

Unit B: Matter and Chemical Change

Name_____

Topic 1 Notes:

What is matter: Use this space for any key brainstorming ideas.

Key Vocabulary

Matter

Atoms

Molecules

Model

In your own words describe the difference between an atom and a molecule?

What are the five key points of the particle model of matter

1.

2.

3.

4.

5.

States of Matter

In each of the containers shown below sketch how the particles of matter would look. Then list

- Which container has the highest energy level
- Which container has the strongest and weakest attractive forces
- List how much movement is happening in each container
- Explain if the substance can take on the shape of the container



The diagram shows three identical, empty, U-shaped containers arranged horizontally. Below each container is a label: **SOLID**, **LIQUID**, and **GAS**. The containers are intended for students to sketch how particles of matter would look in each state.

What causes matter to change states?

What is a mixture?
Give 2 examples

What is a Pure substance?
give 2 examples

What is a heterogeneous mixture

What is a suspension

What is a colloid

What is an emulsion

TYPE OF MIXTURE	DEFINITION	EXAMPLES	ALSO KNOWN AS...
Homogenous			
Heterogeneous			

Vocabulary

Qualitative

Quantitative

Using your own words describe the difference between a physical change and a chemical change

Different substances are classified according to the way they behave, or their properties; however, chemical behavior often changes depending on the surrounding conditions. Complete the following table comparing the two types of changes that can occur:

	Physical Change	Chemical Change
What changes?		
Is a new substance formed?		
Is the change reversible?		
Examples?		

Chemical Reactions

List the six pieces of evidence used to indicate chemical change:

-
-
-
-
-
-

Physical vs. Chemical Properties

Matter can also be classified according to its physical and chemical properties...

	PHYSICAL PROPERTIES	CHEMICAL PROPERTIES
Definition		
Examples		

Topic 3 Notes

Key vocabulary

Subatomic Particles

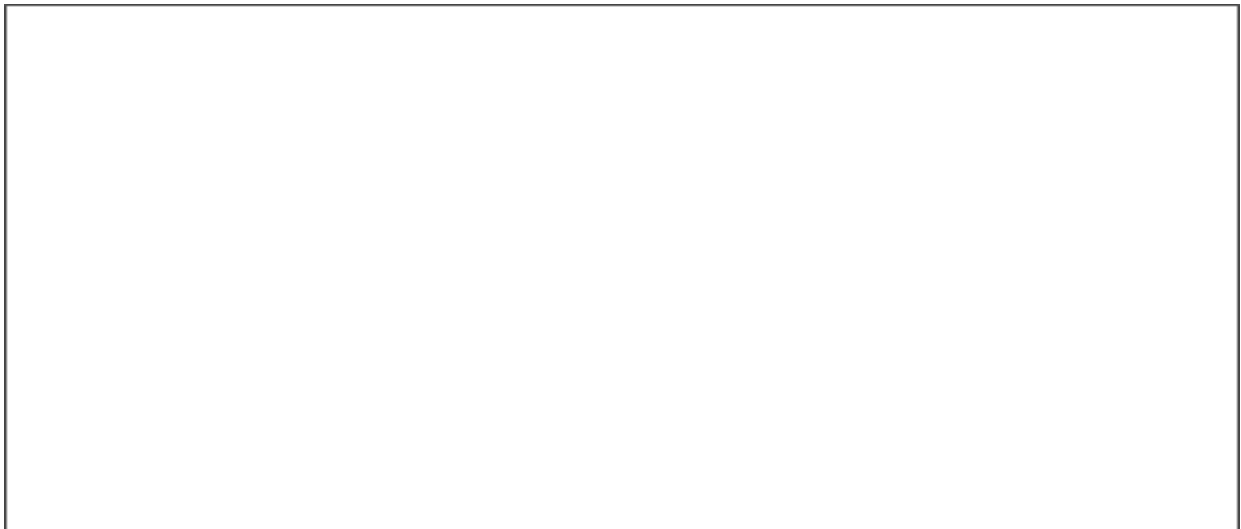
Neutrons

Protons

Electrons

The Atom

Although atoms are the building blocks of matter, they can be further broken down into three types of subatomic particles. In the space below, sketch a diagram of an atom. Label the protons, electrons, and neutrons, and indicate the charge of each.



Atomic Models

Atomic theory has been revised many times throughout history. Complete the following table which summarizes and compares past & present atomic theories...

Model	Explanation	Diagram
Dalton's "Billiard Ball" Model		
Thompson's "Plum Pudding" Model		
Rutherford's "Planetary" Model		
Bohr's Atomic Model		
Electron Cloud Model		

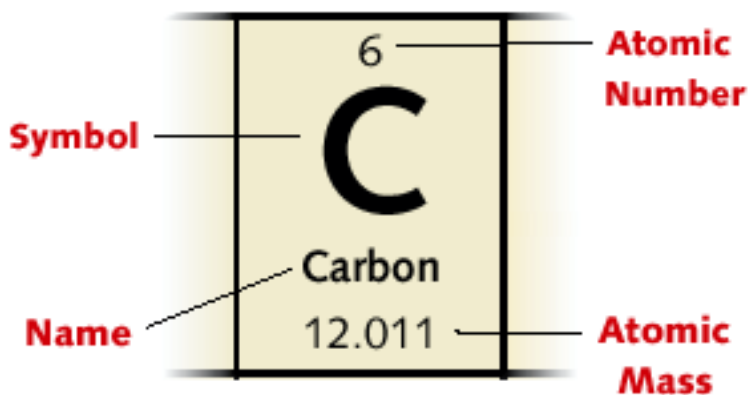
Elements

An element is a pure substance made up of one type of atom. An element's properties are largely determined by the number of protons in its nucleus.

- *How do you know how many protons are in an atom's nucleus? What is this number referred to as?*

- *How do you know how many electrons an atom has? Explain.*

- *How can the number of neutrons in the nucleus of an atom be determined?*



PRACTICE

Element Symbol	Element Name	# of Protons	# of Electrons	# of Neutrons
O				
Ca				
N				
Au				

Element Symbol	Element Name	# of Protons	# of Electrons	# of Neutrons
	sodium			
		19		
Al				
			9	

Ions

During a chemical reaction, atoms gain or lose electrons to form chemical bonds with other atoms, thereby becoming more stable. The gain or loss of electrons produces an ion, or an atom that is no longer neutral.

Define each of the following:

- ANION
- CATION

Classifying Elements and the Periodic Table

Key Vocabulary:

Periodic Table

Period

Group

Chemical Family

(From the video)

Who created the periodic Table of elements?

What was the table originally based on?

What are three things that the periodic table is capable of predicting

What are the three MAIN sections of the periodic table? Name some properties of each

Section	State at room temp.	Appearance	Conductivity	Malleability and ductility

Where are alkali metals on the table?

Name two examples

Name a property of these metals

Where are alkaline earth metals on the table?

Name two examples of these materials

Name a property of these metals

Where are Halogens on the table?

Name 2 examples of these materials

Name a property of halogens

Where are noble gasses on the table?

Name two examples

What is a unique property of these gasses?

Topic 6 Chemical Compounds

Key Vocabulary

Atom

Bond

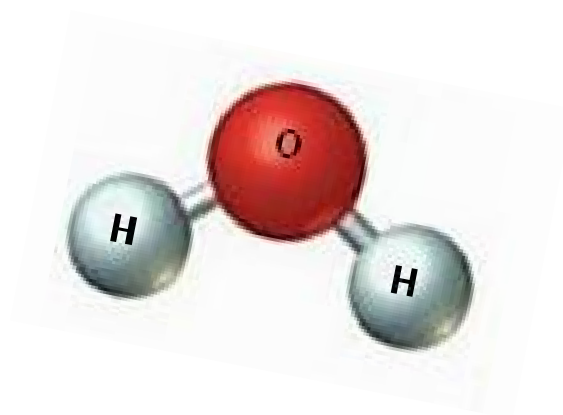
Molecule

Compound

Explain the difference between a compound and a molecule.

the following elements are considered to be diatomic:

- 1)
- 2)
- 3)
- 4)
- 5)
- 6)
- 7)



Chemical Formulas

Chemical formulas (i.e. CO_2) tell us three things about a compound:

-
-
-

Compound	Elements Present	Total Number of Atoms	State
$\text{H}_2\text{O} (\text{l})$			
$\text{NaCl} (\text{s})$			
$\text{Cl}_2 (\text{g})$			

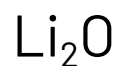
Chemical Bonds

Elements in compounds are held together by chemical bonds, which form when elements share, gain, or lose electrons. There are two type of chemical bonds...

1. IONIC BONDS:

2. MOLECULAR (COVALENT) BONDS:

Practice Identify if the following are ionic or covalent



Properties of Molecular vs. Ionic Compounds

	Molecular	Ionic
Strong or weak bonds?		
Conductivity?		
State of matter?		
Example		

Naming Compounds

- Explain the difference between a compound's "common" name and its "IUPAC" name. What does "IUPAC" stand for?

Naming Molecular Compounds

The names of molecular compounds follow these rules:

1.

2.

3.

PREFIXES:

1 =	6 =
2 =	7 =
3 =	8 =
4 =	9 =
5 =	10 =

** Note that the prefix "mono" is only used if referring to the second element!*

MOLECULAR COMPOUNDS PRACTICE

Name the following molecular compounds according to the IUPAC naming system:

1) CO_2 = _____

2) CCl_4 = _____

3) SiO_2 = _____

4) P_2O_3 = _____

5) SF_6 = _____

6) P_4O_{10} = _____

7) N_2O = _____

MOLECULAR COMPOUNDS PRACTICE

Write the chemical formula for each of the following molecular compounds:

1) Carbon tetrafluoride = _____

2) Carbon monoxide = _____

3) Iodine heptafluoride = _____

4) Diarsenic pentoxide = _____

Naming Ionic Compounds

The names of ionic compounds follow these rules:

1.

2.

3.

IONIC COMPOUNDS PRACTICE

Name the following ionic compounds according to the IUPAC naming system:

1) NaCl = _____

2) KP_3 = _____

3) LiCl = _____

4) Al_2O_3 = _____

5) NaF = _____

6) ZnBr_2 = _____

7) Li_3N = _____

8) MgS = _____

➤ *What must you do in order to write the chemical formula for an ionic compound?*

IONIC COMPOUNDS PRACTICE

Write the chemical formula for each of the following ionic compounds:

1) Calcium sulfide = _____

2) Calcium iodide = _____

3) Calcium phosphide = _____

4) Zinc chloride = _____

5) Silver oxide = _____

6) Strontium nitride = _____

7) Lithium sulfide = _____

8) Scandium fluoride = _____

9) Magnesium oxide = _____

10) Sodium iodide = _____

Multivalent & Polyatomic Ionic Compounds

➤ *What is a multivalent ion? Provide an example.*

Topic 7 Chemical Reactions

Define the following Key vocabulary words

Reactant

Product

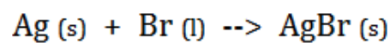
Endothermic

Exothermic

Chemical Equations

Any chemical reaction can be represented with an equation. Describe what is occurring in the reaction below. Label the reactants and the products...

silver + bromine --> silver bromide



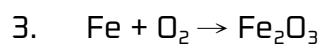
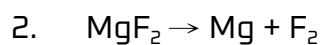
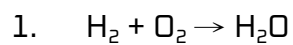
Describe which of the compounds above are reactants and which are products.

Copy down at least one additional example of a chemical reaction from the slides

Write the following reactions as equations

1. Hydrogen gas and Nitrogen Gas becomes Nitrogen trihydride gas
2. Sodium is heated with chlorine gas to become sodium chloride
3. Magnesium reacts with Hydrogen chloride to create Hydrogen gas and magnesium chloride

Write the following reaction equations as sentences

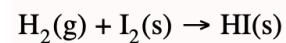
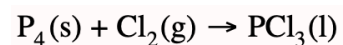
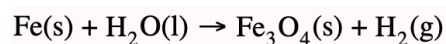
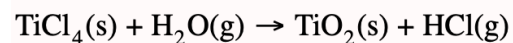
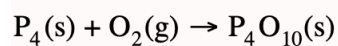
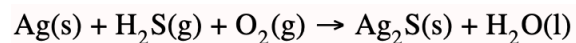


Endothermic vs. Exothermic

All chemical reactions involve changes in energy. Complete the following table comparing endothermic and exothermic reactions.

	Definition	Example	Chemical Equation
EXOTHERMIC			
ENDOTHERMIC			

Additional Equation Practice - Write the following equations as a sentence



Write the following sentences as equations

Sodium Combines With chlorine to produce sodium chloride

Aluminum reacts with oxygen to produce aluminum oxide

Mercury II oxide decomposes to produce mercury and oxygen

Solid iron III oxide and carbon monoxide gas produce iron metal and carbon dioxide gas.

Solid mercury II oxide decomposes to form liquid mercury and oxygen gas

Types of Chemical Reactions

Define and provide an example of each type of chemical reaction listed below:

a) FORMATION REACTIONS

b) DECOMPOSITION REACTIONS

c) Neutralization / REPLACEMENT REACTIONS

d) COMBUSTION REACTIONS

In Class Practice

Classify the following Reactions as either Formation (F), Decomposition (D), Combustion (C), a Single Replacement (SR), or double replacement (DR)

