CHEMICAL REACTIONS

EXERCISE 1

Classify the following processes as physical or chemical transformations. Explain your answer.

A. We cook an egg for three minutes.
B. We compress the air that there is within a syringe.
C. We burn wood to warm us up.
D. We tear up a piece of paper.
E. Digestion of food.
F. We dissolve a spoon of salt in a beaker of water.
G. We burn a small piece of torn up paper.
H. We pour a small amount of the salt water into another beaker and heat it until the water vaporizes and the salt appears.
I. The bodywork oxidizes.
J. We cut a copper wire
K. A perfume bottle evaporates.
L. We mix water and sugar.
M. Old leaves decompose.
N. We paint wood.
O. Ice melts.

EXERCISE 2

We know that the liquid contained in a glass is a pure substance whose density is 0,9 g/cm^3 . We warm it up and we let it cool verifying that the density is now of 1 g/cm^3

- Is the obtained liquid the same substance of the beginning? Why?

- Is a physical or chemical change? Why?

EXERCISE 3

Draw a molecule of the following substances knowing the formula.

Substance	Drawing
Mercury, **Hg**	
Carbon monoxide, **CO**	
Sodium chloride, **NaCl**	
Hydrogen, **H_2**	
Copper sulphate, **$CuSO_4$**	
Butane, **C_4H_{10}**	
Calcium oxide, **CaO**	
Helium, **He**	
Ammonia, **NH_3**	
Methane, **CH_4**	

Nitrogen, N_2	
Ethanol, C_2H_6O	

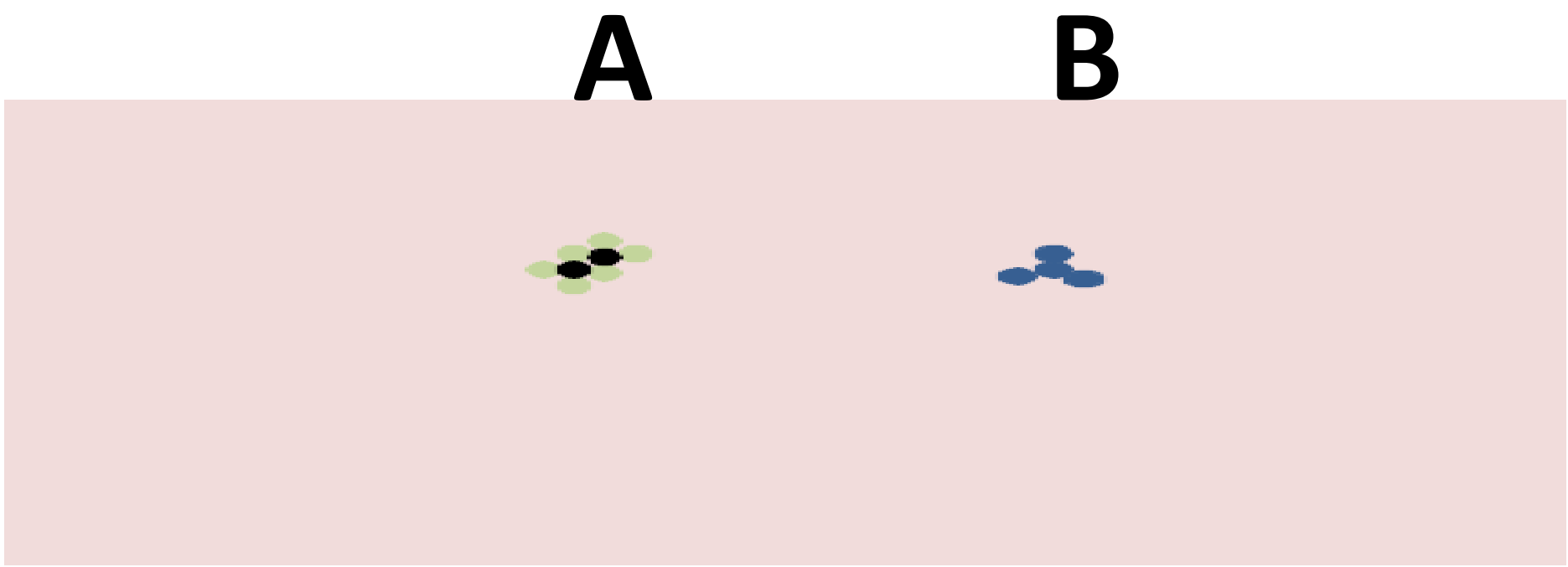
EXERCISE 3

Indicate the formula of the following substances from the drawing of one of its molecules.

Ca O Hg Cl C S H P

MOLECULE	FORMULA
	
	
	
	
	
	
	
	

EXERCISE 4



These two diagrams show a molecule of a simple

substance and a molecule of a compound.

1. The diagram A shows…….
   because there is more than one type of……..

2. The diagram B shows ……
   because there is one type of ……

EXERCISE 6

Indicate if the following substances are simple substances or compounds. Explain your answer.

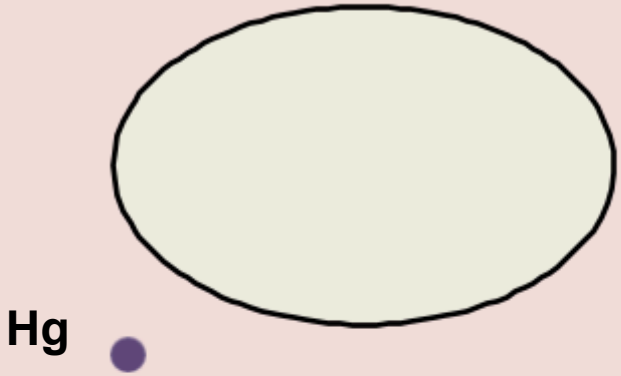
Substance	Simple or compound

Mercury, **Hg**	
Carbon monoxide, **CO**	
Sodium chloride, **NaCl**	
Hydrogen, **H_2**	
Copper sulphate, **$CuSO_4$**	
Butane, **C_4H_{10}**	
Calcium oxide, **CaO**	
Helium, **He**	
Ammonia, **NH_3**	
Methane, **CH_4**	
Nitrogen, **N_2**	
Ethanol, **C_2H_6O**	

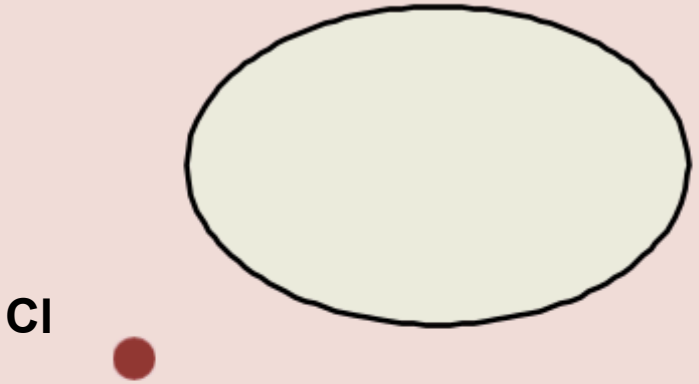
EXERCISE 7

Using the symbols that are indicated, draw in your notebook how you imagine the following substances.

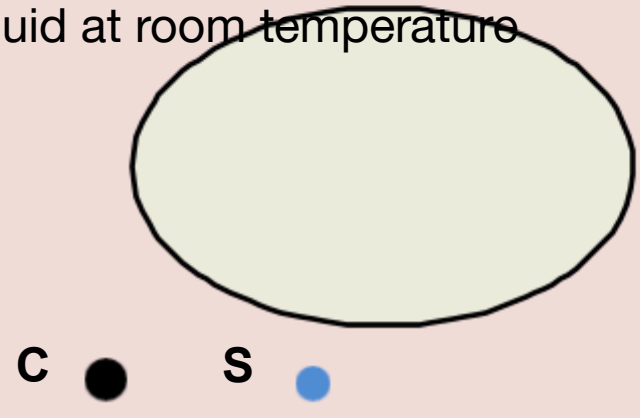
The simple substance mercury (**Hg**), liquid at room temperature



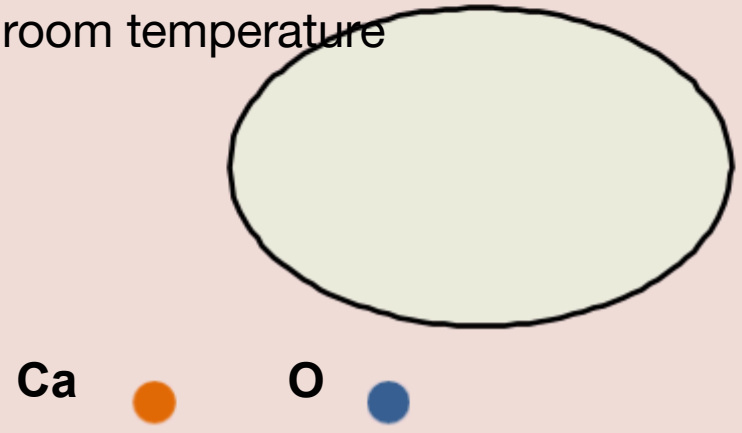
The simple substance chlorine (**Cl_2**), gas at room temperature



The compound carbon disulfide (**CS_2**), liquid at room temperature



The compound calcium oxide (CaO), solid at room temperature



EXERCISE 8

Are the following phrases true or false?

A. In a chemical reaction, the molecules of the reactants do not change but they mix with each other.

B. In a chemical reaction, the molecules of the reactants disappear and they do not become anything.

C. In a chemical reaction, the molecules of the reactants continue being the same ones but in another state.

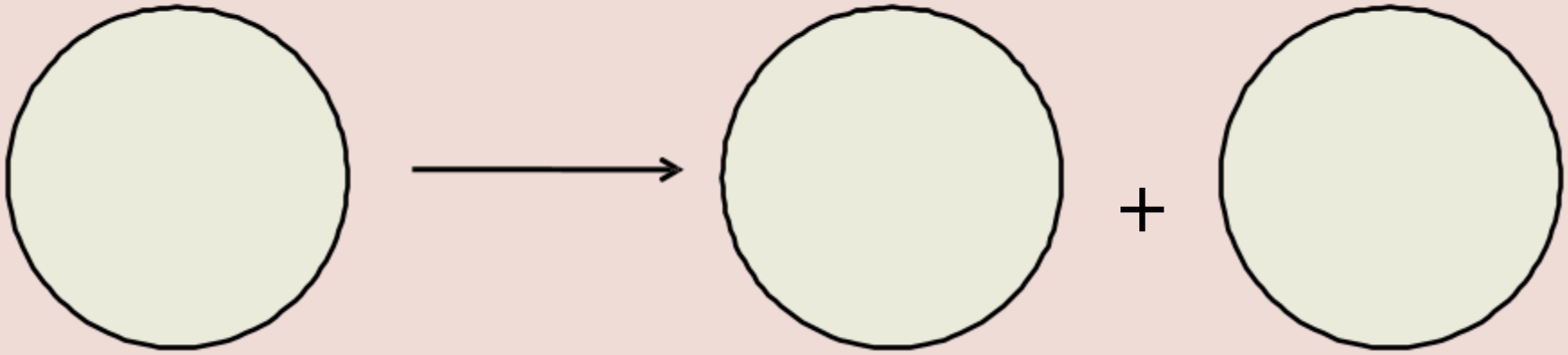
D. In a chemical reaction, the molecules of the reactants disappear and other new ones appear.

EXERCISE 9

The calcium carbonate ($CaCO_3$), is a solid substance at room temperature. If

we warm it up sufficiently, it disappears and it gives rise to two substances, the calcium oxide (CaO), that is solid at room temperature and the carbon dioxide (CO_2) that is gas at that temperature.

A. Draw how you imagine what happens to the molecules in that process.



$CaCO_3$ CaO CO_2

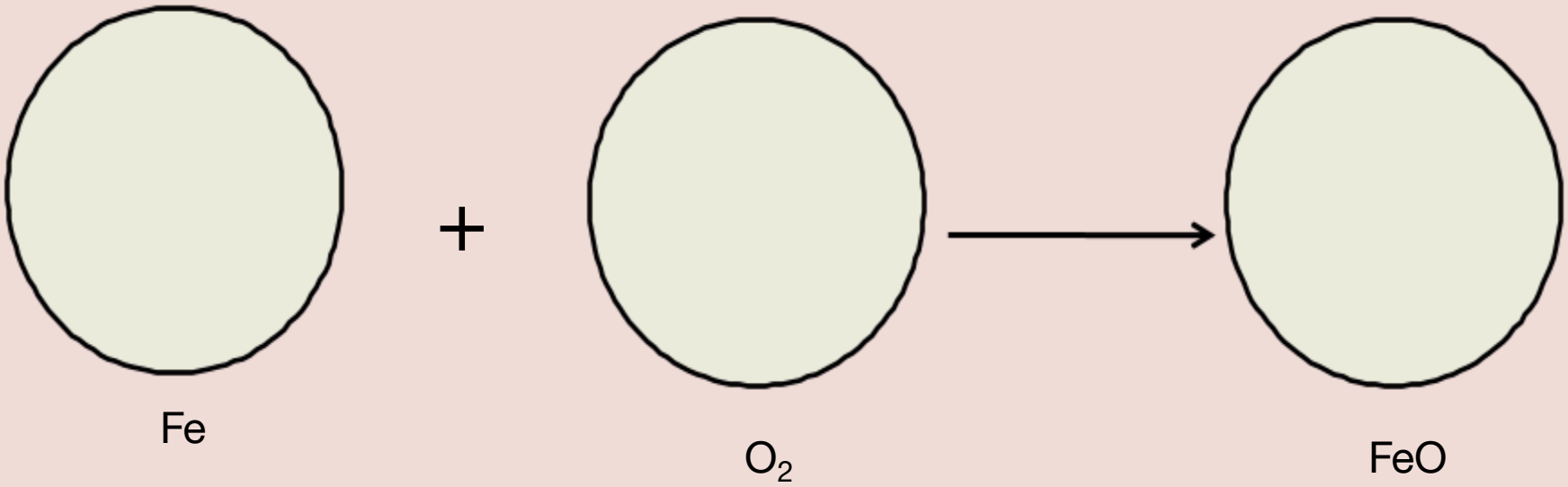
B. Is it a physical or chemical change? Explain your answer.

C. Is it a simple substance or a compound? Explain the answer with arguments based on the molecular atomic theory.

EXERCISE 10

Iron (Fe) is a solid substance at room temperature, which can react with the oxygen (O_2), a substance that appears in gaseous state at room temperature, to make iron oxide (FeO), a solid substance at room temperature.

A. Draw how you imagine the molecular atomic structure of the iron and the oxygen before the reaction and formed iron oxide.



B. How is it possible that we obtain a solid substance from a solid substance and another one gaseous?

C. If we write the chemical reaction of the previous process of the following form:

$Fe + O_2 \rightarrow FeC$

Is this correct? Explain your answer.

EXERCISE 11

If we warm the solid iron up until the temperature of 1808 K turns to a liquid,

when we cool it below that temperature it returns to solid state with the same aspect of the iron.

A. Is this a physical or chemical process? Explain your answer.

B. Draw how you would imagine the changes produced in the iron when we warm it up.

Fe (solid)

Fe (liquid)

EXERCISE 12

Connect the terms of the two columns

A. A pure substance formed by molecules of an atom

B. A pure substance, three molecules of a compound.

C. Four different chemical elements.

D. A pure substance, four molecules of a simple substance.

1. 

2. 

3. 

4. 

EXERCISE 13

Are the following sentences true or false?

A. Sulphur is a simple substance of yellow colour, therefore, sulfur atoms are yellow.

B. In a physical change, the molecules disappear and other new ones appear.

C. In a chemical change the new substances have properties different from the initial substances.

D. The compounds disappear and give rise to other substances by physical procedures.

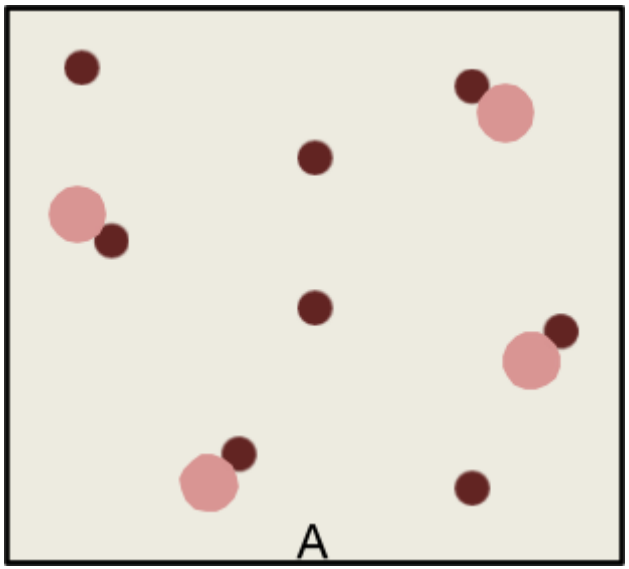
E. An element is just like simple substance.

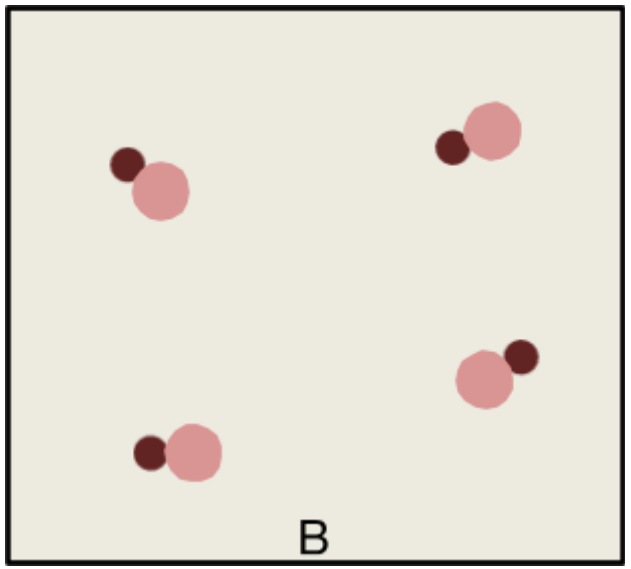
F. The water molecules are liquid.

EXERCISE 14

The following drawings represent different gaseous systems. The

symbols ● and ● represent different atoms:





A. Classify each one of the diagrams as simple substance, compound or mixture. Explain your answer.
B. If we cool the system A until it turns to liquid, will we obtain one or more substances? Explain the answer. Is it a physical or chemical process? Explain your answer.

C. If we cool the system B until it turns to liquid, will we obtain one or more substances? Explain the answer. Is it a physical or chemical process? Explain your answer.

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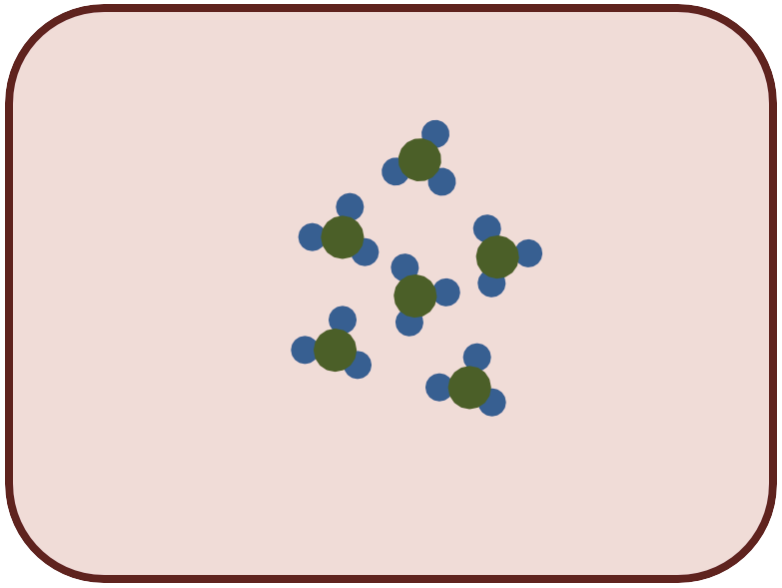
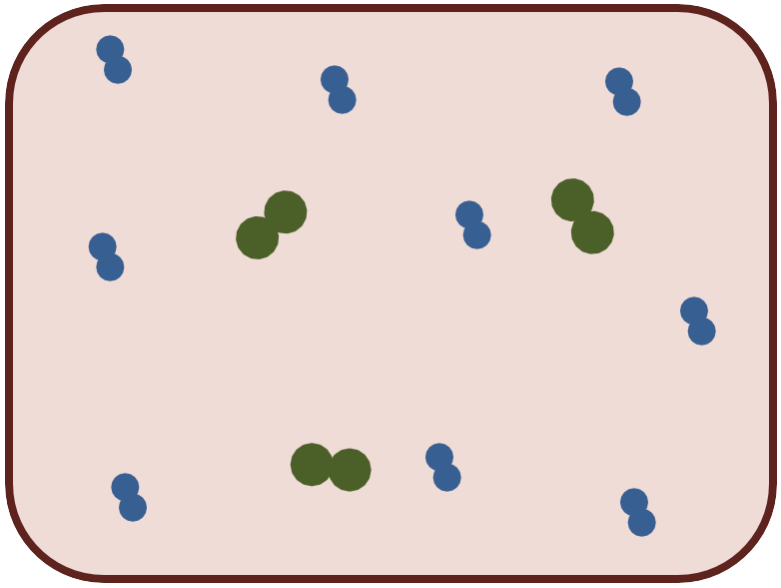
EXERCISE 15

The figure A represents the atomic-molecular structure of a system. After warming it up and letting it cool, the resulting system has the atomic-molecular structure indicated in figure B. According to these atomic-molecular diagrams, is it a physical change or a chemical change? Explain your answer.

A



B



EXERCISE 16

What gas is necessary for combustion to occur?

A. Hydrogen

B. Carbon dioxide

C. Helium

D. Oxygen

EXERCISE 17

Answer considering the information of the table.

Gas	Density (g/L)
Oxygen	1,43
Hydrogen	0,09
Carbon dioxide	1,96

If we fill three balloons, one with oxygen, another one with hydrogen and another one with carbon dioxide:

A. Which one will rise more?

B. Which one will rise less?

EXERCISE 18

Connect the terms of the two columns

A.Oxygen

B.Hydrogen

C.Carbon dioxide

- This gas becomes cloudy quickly from a dissolution of calcium hidroxide.
- This gas intensifies the flame of something that is burning.
- When this gas makes contact with the oxygen of the air, it explodes and it forms water.

A. ……. changes are those in which the substances continue ……. the same ones.

B. Chemical …….. are those in which the …….. that there are at the beginning …….. and in their place new ones appear.

C. The …….. changes are called chemical …….. .

D. Pure substances can be: …….. substances and …….. .

E. …….. substance is which …….. not disappear and does not give rise to other different ones by …….. or …….. .

F. …….. substance is which disappears and other different ones by …….. or …….. .

G. In a simple substance, all the …….. that form their molecules are equal.

H. In a compound, the …….. are formed by at …….. two atom …….. .

I. An element has not …….. , a simple substance has them.

Revise your vocabulary. Choose a word and fill the blanks below.

J. Atoms and molecules are …….. that the …….. invent to explain the …….. of the substances. …….. and molecules have not properties.

K. The molecular …….. theory explains chemical changes that molecules …….. when they hit to each other and the resulting atoms combine …….. other molecules.