This device includes a photoresistor that 5. **monitors** light transmittance or absorbance through the sample, which is then utilized to calculate concentration.

4. A water bath is one of the most 1. **essential** apparatus in a chemical laboratory. It is a device used for heating 2. **flammable** chemical samples at a constant temperature. A laboratory water bath is generally 3. **composed** of a heating assembly, a stainless-steel chamber that holds the water and samples, and a 4. **user** interface. Some water baths have extra features like circulating water to 5. **maintain** a consistent temperature or a shaking water bath to keep the samples moving while they are cooked.

7. 1. d 2. g 3. b 4. a 5. j 6. c 7. i 8. e 9. f 10. h

8. 1. Florence flasks, boiling flasks: Florence flask has a round bottom and a long neck. It is used to hold liquids and can be easily swirled and heated. It can also easily be capped by rubber or glass stoppers.

2. A watch glass is just a round piece of glass that is slightly concave/convex (think of a lens). It can hold a small amount of liquid or solid. They can be used for evaporation purposes and also can function as a lid for a beaker.

3. This is a primary measuring tool for the volume of a liquid. There are several markings up and down the length of the container with specific increments. Graduated cylinders come in many sizes. The smaller they are in diameter, the more specific the volume measurements will be.

4. A burette is a glass tube that is open at the top and comes to a narrow pointed opening at the bottom. Right above the bottom opening is a stopcock that can be turned to control the amount of liquid being released. There are markings along the length of the tube that indicate the volume of liquid present. These are usually attached with a clamp to a ring stand.
A burette is used for extremely accurate addition of liquid. By adjusting the stopcock, the amount of liquid that is released can be slowed to a drop every few seconds. Burettes are one of the most accurate tools in the lab.

UNIT 7

3. 1 The number of known compounds then was growing fast as chemists learned to separate and analyze the substances found in nature.

2. Many scientists believed that the formation of organic compounds required the action of some unidentified vital force that could be exerted only by living things.

3. In 1828 the German chemist Friedrich Wohler made the organic compound urea by heating the inorganic compound ammonium cyanate. He thereby proved that no vital force is needed.

4. All of the organic compounds contain carbon, but very few of the inorganic ones do, so the definition of organic compounds was changed to conform to this fact: any compound of carbon is an organic compound except carbon monoxide, carbon dioxide, carbonates, cyanides, cyanates, thiocyanates, and certain carbides.

5. There are two main kinds of forces, or chemical bonds, that hold atoms together in compounds: covalent and electrovalent.

4. The word organic refers to the compounds which contain carbon atoms in it. So the branch of chemistry that deals with the study of compounds, which does not consist of carbon-hydrogen atoms in it, is called ***'Inorganic Chemistry.'*** In simple words, it is opposite to that of Organic Chemistry. The substances which do not have carbon-hydrogen bonding are metals, salts, chemical substances, etc.

5. Briefly: Chemical reactions are processes in which reactants become new products. Chemical equations are the symbolic representation of chemical reactions.

A chemical reaction is a process that occurs when one or more reactants are changed into one or more new substances called products. Example: Hydrogen and oxygen gas combine to produce water.

A chemical equation is a symbolic representation of a chemical reaction where symbols of atoms are used to represent the elements that take part in a reaction.

Numbers are used to represent the ratios of reactants and products to produce the reaction where the arrow points from reactants to products.

Ex: $2H2(g)+O2(g)\rightarrow 2H2O(\ell)$

7. (s) solid; (g) gas; (l) liquid; (aq) indicates that the substance is dissolved in water - the aq comes from aqueous.

8.oxide - An oxide is a category of chemical compound that has one or more oxygen atoms as well as another element in its composition such as Li_2O, CO_2, H_2O, etc.

nitrate - Nitrate is an inorganic compound composed of one atom of nitrogen (N) and three atoms of oxygen (O); the chemical symbol for nitrate is NO_3.

iodide - Iodine is a nonmetallic chemical element and the heaviest nonradioactive halogen.

chloride - a chemical compound that is a mixture of chlorine and another substance. Sodium chloride is the chemical name for common salt.

hydroxide - Hydroxide is a diatomic anion consisting of one atom of oxygen and hydrogen bonded together by a covalent bond, with chemical formula as OH- and carries negatively charged ion.

fluoride - Fluoride is the negative ion of the element fluorine. It's widely found in nature, in trace amounts. It occurs naturally in air, soil, plants, rocks, fresh water, seawater, and many foods. Fluoride also plays a role in the mineralization of your bones and teeth, a process essential for keeping them hard and strong.

sulfate/sulphate - Sulphate also spelled as Sulfate is a chemical compound that is composed of sulphur and oxygen atoms.

acid - A chemical that gives off hydrogen ions in water and forms salts by combining with certain metals. Acids have a sour taste and turn certain dyes red.

9. *e.g.: HCl - hydrochloric acid*

HF - hydrogen fluoride

H_2SO_4 - sulfuric acid

H_2SO_3 - sulfurous acid

HNO_3 - nitric acid

HNO_2 - nitrous acid

PI_3 - phosphorus triiodide

SO_3 - sulfur trioxide

$Ca(NO_3)_2$ - calcium nitrate

$Ca(NO_2)_2$ - calcium nitrite

NaOH - sodium hydroxide

$Ca(OH)_2$ - calcium hydroxide

Fe_2O_3 - ferric oxide

FeO - ferrous oxide

K_2O - potassium oxide

$ZnCl_2$ - zinc chloride

ZnO - zinc oxide

UNIT 8

3. 1. To decide whether a substance is an acid or base, count the hydrogens on each substance before and after the reaction. If the number has decreased that substance is the acid (which donates hydrogen ions). If the number of hydrogens has increased that substance is the base (accepts hydrogen ions)

2. An acid is a contributing product containing hydrogen ions. If the solution contains more hydronium ions (H3O+) than hydroxyl ions (OH-) , then the given solution is a acid. Similarly, if the solution contains more hydroxyl ions (OH-) than hydrogen ions (H+) , then the given solution is a base.

3. The sodium hydroxide, calcium carbonate and potassium oxide are examples of bases. A base is a material that interacts with hydrogen ions and can neutralize the acid. Bases are classified as acceptors of a proton (H+), and ammonium hydroxide are typical examples of the bases.

4. Acids are ionic compounds that, when dissolved in water, produce positive hydrogen ions (H+) When dissolved in water, acids are sour in taste, conduct electricity and react with metals to produce hydrogen gas. Certain indicator compounds may be used to detect acids, such as litmus. Acids turn blue litmus red.

5. Two types of corrosive compounds are the acids and bases. Any material with a pH value between 0 and 7 is known to be acidic while a pH value between 7 and 14 is a base. whereas, bases are ionic compounds that produce hydroxide ions(OH-) when dissolved in water.

6. Acids play significant roles within the human body. The presence of hydrochloric acid in the stomach helps digestion by breaking down large and complex food molecules. Amino acids are required for protein synthesis which helps to grow and repair body tissues.

7. The sodium hydroxide, calcium carbonate and potassium oxide are examples of bases. A base is a substance that reacts with hydrogen ions and can neutralize the acid. Most bases are minerals which form water and salts by reacting with acids. Bases include the metal oxides, hydroxides, and carbonates.

8. To decide whether a substance is an acid or base, count the hydrogens on each substance before and after the reaction. If the number has decreased that substance is the acid (which donates hydrogen ions) . If the number of hydrogens has increased that substance is the base (accepts hydrogen ions).

9. Base taste bitter has a soapy texture and releases hydroxide ions when dissolved in water. They are good conductors of electricity and have a pH value of more than seven. Sodium hydroxide, potassium hydroxide and magnesium hydroxide are some examples of bases.

10. Yes, acids do react with the metal to form the corresponding salt and liberate hydrogen gas.

$2\ M + 2\ HX \rightarrow 2\ MX + H_2$

4.

Acids	**Bases**
Acid gives off hydrogen ions when dissolved in water.	Bases give off hydroxyl ion when dissolved in water.
It turns blue colour litmus paper into red.	It turns red colour litmus paper into blue.
It has a sour taste.	It has bitter taste and soapy to touch.
Its pH value ranges from 1 to 7.	Its pH value ranges from 7 to 14.
Example: HCl, H_2SO_4 etc.	Example: NaOH, KOH etc.

5. 1. What is there on the table?
2. What must know any student?
3. What is there in the lab?
4. What was called a base?
5. What was stressed in the article?
6. How many objections are there?
7. What does the protonic theory state?
8. Why is there little chance for the reaction to be completed?
9. What subject has been the most controversial in chemistry?
10. How were acids and bases defined?

6. 1. The classification of substances into acids and bases has greatly changed.
2. The theory of ionic dissociation has played a great role in the development of chemistry.
3. The problem of nomenclature is still very important in chemistry.
4. Any explosive substance must be handled with care.

5. The atomic theory was a great contribution to the world's science.
6. The most important chemical property of oxygen is its acidity.
7. Pure sulphuric acid is a colourless liquid about twice as heavy as water.
8. No branch of science is broarder in its scope than chemistry.
9. Water is the most widely distributed compound.
10. The data must be taken into account in this article.

7. Lewis Concept of Acids and Bases: 1. d; 2. g; 3. a; 4. c; 5. f; 6. b; 7. e;

UNIT 9

3 1. What is Chemical Equilibrium?

2. Why is Chemical Equilibrium called Dynamic Equilibrium?

3. Types of Chemical Equilibrium

4. Principle affecting chemical equilibrium

5. Examples of Chemical Equilibrium

Factors Affecting Equilibrium is the odd one out.

4 . 1. What is the effect of temperature on equilibrium constant during an exothermic reaction?

2. What is the effect of a catalyst on a chemical equilibrium?

3. What is the effect of addition of inert gas during chemical equilibrium?

4. What is meant by forward reaction?

5. What is meant by backward reaction?

5. 1.c 2.e/d 3.d/e 4.g 5.a 6.b 7.f 8.i 9.j 10. h

6. Factors that affect equilibrium

Change in Concentration:

- The concentration of the **reactants** or **products** added is **relieved** by the reaction which consumes the substance which is **added**.
- The concentration of **removed** reactants or products is relieved by the reaction **which** is in the direction that **replenishes** the **substance** which is removed.
- When the concentration of the reactant or product is changed, there is a **change** in the composition of the **mixture** in chemical equilibrium.

Change in Pressure: Change in pressure **happens** due to the **change** in the volume. If there is a change in pressure it can **affect** the gaseous reaction as the total number of **gaseous** reactants and products are now **different**. According to Le Chatelier's principle, in heterogeneous chemical equilibrium, the change of pressure in **both** liquids and solids **can** be ignored because the volume is **independent** of pressure.

Change in Temperature: The **effect** of temperature on chemical equilibrium **depends** upon the sign of ΔH of the reaction and follows Le-Chatelier's Principle.

- As temperature **increases**, the equilibrium constant of an exothermic reaction **decreases**.
- In an endothermic reaction the equilibrium constant increases with **an increase** in temperature. **Along with** the equilibrium constant, the rate of reaction **is** also affected by the change **in** temperature. As per Le Chatelier's principle, the equilibrium **shifts** towards the **reactant** side when the temperature increases in case of exothermic reactions, for endothermic reactions the equilibrium **shifts** towards the product side with an increase in temperature.

Effect of a Catalyst: A catalyst **does not** affect the chemical equilibrium. It only speeds **up** a reaction. In fact, catalyst equally speeds up the **forward** as well as the reverse reaction. This **results** in the reaction reaching its equilibrium **faster**.

The same amount of **reactants** and products will be **present** at equilibrium in a catalysed or a non-catalysed **reaction**. The presence of a catalyst only facilitates the reaction to proceed through a lower-energy transition **state** of reactants to products.

Effect of Addition of an Inert Gas: When an inert gas like argon is **added** to a constant volume it **does not take** part in the reaction so the equilibrium remains undisturbed. If the gas added is a reactant or product involved in the reaction then the reaction quotient will change.

UNIT 10

3. 4A; 1B; 5C; 2D

4. F 1. **Carbon** is the central element to all living organisms

F 2. Organic chemistry overlaps with other sciences like **biochemistry, medicine, and materials science.**

T 3. By studying organic compounds, people can learn more about the human body and how it works. **(Yes, it is true)**

F 4. Lipids include fats and **waxes.**

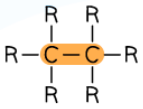
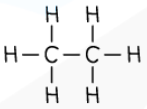
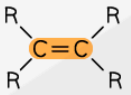
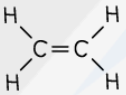
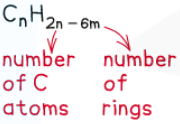
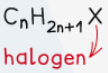
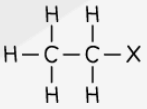
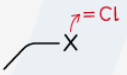
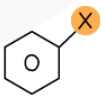
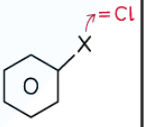
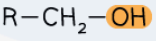
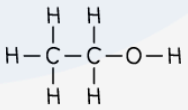
F 5. Proteins are made up of **long** chains of amino acids, but they play an important role in nearly every process that takes place in cells.

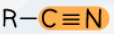
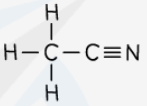
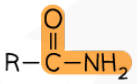
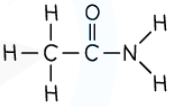
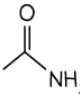
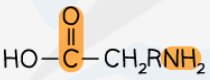
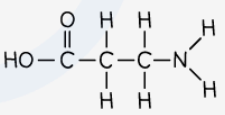
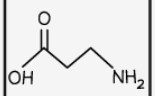
F 6. Alkanes include **ethane, propane, methane, and butane= alkynes.**

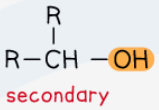
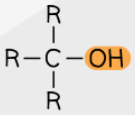
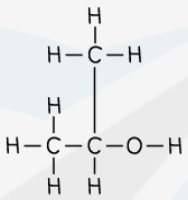
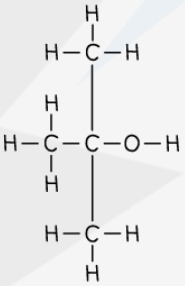
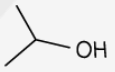
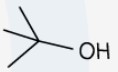
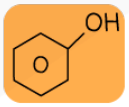
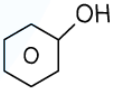
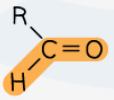
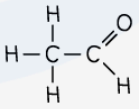
F 7. **Only around 18 percent of the human body is carbon atoms**.

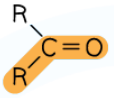
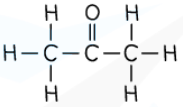
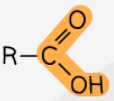
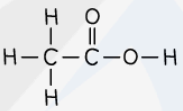
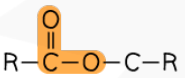
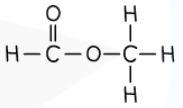
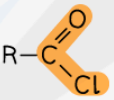
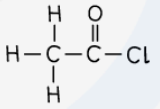
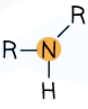
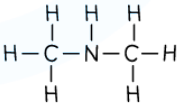
T 8. Synthetic dyes made from organic compounds save the plants. (**Yes, synthetic dyes made from organic compounds have allowed the manufacture of dyes rather than using plants for dyes.)**

5.

Functional Group	General Formula	Structural Formula	Displayed Formula	Skeletal Formula	Name
Alkane	C_nH_{2n+2}				ethane
Alkene	C_nH_{2n}				ethene
Arene	C_nH_{2n-6m} 		N/A		benzene
Halogenoalkane	$C_nH_{2n+1}X$ 				chloroethane
Halogenoarene	$C_nH_{2n-7m}X$		N/A		chlorobenzene
Alcohol	$C_nH_{2n+1}OH$				ethanol

Nitrile	$C_nH_{2n+1}CN$				ethanenitrile
Amide	$RCONH_2$				ethanamide
Amino Acid	N/A				N/A

		 secondary  tertiary	 	 	propan-2-ol 2-methylpropan-2-ol
Phenol	$C_nH_{2n-7m}OH$		N/A		phenol
Aldehyde	$C_nH_{2n+1}CHO$				ethanal

Ketone	$C_nH_{2n}O$				propanone
Carboxylic Acids	$C_nH_{2n+1}COOH$				ethanoic acid
Esters	$C_nH_{2n}O_2$				methyl methanoate
Acyl chloride	RCOCl				ethanoyl chloride
Amine	$C_nH_{2n+3}N$				dimethyl amine

6. Hydrocarbons

The simplest organic compounds are hydrocarbons. **Hydrocarbons** contain only two elements, hydrogen and carbon. A **saturated** hydrocarbon or alkane is a hydrocarbon in which all of the carbon-carbon **bonds** are single bonds. Each carbon atom **forms** four bonds and each hydrogen forms a **single** bond to a carbon. The bonding around each carbon atom is **tetrahedral**, so all bond angles are

109.5°. As a result, the carbon atoms in higher alkanes are **arranged** in zig-zag rather than linear patterns.

7. 1e; 2a; 3g; 4f; 5i; 6j; 7d; 8b; 9h; 10c

One of the most important elements for all living things is carbon. Carbon is the element with atomic number 6 and element symbol C. Here are 10 interesting carbon facts for you:

1. Carbon is the basis for organic chemistry, as it occurs in all living organisms. The simplest organic molecules consist of carbon chemically bonded to hydrogen. Many other common organics also include oxygen, nitrogen, phosphorus, and sulfur.
2. Carbon is a nonmetal that can bond with itself and many other chemical elements, forming over ten million compounds. Because it forms more compounds than any other element, it is sometimes called the "King of the Elements."
3. Elemental carbon can take the form of one of the hardest substances (diamond) or one of the softest (graphite).
4. Carbon is made in the interiors of stars, although it was not produced in the Big Bang. Carbon is made in giant and supergiant stars via the triple-alpha process. In this process, three helium nuclei fuse. When a massive star turns into a supernova, carbon scatters and can be incorporated into next-generation stars and planets.
5. Carbon compounds have limitless uses. In its elemental form, diamond is a gemstone and used for drilling/cutting; graphite is used in pencils, as a lubricant, and to protect against rust; while charcoal is used to remove toxins, tastes, and odors. The isotope Carbon-14 is used in radiocarbon dating.
6. Carbon has the highest melting/sublimation point of the elements. The melting point of diamond is ~3550°C, with the sublimation point of carbon around 3800°C. If you baked a diamond in an oven or cooked it in a frying pan, it would survive unscathed.
7. Pure carbon exists free in nature and has been known since prehistoric time. While most elements known since ancient time only exist in one allotrope, pure carbon forms graphite, diamond, and amorphous carbon (soot). The forms look very different from each other and display dissimilar properties. For example, graphite is an electrical conductor while diamond is an insulator. Other forms of carbon include fullerenes, graphene, carbon nanofoam, glassy carbon, and Q-carbon (which is magnetic and fluorescent).
8. The origin of the name "carbon" comes from the Latin word *carbo*, for charcoal. The German and French words for charcoal are similar.
9. Pure carbon is considered non-toxic, although inhalation of fine particles, such as soot, can damage lung tissue. Graphite and charcoal are considered safe enough to eat. While non-toxic to humans, carbon nanoparticles are deadly to fruit flies.

10. Carbon is the fourth most abundant element in the universe (hydrogen, helium, and oxygen are found in higher amounts, by mass). It is the 15th most abundant element in the Earth's crust.

8. 1. **How many actively cycled carbon can be found in the ocean?**

The ocean stores approximately 50 times more actively cycled carbon than the atmosphere, making it the largest carbon reservoir.

2. **What organisms provide carbon to the soil?**

Carbon is provided to the soil in the form of molecules produced by photosynthetic organisms such as plants**.**

3. **In what form is carbon in the atmosphere?**

Carbon in the atmosphere is usually in the form of carbon dioxide (CO_2), or methane (CH_4).

9. 1b The common name of Methanoic acid is formic acid.

2d The common name of Ethanoic acid is acetic Acid.

3a The common name of propanoic acid is propionic acid

4c The common name of butanoic acid is butyric acid

5e The common name of pentanoic acid is valeric acid

6g The common name of dodecanoic acid is lauric acid

7h The common name of hexadecanoic acid is palmitic acid

8f The common name of octadecanoic acid is stearic acid

10.

1. **methanoic acid** **HCO_2H** It is widely used in livestock feed as a preservative and antibacterial agent. It is also used in the manufacturing of leather, rubber, etc. Beekeepers use it as a miticide.
2. **ethanoic acid** **CH_3COOH** **Ethanoic acid** (CH_3COOH) belongs to the group of carboxylic acids and is commonly called as **acetic acid**. It is slightly heavier than water with a density of 1.05 g/cm^3. After adding 5-8% of acetic acid in water it becomes vinegar and is mostly used as preservatives in pickles. Ethanoic acid is widely used in many industries.Commercially it is used in the manufacturing of esters, vinegar, and many polymeric materials.Vinegar has

been shown to reduce high concentrations of blood sugar.Used as an agent to lyse red blood cells before white blood cells are examined.Used as a solvent in the production of camphor, ascent and cooking ingredient.Used as a stop bath for photographic emulsion development.Farmers sometimes spray acetic acid on livestock silage to fight fungal and bacteria growth.
3. **propanoic acid** *C3H6O2* Propionic Acid is a colorless, oily liquid with a strong, unpleasant odor. It is used as a preservative, fungicide, and antimicrobial agent.
4. **butanoic acid** *C4H8O2*. Used in the manufacture of esters for artificial flavourings, as a food additive, in the manufacture of varnishes, and in decalcifying hides. Used in the manufacture of perfume, flavourings, pharmaceuticals, and disinfectants. Butanoic acid is used in the food industry as a flavoring agent and preservative.
5. **pentanoic acid** *C5H10O2* Valeric acid (pentanoic acid) is a straight-chain alkyl carboxylic acid with a very unpleasant odor. It is found naturally in the perennial flowering plant valerian (Valeriana officinalis), from which it gets its name. Volatile esters of valeric acid tend to have pleasant odors and are used in perfumes and cosmetics.
6. **dodecanoic acid** *C12H24O2* The Lauric Acid creates a foaming soap when saponified. This is a key attribute of soaps - and so a blend of oils is normally used to create a soap that foams, but that is also not too hard or too soft. Lauric acid is a saturated fat. It is found in many vegetable fats, particularly in coconut and palm kernel oils. People use it as medicine. Lauric acid is used for treating viral infections including influenza (the flu); swine flu; avian flu; the common cold; fever blisters, cold sores,
7. **hexadecanoic acid** *C16H32O* / **$CH_3(CH_2)_{14}COOH$** One of the main uses of palmitic acid is in soaps because of its ability to help keep skin smooth. Palmitic acid is found in beeswax, which is a popular ingredient in personal care products. In cosmetics, palmitic acid is used in skin make-up to hide blemishes. It is also used in certain surfactants as a cleaning agent.
8. **octadecanoic acid** *C18H34O2* / **$CH_3(CH_2)_{16}COOH$** A C_{18} straight-chain saturated fatty acid component of many animal and vegetable lipids. As well as in the diet, it is used in hardening soaps, softening plastics and in making cosmetics, candles and plastics.

UNIT 11

3. 1. It is a science which uses the basic concepts of biology and chemistry to determine how drugs affect the organism; it gives a unique perspective in understanding how cells, organ systems, and organisms function.

2. It uses the basic concepts of biology and chemistry to determine how drugs affect the organism;

3. Unlike other basic science fields, pharmacology is a special field in which one can systematically investigate the mechanism for a biological event - from the molecular level to the whole animal.

4. Yes, it does.

5. The first Western pharmacological treatise, a listing of herbal plants used in classical medicine, was made in the 1st century AD by the Greek physician Dioscorides.

6. By the early 19th century, French and German chemists had isolated many active substances—morphine, strychnine, atropine, quinine, and many others—from their crude plant sources.

7. He defined its purpose, wrote a textbook of pharmacology, helped to found the first pharmacological journal, and, most importantly, headed a school at Strasbourg that became the nucleus from which independent departments of pharmacology were established in universities throughout the world. 8. Pharmacological research has developed a vast array of new drugs, including antibiotics, such as penicillin, and many hormonal drugs, such as insulin and cortisone.

9. During the early 20th century, pharmacologists became aware that a relation exists between the chemical structure of a compound and the effects it produces in the body.

10. After 1930 the area of pharmacological research underwent a vast and rapid expansion.

4 1. Pharmacology is the study of drugs

2. Pharmacy is a professional program for students wishing to become licensed pharmacists.

3. This algorithm can be used to improve medical treatment.

4. The pharmacologist does not test the effects of drugs on patients.

5. Constant testing is required for the routine control of drug products.

6. A license is required to dispense drugs legally.

7. Pharmacology investigates biological mechanisms from the molecular level to the whole animal.

8. A pharmacologist studies how medicine actually works, and usually works in a science lab.

9. A pharmacist is a health care provider who works at a pharmacy.

10. Physicians determine the clinical effectiveness of new drugs.

5.

	Synonym
capacity	measure, scope, quantity
limit	border, bound, end, extremity
to place	set, allocate, put
principally,	basically, notably, especially
to be accompanied by	assisted by, backed,
because,	as, considering, for the reason that
toward	coming, forward
consequently	therefore

6.

Word	**Antonym**
constant	inconstant, different, changing
saturated	dried out
at first	at last
always	rarely, seldom
easy	difficult, complicated, complex
decrease	increase, rise
near	far
minimum	maximum
seldom	often
limited	general, free, unrestricted

7. 1. The capacity of a solvent to dissolve a given solute is often limited though there are many pairs of substances which can be mixed in any proportions.

2. In order to control our environment, the first purpose of science must be to study and understand it.

3. To answer the question “What are the uses of sulphuric acid?” fully, one would need to write a book.

4. The alkali metals arc usually stored in oil so as to exclude air.

5. In order for two molecules to react with each other, they must, first of all, be in the presence of each other.

6. For hydrogen to be obtained from water, electrolysis may be used.

7. Sodium is a white metal soft enough to be easily cut with a knife and light enough

to float on water.

8. The minerals in which aluminum occurs, am too numerous to recite.

9. The vapour pressure of many pure liquids or solids is very low, in fact, so low as to be immeasurable by direct means.

10. The catalytic substance can be recovered unchanged after the reaction is completed.

11. As the temperature is raised, the rate of evaporation increases.

12. Once the validity of a hypothesis has been tested by all possible experiments and is found to be in harmony with all the facts, it assumes the status of a theory.

8 1. deals 2. observations; 3. predict; 4. test; 5. clinical; 6. routine

UNIT 12

3. A pharmacist dispenses prescription medications and advises patients on their use. Pharmacology, a biomedical science, focuses on chemical drugs and how they affect the people and organisms that consume them. Pharmacologists are responsible for developing the drugs that pharmacists safely dispense to patients.

4. Side effects are expected reactions that often happen when a patient takes a drug.

What are possible side effects?

All drugs have side effects. Some side effects are more common than others.

- Taste disturbances
- Diarrhea
- Weight loss
- Insomnia
- Headache
- Allergy

5. Side effects are not the same thing as adverse effects. Side effects are expected and sometimes intended effects of a drug. However, unintended pharmacological effects are referred to as adverse effects.

Patients may be told to expect side effects, and physicians are aware of these effects when they occur. However, in cases where an unexpected and harmful

pharmacological effect occurs (for example: due to dose, or perhaps unexpected genetic reactions), this is referred to as an adverse effect.

6. Pharmacokinetics and pharmacodynamics are must-know pharmacology terms. Pharmacokinetics (PK) is a discipline of pharmacology that studies how an organism, such as humans, affects a drug. The study of pharmacokinetics is often summarized in the acronym, ADME:

- Absorption
- Distribution
- Metabolism
- Excretion

In other words, how the body absorbs the drug, distributes it around the body, metabolizes it (for example – via the liver or gastrointestinal tract), and eliminates the drug from the body.

In contrast, pharmacodynamics (PD) talks about **what the drug does to the body**. In other words, the biochemical and physiological effects of the drug on the body. Pharmacodynamics, then, is an important discipline that helps to learn what the optimum dose should be. After all, **some doses are more toxic than others**, even though both doses may achieve a desired clinical outcome (defeating an infection, for example). Studying pharmacodynamics and the effect of the drug on the body helps to establish the most optimum dose-response relationship that limits side effects whilst maximizing the clinical effects of the drug.

7. Drug interactions.

Drug - drug interactions can be positive or **negative.** For example – many drugs negatively interact with one another. One drug can **prevent** the metabolism of another drug, increasing the risk of **side effects** and toxic reactions. Some drugs prevent the mechanism of action of other drugs. There are too many drug interactions to list here and you are not expected to know all these **interactions.** However, it is important you are aware of how drugs can interact with one another.

Similarly, drugs can interact with **food**. The antibacterial drug class, tetracyclines, for example, interacts with calcium ions. This means that, if the patient takes **milk** along with their tetracycline drug, it interacts with and prevents the antibacterial drug from working. For this reason, milk must be **avoided** before/after the patient takes the drug. There are hundreds of other food-drug interactions.

8. Alcohol and Drug Interactions

In an ideal world, alcohol should be avoided with all drugs. In reality, this isn't always what happens – though patients must still be warned about the clinical consequences of taking alcohol with their medicines. When alcohol is consumed with metronidazole, it triggers what is known as a disulfiram-like reaction. Disulfiram (*Antabuse*) is a drug used to treat alcoholism. It deters alcoholics from drinking alcohol because once alcohol and the medicine are taken together, disulfiram causes hangover-like effects in the patient – such as abdominal pain, nausea, vomiting, and headache.

Grapefruit Juice and Statins

Grapefruit juice contains compounds called furanocoumarins. These compounds decrease the level of liver enzymes needed to metabolize statins. As a result, taking the two concurrently increases the risk of statin toxicity and adverse effects. These adverse effects include muscle pain and, in more serious cases, rhabdomyolysis where muscle breaks down **(**the by-products of which are toxic to the kidney).

Drugs and Dairy Products / Antacids

Many drugs interact with dairy products such as milk and a variety of antacids.

That's because many dairy products and antacids contain multivalent ions such as:

Calcium (Ca^{2+}) Aluminum (Al^{3+}) Magnesium (Mg^{2+}) Zinc (Zn^{2+})

Note the ionic charge on these ions (represented by 2+ and 3+). This is what is responsible for the drug interaction, because these ions interact with and bind to the drug in a process called chelation. Foods, drinks, or antacids that contain these ions reduce the absorption and therefore efficacy of a variety of drugs.

9. Generic versus Branded Drug

When a drug first comes on the market, it has a *patent*. This means that they have legal control over the ingredient production of that medicine. No competitor exists during this period where the founding company owns the patient.

After this patent expires, competitor pharmaceutical companies can now come flooding in to produce the medicine – often at a significantly cheaper cost. That's because these competing companies do not have the significant drug manufacturing costs that the founding company had.

In other words, generic drugs are copies of brand-name drugs with the same dose, use, side effects, route of administration and almost every other clinical factor. The pharmacological effects are the same.

UNIT 13

3. Biochemistry explores chemical processes related to living organisms. It is a laboratory-based science combining biology and chemistry.

Biochemists study the structure, composition, and chemical reactions of substances in living systems and, in turn, their functions and ways to control them. Biochemistry emerged as a separate discipline when scientists combined biology with organic, inorganic, and physical chemistry. They began to study areas such as:

- How living things get energy from food
- The chemical basis of heredity
- What fundamental changes occur in disease

Biochemistry includes the sciences of molecular biology, immunochemistry, and neurochemistry, as well as bioinorganic, bioorganic, and biophysical chemistry.

4. 1.Plants, animals, and single-celled organisms all use **… the same basic chemical compounds to live their lives.**
2. Biochemical cycles that repeat over and over allow … **living creatures to survive on Earth.**
3. Life is one big network of activity where …. **each piece relies on all of the others.**
4. Metabolism is the total of all … **the chemical reactions an organism needs to survive.**
5. There are two main chemical processes - … **The first is called glycolysis. That's the breakdown of sugars. The second process is called photosynthesis.**

5.
1. Biochemists have to understand only the living world and molecules construction. **False. Biochemists have to understand both the living world and the chemical world.**
2. Just the simplest organisms use basic chemical compounds to live. **False. Plants, animals, and single-celled organisms all use the same basic chemical compounds to live their lives.**
3. Biochemistry is a science about the cells. **False. Biochemistry is not about the cells or the organisms. It's about the smallest parts of those organisms, the molecules.**
4. Biochemical cycles rely on enzymes and other proteins. **True**
5. Photosynthesis is the total of all the chemical reactions an organism needs to survive. **False. Metabolism is the total of all the chemical reactions an organism needs to survive.**

6. Four Steps of Enzyme Action
- The enzyme and the substrate are in the same area.

Some situations have more than one substrate **molecule** that the enzyme will change.

2. The enzyme grabs on to the substrate at a special area called the active site.
The combination is called the enzyme/substrate complex. **Enzymes** are very, very specific and don't just **grab** on to any molecule. The active site is a specially shaped area of the enzyme that fits around the substrate. The active site is like the grasping claw of the robot on the assembly line. It can only **pick up** one or two parts.

3. A process called catalysis happens.
Catalysis is when the substrate is changed. It could be broken down or **combined** with another molecule to make something new. It will break or build chemical **bonds**. When done, you will have the enzyme/products complex.

4. The enzyme releases the product.
When the enzyme lets go, it returns to its original shape. It is then **ready** to work on another molecule of substrate.

7. 1. Exercise usually _____ the rate of your metabolism.

Increases Exercise usually increases the rate of your metabolism. A short workout won't increase the rate as much because it would be defined as an anaerobic workout (not needing oxygen). A longer workout (aerobic) gives the cells time to lose all of their stored energy. Your body then needs to breakdown fat and proteins and turn them into sugars. That increase in the number of reactions means your metabolism is increasing.

2. You will usually find carbohydrates in...

Starches Carbohydrates are found in starches. The simplest carbohydrate is a sugar, but as you combine sugars into larger macromolecules, they are defined as starches. Proteins are made of amino acids. Waxes are a form of lipid. Nucleotides are closely associated with amino acids and can be found in your DNA.

3. The process of photosynthesis depends on which molecule?

Chlorophyll Photosynthesis depends on chlorophyll molecules to help convert light energy from the Sun into energy that can be used to create sugars. Chlorophyll is not the only molecule involved in the process, but it is the key in capturing the light energy. There are several forms of chlorophyll.

4. Changes in the *pH* can change the progress of certain metabolic reactions.

True Any change in pH can change metabolic processes. The easiest example of this situation would occur to enzymes. If you change the pH of a system, some enzymes might not be able to function and metabolism might come to a stop. pH changes (if extreme enough) could even break down tissues and cell membranes, killing the cells. Imagine the damage to a cell if you place it in in a strong acid.

5. In animals, if an organism eats too many carbohydrates, those carbohydrates can be converted into...

Fats Excess carbohydrates are converted into fats. The process is called lipid synthesis. You need to remember that not all animals have this process. Insects aren't really known for their fat bellies. If you look at mammals, most of us store some fat in one form or another. A whale might have thousands of pounds of blubber while a mouse might only have a little fat.

6. DNA can be used to code RNA which is then used to create...

Proteins RNA is used as a template to create the proteins of a cell. DNA is first transcribed to create mRNA. That mRNA then moves out of the nucleus and is translated into a string of amino acids. As the chain of amino acids grows, it twists and turns, finally creating subunits for larger proteins.

7. Proteins can be made without DNA instructions.

False The information needed to make proteins is stored in DNA molecules. You can't make new proteins without DNA, and you can't make new DNA without proteins.

However, some simple organisms can create proteins without having any DNA of their own. These organisms are usually parasitic because they don't have any cell organelles. They carry small nucleotide sequences (RNA) that are inserted into a cell. Those sequences can trigger the cell to start making new proteins.

8. All catalysts are enzymes and all enzymes are catalysts.

False All enzymes are catalysts, but not all catalysts are enzymes. Some catalysts can be inorganic. Some enzymes require inorganic cofactors before they can start to work. Catalysts are there to lower the activation energy of a reaction and speed up the chemical processes.

9. Most metabolic processes have many steps.

True Some metabolic processes have hundreds of steps. Some are much shorter with only a few dozen steps. The fact you need to remember is that biochemical processes are usually very complex. When you break down the whole process into individual reactions, it becomes much easier to understand.

10. Purines and pyrimidines are types of...

Nucleotides Purines and pyrimidines are types of nucleotides. You will find these compounds in DNA and RNA. They are the building blocks of our genetic code. You also will find that nucleic acids are closely related to amino acids. Instead of building proteins the way amino acids do, nucleic acids form long chains that might become strands of DNA.

8. 1.Metabolism is the process that only converts nutrients into more complex compounds.

False Metabolism includes the processes that break down nutrients (catabolism) AND the processes that build up compounds that the organism needs to survive (anabolism).

2. All organisms need to breathe oxygen to survive.

False Not all organisms require oxygen to survive. Anaerobic organisms survive quite well without the presence of oxygen gas. You are an aerobic organism, because you need oxygen for your metabolism.

3.Life on Earth could exist without enzymes.

False Living organisms need enzymes to survive. Some of the reactions in your body are very difficult to complete. Enzymes help these reactions happen at speeds that allow your cells to survive. Even something as simple as breaking down sugar molecules (glycolysis) to eventually release energy requires several enzymes.

4. Metabolism is a constant process. It does not matter if an organism needs more or less energy.

False The metabolism of an organism can slow down or speed up, depending on the immediate needs of the organism. Your metabolism will increase when you exercise because your body needs more energy.

5. Lipids are found in every cell on Earth.

True Lipids are found in every cell on Earth. The cell membrane is called a lipid bilayer because of the phospholipids in the structure. The phospholipids in the cell membrane have hydrophobic (water-fearing) and hydrophilic (water-loving) ends. They organize themselves in a bilayer such that the hydrophobic tails meet each other in the middle and the hydrophilic heads face the outside world.

6. While too many steroids are bad for your body, you need some to survive.

True Your body needs steroids to survive. Many of your hormones are created with steroids. Cholesterol is one of the root steroid compounds used in your body. Excessive amounts steroids are dangerous and can eventually destroy your organs. Even some steroid-based medicines become dangerous when taken in high amounts or for long periods of time.

7. All fats are lipids, but not all lipids are fats.

True All fats are lipids, but not all lipids are fats. Lipids are the larger grouping for this example. Some other examples of lipids include steroids and waxes. Fats are also called triglycerides.

8. Are all of the known amino acids found in human proteins?

No here are many amino acids found in nature that are never used in the human body. Humans have about 20 amino acids that we need to survive. We require some in our diet and others that we manufacture in our bodies.

9.Structural proteins can be easily dissolved in water.

False Structural proteins are unable to be dissolved in water. Because structural proteins are designed to support an organism, and most organisms are made of water, the proteins would not work if they dissolved. Imagine if the proteins in your muscles could be dissolved in water. They would become liquid and your body would wind up with no structure.

10. Which of these is not a protein?

All are Proteins All of the choices are proteins. Hemoglobin carries oxygen to your cells. Insulin is a hormone involved in sugar and fat metabolism. Myosin is a part of your connective tissue. When someone asks if something is a protein, look for the "in" at the end of the word. Many proteins are labeled like that. Other examples of proteins include actin, keratin, and immunoglobulins.

11. Proteins can be found...

All of the Above Proteins can be found everywhere in an organism. They can be in the cell, on the membrane, or outside of the cell.

12.There is no way to control the action of an enzyme once it is created.

False There are many ways to control the action of enzymes. You might learn about activators that allow an enzyme to start working or help it work more efficiently. There are also inhibitors that slow down or stop the action of enzymes. In addition, there are non-biological factors that limit enzyme activity, including temperature and concentration.

13.The acidity of the environment can activate an enzyme.

True Some enzymes are inactive until the environment changes. The change could be something like temperature, but acidity can also activate an enzyme. A change in pH for the system can cause the enzyme to change shape and start its job.

14.Where do you find enzymes?

All of the Above Enzymes are found all over your body. In fact, they are found in all cells. Enzymes make it possible for us to be alive. Even the smallest of microorganisms has some enzymes. They have been found in viruses too.

15.Enzymes are always very small molecules attaching to and working to break down very large molecules.

False Since most enzymes are proteins, that means they have some size to them. You can't have an enzyme that is made of three amino acids. Many times, you will find a large enzyme breaking apart smaller molecules. One example is maltase. Maltase attaches to a small maltose molecule (2 sugars) and snaps it apart into two glucose molecules.

16. While enzymes are important, you can live your life just fine without them.

False You can live your life without some enzymes, but you desperately need most of them to stay alive. Some people are lactose intolerant. They have problems with their lactase enzymes and don't break down the sugars properly. However, they are able to survive. Unfortunately, if you are missing an enzyme such as cytochrome-c-oxidase, you cannot survive.

17.Which of these can destroy or permanently deactivate an enzyme?

All of the Above All of these factors can destroy enzyme function. A poison such as cyanide can deactivate specific enzymes. A rise in temperature can heat up and denature many different enzymes at one time. Changes in pH (acidity) can also denature enzymes to a point where they cannot recover.

UNIT 14

3. 1. Environmental chemistry is the scientific study of the chemical and biochemical phenomena that occur in natural places.

2. It includes atmospheric, aquatic and soil chemistry, as well as analytical chemistry.

3. A contaminant is a substance present in nature at a level higher than typical levels or that would not otherwise be there.

4. Environmental chemistry starts by understanding how the uncontaminated environment works.

5. This branch of science is closely connected with contamination.

6. Environmental chemistry is used by the Environment Agency (in England and Wales), the Environmental Protection Agency (in the United States) the Association of Public Analysts, and other environmental agencies and research bodies around the world.

7. Quantitative chemical analysis is a key part of environmental chemistry, since it provides the data that frame most environmental studies.

4. Contamination - contaminant *noun*; contaminate *verb*
pollution - pollute *verb*; polluter *noun*
surround - surrounding ; surrounded *adjective*
emit - emission *noun*; emitted, emitting *adjective*
dangerous - danger *noun*; dangerously *adverb*
environment - environmental *adjective* environmentally *adverb*
identify - identification *noun*; identifier *noun*

5. 1. into; 2. in ; 3. On, of, of, of, in, of, of. 4. of, by. 5. until. 6. to, of. 7. to, of, of. 8. of, of, from, by, by. 9. on, of. 10. until

6. Let us analyse what happens when .-.. liquid is placed in **..a**. closed evacuated container. 2. As long as ..-. temperature remains constant, .-.. evaporation continues at .a.. constant rate. 3. As .-.. pressure of .-.. vapour grows, .**a**.. number of... gas molecules returning to .**the**.. liquid also increases. 4. .-. time dependence of .-.. evaporation and condensation rates should be considered. 5. At equilibrium, ..-.. evaporation and .-.condensation do not stop.

7.

magnitude,	consequence, degree, significance
mention	refer to, touch on/upon, speak briefly of, hint at
substantial	considerable, real, material, weighty, meaningful, significant, important
fraction	tiny part, small part, fragment
remain	continue to exist, endure, last
place	put down, put, set, set down, lay down, deposit
primarily‘	first and foremost, first, firstly, essentially, in essence, fundamentally
vapour	haze, mist, spray, steam

UNIT 15

3. 1. They are mixtures of many different chemical substances. 2. *E.g.,* oxygen, iron, or water 3. Analytical chemistry is a science of obtaining, processing, and giving information about the composition and structure of matter. 4. Some very simple qualitative tests reveal the presence of specific chemical elements in even smaller amounts. 5. Such analytic tests have allowed chemists to identify the types and amounts of impurities in various substances and to determine the properties of very pure materials. 6. Qualitative analysis characterizes the identity of a specimen, while quantitative analysis examines its mass or concentration. 7. Techniques used in qualitative analysis include chemical tests, spectroscopy, spectrometry, microscopy, flame tests, and bead tests. Quantitative analysis employs analytical balances, gravimetric analysis, volumetric analysis, and separation techniques, such as filtration, centrifugation, and chromatography. 8. The demand in modern societies for a variety of safe foods, affordable consumer goods, abundant energy, and labour-saving technologies has a great impact on the environment. Pollution problems have increased with the growth of global population. 9. See the last paragraph.

4. Make derivatives of the following words:

Verb	*Adjective*	*Noun*
afford	affordable	affordability

purify	pure	purity
require	required	requirement
indentify	Identifying/identifiable	identification
rely	reliable	reliability
increase	Increasing/ed	increase
differ	different	difference
remove	removable	removal

5. Give the synonyms for the following words:
to help - assist, support; show – demonstrate, present, display; more – additional; fact –evidence, cases/to truth, certainty; to take notice of - observe, to pay attention to, to take heed of; amount - quantity, demand - request, necessity; to begin – to start, to initiate; a kind of – a type of, a form of; an example – sample, pattern, case.

6. Give the antonyms for the following:
first - last, final; contrary to – for, due to, in agreement with; inexperienced – experienced, advanced, professional, mature; regular - irregular, wrong, incorrect, occasional; to take into account - disregard, ignore; insufficient - sufficient, enough; the same - different, other; simple - complex, hard, difficult; after - first, before, prior to; to finish – start, begin, initiate.

7. Sophisticated analytical instruments have improved the accuracy with which **chemists** can identify substances and have lowered detection limits. An **analytical** technique in general use is gas chromatography, which separates the different **components** of a gaseous mixture by passing (the mixture=it) through a long, **narrow** column of absorbent material. The different gases interact differently with this absorbent **material** and pass through the column at different rates. As the separate gases flow out of the column, they can be passed into another analytical **instrument** called a mass spectrometer, which separates substances. A combined gas chromatograph–mass spectrometer can rapidly **identify** the individual components of a chemical mixture which concentrations may be no greater than a few parts per **billion**. Similar or even greater sensitivities can be obtained under favourable conditions using **techniques** such as atomic absorption, polarography, and neutron activation. The rate of instrumental innovation is such that analytical instruments often become outdated within 10 years. Newer instruments are more **accurate** and faster and are employed widely in the areas of environmental and medicinal chemistry.

KEYS GRAMMAR MODULES

UNIT 1 Grammar module

Personal pronouns, *to be, to have,* countable and uncountable nouns, *there is/are*.

1. **Fill in the gaps using *he, she, it, we, they, you*.**

they	it
she	it
he	she
we	it
they	they
she	it
you	they
it	it
it	they
it	it
it	he
they	they
she	it
it	it
they	they
they	they
they	he

2. Fill in the gaps using *am, is, are, am not, isn't, aren't.*

1. is 2. is 3. isn't 4. is 5. are 6. is 7. am not 8. isn't 9. is 10. is 11. isn't 12. am, am not 13. is 14. is 15. am not 16. aren't, are 17. are 18. is 19. aren't, are 20. aren't, are

3. Change the sentences into questions.

1. Are you ill? 2. Is Linda a pretty girl? 3. Is Belinda a singer? 4. Is Nick an actor? 5. Are we good friends? 6. Is he an officer? 7. Is it an eraser? 8. Are you and Eddie partners? 9. Is Rosie angry? 10. Are Jack and I good swimmers?

4. Fill in the gaps using an appropriate form of the verb *to be.*

1. are 2. are 3. am 4. is 5. are 6. am not 7. is 8. are 9. is not 10. is not 11. are

5. Use the correct form of the verb *to have.*

1. have 2. have 3. has 4. has 5. has 6. has 7. have 8. have 9. have 10. has

6. Use *has, doesn't have, have, don't have* in the following sentences.

1. doesn't have 2. has, doesn't have 3. have, don't have 4. have, has 5. have, has

7. Define the words in bold as countable or uncountable.

1. count. 2. uncount. 3. uncount. 4. count. 5. uncount. 6. count. 7. uncount. 8. count. 9. count. 10. uncount. 11. count. 12. count. 13. count. 14. uncount. 15. count. 16. uncount. 17. count. 18. uncount. 19. count. 20. count.

8. Change these sentences so that you use *there* + the correct form of *to be.*

1. There are two apples on the table. 2. There isn't any boy in the street/ There is no boy in the street. 3. Is there an ATM near here? 4. There will be a party tomorrow. 5. There were a lot of illnesses in the 14th century. 6. There were hardly any people at the meeting. 7. There's a Starbucks next to the bank. 8. Is there a table in the garden? 9.

There isn't a bath in my flat. 10. Is there a train to Glasgow tonight? 11. Is there somewhere to get coffee in the station? 12. There are a lot of mountains in Switzerland. 13. There weren't many mosquitoes near the lake. 14. Will there be biscuits at the meeting? 15. There isn't any bread in the kitchen. 16. Is there a good clothes shop in this town? 17. Were there good teachers at your school? 18. There's a police station nearby. 19. Were there a lot of people in the restaurant? 20. There are no flowers in the hall.

UNIT 2 Grammar module

Some, any, much, many, few, little

1. Complete the sentences. Use *some* or *any.*

1. some 2. any 3. any, some 4. some, any 5. some 6. any 7. any 8. some 9. some 10. some 11. any 12. some 13. some 14. some 15. any 16. any 17. any 18. some 19. any 20. any

2. Choose the correct variant *some or any.*

1. any 2. any 3. some 4. some 5. any 6. some 7. any 8. some 9. some 10. any 11. any 12. some 13. some 14. some 15. any 16. any 17. some 18. any 19. any 20. some

3. Choose *How much* or *How many*.

1. How much 2. How many 3. How much 4. How many 5. How much 6. How many 7. How much 8. How much 9. How many 10. How much

4. Choose the correct variant.

1. a 2. b 3. b 4. a 5. a 6. b 7. a 8. a 9. a 10. b 11. b 12. a 13. a 14. b

5. Choose the correct answer.

1. a 2. a 3. c 4. b 5. d 6. d 7. c 8. b 9. a 10. c 11. b 12. d 13. a 14. b 15. b 16. c 17. c 18. d 19. a 20. a

UNIT 3 Grammar module

Present Simple vs Past Simple

1. Open the brackets in Present Simple.

1. reads 2. likes 3. do 4. meet 5. goes 6. play 7. goes 8. rides 9. have 10. says 11. is 12. lives 13. eat 14. has 15. am

2. Open the brackets in Present Simple.

1. have 2. gets up 3. have 4. goes 5. gets 6. wants 7. hate 8. watches 9. does 10. lives 11. wear 12. sings 13. cooks 14. works 15. read

3. Put the words into the correct order. Write down the sentences (affirmative and questions).

1. What do you have for breakfast?
2. When does ha come home on Fridays?
3. How often does she go out with her friends?
4. Does your brother live in England?
5. Do the kids like their new English teacher?
6. They sometimes visit their aunt on Sundays.
7. Do you often go to the mall with your friends?

8. He hardly ever watches a tennis match.
9. Usually we don't have dinner before seven.
10. Does she always read the paper in the morning?

4. Write down forms of irregular verbs and translate them.

shine	shined / shone	shined / shone	сяяти, світити
hear	heard	heard	чути, слухати
find	found	found	знаходити, виявляти
shut	shut	shut	закривати
beat	beat	beaten / beat	бити, перемогати
breed	bred	bred	розводити, виховувати, плодитися
stick	stuck	stuck	встромляти, колоти, приклеювати
lose	lost	lost	втрачати, пропадати, губити
swim	swam	swum	плавати
lay	laid	laid	класти, накривати
spin	spun	spun	крутити, плести
throw	threw	thrown	кидати
bite	bit	bitten	кусати, клювати
swing	swung	swung	качати, висіти
grind	ground	ground	молоти, точити, шліфувати

5. Complete the table with the necessary form of the verbs.

say	said	said
leave	left	left
have	had	had
flow	flew	flown
do	did	done
become	became	become
pay	paid	paid
see	saw	seen
wear	wore	worn
ring	rang	rung
get	got	got
stick	stuck	stuck
lead	led	led
begin	began	begun
write	wrote	written
catch	caught	caught

6. Fill in the past form of the verb in brackets.

1. were. didn`t live. lived. didn't eat. ate. had
2. paid. didn't pay
3. swam., didn`t swim
4. spent. didn't spend
5. saw. didn`t see

6. drank. didn`t drink

7. Put the sentences into Past Simple.

1. went 2. got 3. lost 4. wrote 5. met 6. read 7. came 8. went 9. had 10. bought 11. ate 12. did 13. took 14. left 15. visited

8. Open the brackets. Use Present Simple or Past Simple.

1. went 2. likes 3. ate 4. talked 5. Did you have…? 6. speaks 7. spoke 8. carries 9. talks 10. drove 11. left 12. leave 13. laughs 14. smokes 15. leaves

UNIT 4 Grammar module

Future Simple and *to be going to do smth*

1. Make up sentences using Future Simple.

1. Amanda will move to a new flat next month.
2. Daniel will attend language courses next year.
3. His cousin will buy the tickets for the plane in two days.
4. Our students will study philosophy next term.
5. I'll do the ironing after dinner.
6. We'll have History exam in three days.
7. Larry and Tom will go to the skating-rink in an hour.
8. You'll write the invitations for the party tomorrow.
9. Mark will go to the swimming-pool next Tuesday.
10. They will leave for Berlin in a week.

2. Ask questions to the words in bold.

1. What will the postman deliver? / When will the postman deliver fresh newspapers?
2. Who will have a picnic in the park? / Where will we have a picnic?
3. Whose brother will translate this article next week? / What will her brother do next week?
4. Where will Alex return at seven o'clock? / When will Alex return home?
5. Whose report will you read very attentively? / How will you read my report?
6. What letter will my friend soon send me? / Whom will my friend soon send an e-mail letter?
7. Who will give you some discs in two days? / When will her cousin give you some discs?
8. What will Jane learn? / What will Jane do?
9. Whose mother will feed the fish in the evening? / What will my mother feed in the evening?
10. Who will drive to the country next Sunday? / Where will they drive next Sunday?

3. Make up questions using the following words.

1. When will they return from their trip?
2. Will the boss sign our documents tomorrow morning?
3. Will I not go to bed early tonight?
4. Will they publish your article in the local newspaper?
5. How will they solve this problem?
6. What will you give her for her birthday?
7. Will they not meet me after classes?
8. Will the secretary receive the documents in the morning?

9. Where will you put the key from your flat?
10. Will next train arrive in twenty minutes?

4. Open the brackets.

Will you *show* me this bracelet? … *Will* you *hold* this bracelet for me if I pay you a small deposit? … I *will hold* this bracelet if you pay £50. … But when *will* you *come* to pay the rest of money and collect it? … My husband *will come* and pay for the bracelet as soon as he does something unforgivable. Perhaps he *will come* this weekend…

5. Make up sentences using *to be going to.*

1. is going to sell 2. are going to spend 3. am going to move 4. What are you going to do...? 5.
is going to build 6. is going to learn 7. are you going to help me? 8. Is she going to study in Dublin? 9. am not going to tell 10. isn't going to ring 11. Are they going to paint the room? 12. aren't going to invite 13. isn't going to work 14. Is he going to apply for that job? 15. aren't going to lend

6. Open the brackets using *to be going.*

1. is going to rain 2. are going to eat 3. am going to wear 4. aren't going to help 5. isn't going to walk 6. Are you going to cook 7. isn't going to share 8. Is she going to leave 9. Is he going to take part 10. aren't going to spend

7. Complete the sentences using *will (´ll)* or *going to*.

1. am going to watch 2. I'll lend 3. I'll get 4. I am going to wash 5. are you going to paint 6. I am going to buy 7. I'll show 8. I'll have 9. I'll do 10. it's going to fall

8. Choose the correct option.

1. b 2. a 3. a 4. a 5. c 6. c 7. b 8. b 9. a 10. b

9. Choose the correct variant.

1. c 2. a 3. b 4. a 5. b 6. c 7. a 8. b 9. a 10. c

10. Open the brackets using *will* or *to be going to*.

1. 'm going to buy 2. 'll clean 3. 'm going to take 4. 're going to have 5. 'll make 6. 'll ask 7. 'll arrive 8. isn't going to run 9. 're going to enjoy 10. 'll buy

UNIT 5 Grammar module

Present Continuous and Past Continuous

1. Write down the affirmative, negative and question form of the sentence.

1. The sun is shining brightly; The sun is shining brightly; Is the sun shining brightly?
2. You are having breakfast; You are not having breakfast; Are you having breakfast?
3. He is running in the park; He is not running in the park; Is he running in the park?
4. They are looking for eyeglasses; They are not looking for eyeglasses; Are they looking for eyeglasses?
5. It is raining in Madrid; It is not raining in Madrid; Is it raining in Madrid?

2. Make up sentences.

1. I am studying at the moment. 2. I am not sleeping. 3. You are playing badminton tonight. 4. We are watching TV. 5. She isn't working in Spain. 6. He isn't waiting for the bus. 8. We aren't going to the cinema tonight. 9. You aren't going to read the newspaper. 10. She is eating chocolate. 11. I am not living in Paris. 12. We are studying French. 13. They aren't leaving now. 14. They are living in London. 15. He

is working in a restaurant now. 16. I am not meeting my father at four. 17. She isn't drinking tea now. 18. She is playing the guitar. 19. We are cooking. 20. He is walking to school now.

3. Use Present Continuous in the sentences.

1. is going 2. is drinking 3. am swimming 4. is washing 5. is drinking 6. are dancing 7. are running 8. are writing 9. is cooking 10. is eating 11. are watching 12. are having 13. is driving. 14. are swimming 15. are having

4. Open the brackets in Past Continuous.

1. was resting 2. were looking 3. were reading 4. was speaking 5. was raining 6. was sweeping 7. were talking 8. were playing 9. was walking 10. were going 11. was studying 12. was sleeping 13. were listening 14. was working 15. was digging

5. Make up sentences. Use Past Continuous

1. He was cooking. 2. Was she playing cards? 3. I wasn't crying. 4. You weren't feeling well. 5. Where was you going when I met you? 6. She wasn't sleeping at midnight 7. Were they working? 8. Were you sleeping when I got home? 9. It was raining at lunchtime. 10. What were you doing? 11. Why was she running? 12. You weren't reading. 13. How were we doing at that time? 14. He wasn't watching a film at 3pm. 15. I was doing my homework at eight o'clock. 16. Where was it raining? 17. Were you shopping when I called you? 18. She was eating dinner when we arrived. 19. Was he living in Tokyo at that time? 20. Was it snowing?

6. Make up the affirmative, negative and question form of the sentence. Use Past Continuous.

1. When was he working there? 2. Were you making dinner? 3. Were they drinking coffee when you arrived? 4. When were we sleeping? 5. They were studying last night. 6. We were talking when the accident happened. 7. He wasn't exercising enough. 8. Was I talking too much? 9. It wasn't snowing. 10. How were they feeling? 11. They weren't talking. 12. Where was I staying? 13. Why was he studying on a Saturday night? 14. I was going to school when you saw me. 15. You were sleeping at 6am. 16. She was working when I called. 17. We weren't leaving when you called. 18. I wasn't staying in a hotel. 19. Were we making too much noise? 20. Were they taking the exam?

7. Choose the correct variant.

1. was watching 2. was preparing 3. am writing 4. are playing 5. are still waiting 6. are waiting 7. is raining 8. are preparing 9. is waiting 10. was waiting 11. was living 12. was sleeping

8. Complete the following sentences using an appropriate present continuous or past continuous tense form.

1. was watering 2. were you doing 3. were waiting 4. is getting 5. are playing 6. is raining 7. am revising 8. is knocking 9. are waiting 10. are shouting 11. are flying 12. are expecting

9. Choose the correct variant. Mind the difference between Present Continuous, Past Simple and Past Continuous.

1. were 2. began 3. are leaving 4. didn't go out 5. was watching 6. was studying 7. weren't 8. 'm watching 9. were you doing 10. was playing

UNIT 6 Grammar Module

Simple Tense vs Continuous Tense

1. Fill in the gaps with Present Continuous or Present Simple, paying attention to their difference.

1. are playing 2. reads 3. am doing 4. 'm eating 5. Do you want 6. are watching 7. don't like 8. is sleeping 9. cooks 10. writes 11. doesn't like 12. 's listening 13. drinks, is drinking 14. are going 15. goes

2. Complete the sentences with Present Simple or Present Continuous.

1. goes, is going 2. reads, is not reading 3. ride; like riding; are; go; is, are 4. likes eating; has; eat; doesn't like eating; never eats; is; is sleeping

3. Ask questions for the underlined words.

1. How often does George have chemistry classes? 2. What does Mike eat for breakfast every morning? 3. What is the teacher doing? 4. Who is grinding some ingredients now? 5. How often do your parents smoke cigarettes? 6. How do Peter and Rob often measure volumes? 7. Where is Sam mixing two chemicals? 8. How many manuals do you read every month? 9. Why can't you understand Hans? 10. Is Sally writing a report now?

4. Write *don't, doesn't, isn't, aren't* or *am not* in the blank space in each sentence.

3. aren't 4. don't 5. don't 6. aren't 7. isn't 8. doesn't 9. isn't 10. doesn't 11. don't 12. don't

5. Fill in the gaps withthe correct form of Past Simple or Past Continuous.

1. was talking 2. studied 3. was sleeping 4. was walking 5. watched 6. was paying 7. cut 8. was dancing 9. was raining 10. rained

6. Complete the sentences with the words in brackets using Past Simple or Past Continuous.

1. was eating, knocked 2. came; was studying, came 3. was studying, dropped by 4. called, were watching 5. came, was talking 6. went; saw; were walking, began, stopped, had 7. went; got, was; was planting; was; was working; was changing

7. Make sentences from the words in brackets. Put the verbs into the correct form.

1. We saw an accident when we were waiting for the bus. 2. It began to rain when I was walking home. 3. Ann was waiting for me when I arrived. 4. They weren't driving fast when the accident happened. 5. We didn't go out because it was raining. 6. What were you doing at this time yesterday? 7. Ann wasn't waiting for us when we arrived. 8. George fell off the ladder while he was painting the ceiling. 9. I was doing some shopping yesterday when I saw a Dutch friend of mine. 10. While Diana was watching her favourite programme there was a power cut.

8. Fill in the correct future tense - *will*, *to be going to* or Present Continuous.

1. are driving/are going to drive 2. will be 3. will take/is going to take 4. won't tell 5. is going to rain 6. are playing 7. am going 8. are going to fly 9. am inviting, will come

10. will help 11. Is he going 12. will win 13. will probably stay 14. isn't leaving 15. will come

9. Use the verbs in brackets in the correct future tenses – will, going to, Present Simple or Present Continuous.

1. leaves 2. are going to have 3. will snow 4. am meeting 5. are flying 6. will drive 7. starts 8. am going to see 9. is going to rain 10. will open

10. Choose the correct variant.

1. a 2. a 3. b 4. c 5. b 6. d 7. a 8. a 9. b 10. a

UNIT 7 Grammar module
Modal verbs

1. Fill in the gaps with *can* or *can't*.

1. can't, can 2. can 3. can, can't 4. can't 5. can't 6. can 7. can't 8. can, can't

2. Fill in the gaps with *can / can't* or *must / mustn't*.

1. must 2. must 3. mustn't/can't 4. can't 5. can 6. can't 7. can't 8. can 9. must 10. must 11. must 12. must 13. mustn't 14. must 15. mustn't 16. can 17. can't

3. Use *must / mustn't / have to* or *(not) have to*.

1. don't have to 2. mustn't 3. mustn't 4. don't have to 5. had to 6. had to 7. have to 8. don't have to 9. had to 10. must 11. don't have to 12. mustn't 13. don't have to 14. have to 15. must 16. has to

4. Fill in the gaps using *(not) have to / must (not) / can / could*.

1. can 2. could 3. doesn't have to 4. must 5. had to 6. mustn't 7. must 8. could 9. can 10. mustn't

5. Use a suitable present or past modal forms.

1. could 2. can 3. can 4. can't 5. might have gone 6. must have walked 7. had to 8. might 9. could 10. must/has to 11. had to /must have written 12. must have stayed 13. might/can 14. must have snowed 15. must 16. must/have to 17. can't

6. Draw conclusions using *can't / must / might*.

1. He must be rich. 2. He could have a job. 3. They must be tourists 4. She must be a sports reporter. 5. He can't be a doctor. 6. She can't be stupid. 7. must 8. might 9. might 10. can't

7. Fill in *must* or *mustn't*.

1. mustn't 2. must 3. must 4. mustn't 5. mustn't 6. must

UNIT 8 Grammar module
Present Perfect vs Past Simple

1. Write a suitable sentence using Present Perfect Tense.

2. Tom has lost his weight. 3. Bill has broken his leg. 4. My sister has lost her pen. 5. Mary has gone on holiday. 6. He has been to Canada. 7. He has bought a lot of packages. 8. I have eaten too much. 9. She has cleaned the house. 10. He has worked hard this year.

2. Use Present Perfect Tense after *because*.

1. He can't walk very fast because he has hurt his leg. 2. I can't get in because I have lost the key. 3. I know this story very well because I have seen the film. 4. I can't post the letter because I haven't put stamp on it. 5. He can't stand up because he has eaten too much. 6. They can't go on holiday because they haven't saved money. 7. I know him because I have met him before. 8. We don't know how he is because we haven't heard from him. 9. He won't take a cigarette because he has given up smoking. 10. She can't get in because he has locked the door.

3. Follow the example and do the same using *already*.

1. I have already found them. 2. I have already turned it down. 3. I have already tidied it. 4. I have already posted them. 5. I have already seen him. 6. I have already stopped

smoking. 7. I have already cleaned them. 8. I have already brushed them. 9. I have already made it. 10. I have already invited her.

4. Follow the example and do the same using *yet.*

1. I've written to them three times but they haven't replied yet. 2. I've asked you again and again but you haven't done it yet. 3. I lent him $10 last month but he hasn't given it back yet. 4. He lost his pen a week ago but he hasn't found it yet. 5. He borrowed my book last year but he hasn't given it back yet. 6. She went to New York six months ago but she hasn't returned yet. 7. She gave me $2 a week ago but she hasn't returned it yet. 8. I finished reading my library books a long time ago but I haven't changed them yet. 9. She went to the bus-stop half an hour ago but the bus hasn't come yet. 10. He's still studying that lesson but he hasn't learnt (learned) it yet.

5. Fill in the gaps with *already* or *yet.*

1. yet 2. already 3. already 4. already 5. yet 6. yet 7. already 8. yet, yet 9. yet, already 10. already 11. already 12. yet

6. Ask questions with *how long*.

1. How long have you known Bob? 2. How long have they been married? 3. How long has he been unemployed? 4. How long have these books been here? 5. How long has she been at the airport? 6. How long has she been ill? 7. How long has she had a bad cold? 8. How long has he had long hair? 9. How long have you had a yacht? 10. How long have they been in the restaurant? 11. How long have your parents been in London? 12. How long has the car been under the table?

7. Rewrite the following sentences twice, using *since* and *for.*

1. We've been here a) for an hour / b) since 4 o'clock
2. She hasn't spoken to me a) for 2 weeks / b) since last week
3. They've lived in this street a) since 1970 / b) for a long time
4. I haven't had time to do a) since last Monday / b) for a few days
5. We haven't bought a new one a) for ages / b) for many years

8. Put the verbs in the correct tense. Use Simple Past or Present Perfect.

1. Has … finished...? 2. Did … finish…? 3. have just gone 4. went 5. Did … study…? 6. Have … sent…? 7. Did … call …? 8. haven't seen 9. has just arrived 10. Have …ever been…? 11. Did … enjoy…? 12. Didn't … finish…? 13. have lost 14. has had 15. … did he give up…? 16. bought 17. has taken 18. … didn't Jim want…? 19. Have … washed…? 20. was

9. Choose the correct variant.

1. b 2. a 3. a 4. b 5. a 6. c 7. c 8. a 9. b 10. c

10. Put the verbs in the correct tense. Use Past Simple or Present Perfect.

1. have been ('ve been) / were 2. began / has risen 3. met / have been ('ve been) 4. was / has never been ('s never been) 5. told / has been ('s been) 6. have bought ('ve bought) / did you buy 7. Have you cleaned / went 8. has read ('s read) / read 9. has been ('s been) / has never bought ('s never bought) 10. stopped / smoked

UNIT 9 Grammar module
Past Perfect

1. Put in the verbs in brackets into the gaps and form sentences in Past Perfect.

1. had lived
2. had eaten
3. had phoned
4. had packed
5. had told
6. had been
7. had collected
8. had finished
9. had broken
10. had arrived

2. Open the brackets using Past Perfect.

1. had started 2. had lived 3. had eaten 4. had listened 5. had left 6. had finished 7. had been 8. had met 9. had forgotten 10. had studied 11. hadn't rained 12. hadn't paid 13. hadn't done 14. hadn't eaten 15. hadn't brought 16. hadn't visited 17. hadn't met 18. hadn't had 19. hadn't used 20. hadn't studied

3. Choose the correct variant.

1. a 2. b 3. c 4. a 5. c 6. b 7. a 8. b 9. b 10. c

4. Complete the sentences using the words in brackets in Past Simple or Past Perfect.

1. hadn't called 2. called 3. 'd bought (had bought) 4. decided 5. got 6. Had I made 7. 'd seen (had seen) 8. had run 9. had I put 10. tried

5. Open the brackets using Past Perfect or Past Simple.

1. had spent, wanted
2. had phoned, left
3. turned on, had washed
4. arrived, had already started
5. had come, fed
6. sang, had played
7. watched, had gone
8. had made, phoned
9. was, had studied
10. had ridden, met

6. Fill in Past Simple or Past Perfect Tense.

1. had opened, became 2. had seen, went 3. had left, started 4. had started, took 5. played, had done 6. thanked, had taken 7. saw, had left 8. combed, had brushed 9. went, had put 10. went, had stopped 11. arrived, had already started 12. started, had gone 13. had got, showed 14. fell, had taken 15. ate, had asked

7. Use a suitable Past Simple or Past Perfect Tense.

1. had worried, heard 2. was, had thought 3. had shot 4. drank, had finished 5. had just folded, opened, entered 6. had brought 7. had worked, decided 8. arrived, had already gone 9. had waited, finished 10. had left, finished 11. had bought, went 12. had just turned off, rang

8. Use a suitable Past Simple or Past Perfect Tense.

1. had … known, got 2. drove, had spent 3. got, had already left 4. sat, had had 5. hadn't … asked, left 6. had let 7. had earned 8. had gone, sat, lighted (lit) 9. had to, had broken 10. had been, heard

UNIT 10 Grammar Module

Future forms

1. Make sentences with *will be –ing.*

1. So at 9.30 I'll be watching television. 2. So at 4 o'clock tomorrow I'll be playing tennis. 3. So at 8.30 this evening he will be studying. 4. So at 10 o'clock tomorrow morning we'll be cleaning the flat. 5. So at 8.30 this evening he will be watching the football match. 6. We'll be finishing dinner then. 7. I'll be working. 8. you will still be doing 9. I'll be staying 10. Wil you be seeing…?

2. A gang of criminals have a plan to steal millions of pounds from a London bank and leave the country. They're talking about what they will be doing a week from now, after the robbery.

2. We'll be relaxing at our villa. 3. I'll be sitting by the pool. 4. The sun will be shining. 5. We will be enjoying ourselves. 6. The police will be looking for us. 7. But we will be laughing at them.

3. Make sentences with *will be –ing.*

2. He will be sleeping at eleven o'clock. 3. We'll be working very hard at this time next month. 4. They will be traveling all night. 5. She will be doing the washing up in an hour's time. 6. He'll still be mending his car at dinner time. 7. I'll be driving a BMW in two years' time. 8. I'll be studying English from 8 to 10. 9. I'll be having an interview now at 2 o'clock this afternoon. 10. We'll be listening to pop music at this time tomorrow.

4. What will life be like in the year 2100? Complete the sentences using *will have* + past participle form.

1. will have become 2. will have taken over 3. will have run out 4. Will scientists have found …? 5. will education have changed? 6. Will we have found…?

5. Use *will have* + past participle form.

1. the film will have already started 2. Jim will have gone to bed 3. he will have spent all his money 4. he will have been here exactly three years 5. will have been married 6. she will have traveled

6. Use Future Perfect Tense.

1. will have written 2. won't have forgotten 3. will have redecorated 4. will have been 5. won't have made 6. will have driven 7. will have stopped 8. will have had 9. will have married 10. will have become 11. will have disappeared

7. Fill in the gaps using Future Perfect Continuous Tense.

1. will have been living 2. will have been flying 3. will have been working 4. will have been teaching 5. will have been wearing 6. will have been driving 7. will have been taking 8. will have been having 9. will have been living 10. will have been playing 11. will have been dancing 12. will have been learning

UNIT 11 Grammar module
Perfect Continuous

1. Write sentences in the correct form. Use Present Perfect Continuous.

1. has been working 2. have been studying 3. have been eating 4. have been living 5. has been playing 6. have been learning 7. have been cooking 8. has been going 9. has been raining 10. have been sleeping 11. haven't been working 12. haven't been eating 13. haven't been exercising 14. hasn't been studying 15. haven't been living 16. hasn't been snowing 17. hasn't been playing 18. haven't been drinking 19. haven't been sleeping 20. haven't been watching

2. Use Present Perfect Continuous Tense to fill in the gaps.

2. has been writing 3. has been eating 4. has been peeling 5. has been attending 6. have you been learning 7. I've been looking 8. has been escaping 9. have you been using 10. has been living 11. has been earning 12. has been raining

3. Choose Present Perfect or Present Perfect Continuous.

1. I've bought 2. Have you finished 3. have been eating 4. have read 5. have written 6. have you been doing 7. has eaten 8. have drunk 9. You've been playing 10. haven't seen 11. has scored 12. have been dancing 13. have been waiting 14. I've finished 15. I've been writing 16. have been travelling 18. has found 19. have been running 20. have been writing

4. Choose the Present Perfect simple or Present Perfect Continuous to complete the sentences below.

1. c 2. a 3. a 4. b 5. b, c 6. a 7. a 8. c 9. a 10. b

5. Complete the dialogues below with the Present Perfect Simple or Present Perfect Continuous of the verbs in brackets. If both tenses are possible, use the Present Perfect Continuous.

1. have been walking ('ve been walking), have walked ('ve walked) 2. have been drinking, have only drunk, have drunk 3. have been waiting, have you been 4. have been teaching, have met 5. have been making, have made 6. has been calling, have called, have been sitting 7. have been working, have not met 8. have lost, have been trying 9. have not said 10. have washed

6. Use Past Simple or Present Perfect Tense to fill in the gaps.

1. have you learned, came? have you made? have already met 2. had, went 3. have just had, didn't have 4. wrote 5. have the team won 6. have never met 7. rained, hasn't

rained 8. have you written 9. was 10. has never seen 11. Have you seen 12. got, was, went 13. have you washed 14. wasn't 15. worked

7. Write sentences with Past Perfect Continuous.

What had they been doing?

1. John had been waiting for us.
2. What had she been reading?
3. The ducks had been swimming.
4. We hadn't been drinking much.
5. Had it been snowing all night?
6. Had the baby been crying?
7. The girls had not been running.
8. I had been looking for you.
9. They had not been watching TV.
10. Why had he been laughing?

8. Put the verbs into the correct form (Past Perfect Continuous).

1. had been sleeping 2. had been waiting 3. had been looking 4. hadn't been walking 5. had she been learning 6. had been singing 7. had been driving 8. had been helping 9. hadn't been working 10. had been cycling

9. Make Past Simple or Past Perfect Continuous.

1. had been waiting, arrived 2. was, had been eating 3. saw, had been running 4. had been raining, was 5. arrived, had been working 6. had been studying, met 7. had been talking, wanted 8. had been drinking, felt 9. had been hoping, got 10. had been dreaming, booked

10. Open the brackets using Past Continuous, Past Perfect Simple or Past Perfect Continuous.

1. had been writing 2. had had 3. were driving 4. had already seen 5. had been working 6. was cooking 7. had been crying 8. were all watching

UNIT 12 Grammar module

Comparatives and Superlatives

1. Fill in the gaps with the adjectives in brackets.

1. older than 2. easier than 3. the tallest 4. fatter than 5. the smallest 6. the largest 7. the longest 8. more popular than 9. better than 10. worse than 11. larger than 12. the most beautiful 13. the shortest 14. the funniest 15. the prettiest

2. Fill in the gaps as in the example.

the smallest, the coldest, the dirtiest, more expensive than, the most expensive, the worst, the most horrible

3. Complete the sentences.

2. older than 3. heaviest of 4. lighter than 5. taller than 6. the tallest of 7. older than 8. less … than 9. more … than 10. smaller than 11. the biggest of 12. bigger than

4. Read the passage and complete the sentences.

1. Miss Bennet is shorter than her brother James. 2. James is taller than his sister. 3. Miss Bennet is older than her best friend. 4. Her best friend is younger than Miss

Bennet. 5. Miss Bennet is shorter than her brother. 6. Her brother is taller than Miss Bennet. 7. Miss Bennet is fatter than Tina. 8. Tina is slimmer than Miss Bennet. 9. Miss Bennet is slimmer than her brother. 10. Her brother is fatter than Miss Bennet.

5. Use *as … as* in the gaps.

1. as good as 2. as heavy as 3. as sweet as 4. as tall as 5. as difficult as 6. as exciting as 7. as easy as 8. as expensive as 9. as hot as

6. Choose the correct variant.

1. b 2. a 3. c 4. a, c 5. c 6. a, c 7. a 8. a, b 9. a. 10. a

7. Complete the sentences with the comparative or superlative forms of the words in brackets.

1. easier 2. more slowly 3. nearer 4. difficult 5. farthest/furthest 6. thinner 7. better 8. busiest 9. fewer 10. trickiest

8. Open the brackets.

4. more formal 5. smaller 6. better 7. slightest 8. highest 9. worse 10. more favourable 11. plainer 12. biggest 13. worse 14. most critical 15. more conventional 16. best 17. best 18. more dangerous 19. most miserable 20. nearer

UNIT 13 Grammar module
Passive Voice (part 1)

1. Fill in Passive in the appropriate tense.

2. Pyramids were built by Egyptians. 3. Milk is produced by cows. 4. Coffee is grown in Brazil. 5. Chopsticks are used in China. 6. Plants are watered every day. 7. The thief was arrested by policeman yesterday. 8. The injured man was taken to a hospital two days ago. 9. The car will be repaired tomorrow. 10. The letter was sent last week.

2. Put the verbs in brackets into Present Simple Passive.

is owned, is kept, is fed, is always dressed, is said

3. Look at the Hotel Information table and write sentences as in the example.

2. Dinner is served in Main Restaurant between 8 and 10 pm. 3. Newspapers are sold at the Reception Desk. 4. Telephone calls can be made at the Reception Desk. 5. Rooms are cleaned by Maid Service daily. 6. Hot water is supplied 24 hours a day. 7. Films are shown in Hotel Cinema every night at 10 pm.

4. Put the verbs in brackets into Past Simple Passive.

were called, was caught, was found, were taken, were questioned, were charged

5. Choose the correct variant.

1. a 2. c 3. b 4. a 5. a 6. c 7. a 8. c 9. b 10. b 11. c 12. c 13. b 14. b 15. a 16. b 17. c

6. Open the brackets.

1. was scared
2. are made
3. was closed
4. is done
5. were painted
6. was eaten

7. are used
8. were asked
9. was built
10. are used
11. is given
12. was stolen

7. Find passive sentences in the text and transform them into active.

some scientists consider plasma to be the fourth state of matter

They don't relate the plasma state to blood plasma, … they have used the term in physics to represent an ionized gas. They see lightning as a form of plasma. They found plasma in both ordinary and exotic places. When they pass an electric current through neon gas… Nuclear fusion heats it (plasma).

UNIT 14 Grammar module
Passive Voice (part 2)

1. Write an active sentence and a passive sentence for each subject. Choose an appropriate tense.

1. My textbook has 54 pages. My textbook will be read.
2. My best friend is looking for his car. My best friend was questioned by the police.
3. Some students have learned the material. Some students will be asked by the teacher.
4. I have missed the class. I am informed about the latest news.

2. Fill in the gaps with Passive Voice of the verb in brackets. Choose an appropriate tense.

1. are made 2. is being made 3. can be found 4. aren't allowed 5. will be announced 6. were presented 7. had been published 8. is being built 9. have been sold 10. was it filmed 11. was taken 12. has been called 13. was chosen 14. will be shown 15. was added 16. are presented, was built

3. Define the tense. Change the sentences to Passive Voice.

1. The large house has been built by the Browns. 2. She was stung by a jellyfish while she was swimming. 3. She was given a nice present. 4. The new song is being sung by Jane. 5. The house was destroyed by the storm. 6. A lot of money was spent on the first shopping Saturday. 7. Hoe is that word written? 8. The flowers were watered by her every day. 9. His parents were called to the office. 10. The show will be directed by Ben. 11. The window pane has been broken by the dog. 12. The bill must be paid first. She was being interviewed for the job. 14. He was told not to talk in class. 15. Your neighbor shouldn't be spoken to. 16. Your bicycle must not be left in the hall. 17. Can French be learned easily? 18. I am surprised with your impolite tone. 19. The car will be repaired by James. 20. The book was written by an unknown author. 21. He was forced to steal the money out of his dad's room. 22. We have been invited to dinner by our neighbors. 23. Why is the old theatre being torn down? 24. My ideas will be presented at the conference tonight. 25. You would have been told.

4. Make sentences in passive voice using the tenses in brackets. Add words where necessary.

1. Great motorcycles are made in Japan. 2. The lawn was not mowed last week. 3. The postman has not been seen recently. 4. The Gothic cathedral was built in the 10th century. 5. Many languages are spoken in the EU. 6. The schoolhouse is being repaired today. 7. The prize will be awarded tomorrow. 8. After the accident Harry was taken to a doctor. 9. When I came in the fridge was being repaired. 10. The jewels were found in the basement. 11. After the shop had been closed it was sold. 12. Special technology is being used. 13. The thief has not been found by the police. 14. The shop will be closed next month. 15. The cat is called Sissy.

5. Fill in the gaps with Active or Passive Voice of the verb in brackets. Use the tense indicated.

1. are made 2. has made 3. will rent 4. designs 5. was wearing, was designed 6. wrote, was written 7. had 8. have never seen 9. is used 10. make 11. thank

6. Fill in the gaps using the correct tense and voice.

1. is being played 2. helped, was being painted 3. had had, was called 4. looks, haven't been paid. 5. realized, had been stolen 6. meet, won't treat 7. sees, will get 8. has stopped smoking, had 9. finishes changing, will take 10. had already been mended 11. would open 12. to go, sounds 13. won't wake up, uses

7. Use the correct tense and voice.

1. have been playing / has played, was 2. don't look, is following 3. has happened, was hit, called, was taken, did he have, didn't, is said, had to stay; have his parents been informed, have already been phoned; are, aren't/weren't allowed to see, are waiting, to hear

4. are decorated, are bought 5. looks, has just given 6. must be cooked, go 7. was given 8. had been, died 9. arrived, realized, had already left 10. Have you seen 11. Did you see 12. have been trying, haven't succeeded

UNIT 15 Grammar module
Conditionals (zero, 1st, 2nd, 3rd)

1. Put the verbs in brackets into the correct tenses

1. rain 2. try 3. ages 4. melts 5. visit 6. boil 7. cycles 8. eat 9. drinks 10. goes

2. Choose the correct form of each verb to complete each sentence.

1. a 2. b 3. a 4. a 5. b 6. a 7. b 8. b 9. a 10. b

3. Put the verbs in brackets into the correct tenses.

1. will give 2. sit 3. eats 4. will telephone 5. will arrest 6. reads 7. will steal 8. doesn't open 9. washes 10. needs 11. don't go 12. makes 13. is 14. hears 15. will make 16. will bury 17. won't be 18. doesn't start 19. won't let or don't let (habit) 20. goes 21 sells 22 will you repay 23. rises 24. works 25. turns/will turn 26. burns 27. don't like 28. will have 29. see

30. will you promise 31. don't believe 32. likes 33. will make 34. shan't/won't be able 35. knows 36. ring

4. Complete with the correct form of the verbs.

1. buys, will spend 2. tell, see 3. freeze, will turns / turn 4. touch, will go / goes 5. leave, will call 6. rains, will stay 7. will pass, studies 8. will have to, find

5. Put the verbs in brackets into the correct tenses.

1. sells, will buy 2. will come, starts 3. will be, trains 4. click, will cancel 5. are, will play 6. will understand, marks 7. will get, improves 8. recycle, will reduce 9. change, will save 10. snows, will go

6. Put the verbs in brackets into the correct tenses in 2nd Conditional.

2. …, weren't 3. wouldn't say, had 4. wouldn't touch, gave 5. would be, didn't seek 6. wrote, would not be printed 7. didn't remain, would lose 8. wouldn't be, wasn't 9. did, wouldn't believe 10. had, would carry 11. did, would make 12. laughed, would spoil 13. were, wouldn't mind 14. went, would raise 15. fled, would have 16. looked, would see 17. would laugh, was 18. wouldn't know, left 19. stayed, would fill 20. did, would get up

7. Put the verbs in brackets into the correct tenses in 1st or 2nd Conditionals.

4. wants 5. is 6. did 7. don't tell 8. wish 9. knew 10. stay 11. go 12. ran 13. fail 14. had 15. begins 16. saw 17. continue 18. say 19. stood 20. feel

8. Put the verbs in brackets into the correct tenses in 3rd Conditional.

1. had been, would have gone 2. would have bought, hadn't sold 3. hadn't failed, would have lent 4. had told, wouldn't have arrived 5. would have been, had read 6. wouldn't have hurt, hadn't dropped 7. had used, wouldn't have cut 8. had celebrated, would have brought 9. would have taken, had run 10. hadn't forgotten, would have given

9. Put the verbs in brackets into the correct tenses in 2nd or 3rd Conditionals.

3. refused 4. was 5. hadn't observed 6. wished 7. had lived 8. had sold 9. had felt 10. did 11. hadn't witnessed 12. hadn't met 13. hadn't been 14. refused 15. had told 16. didn't kill 17. hadn't lost 18. paid 19. loved 20. thought

10. Put the verbs in brackets into the correct tenses in 1st, 2nd, 3rd Conditionals.

4. comes 5. hadn't killed 6. isn't 7. hadn't been 8. work 9. tell 10. remember 11. catch 12. think 13. had died 14. did 15. succeeds 16. wants 17. is 18. refuses 19. ask 20. had tried

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