

DATE:
27 JULY 2020

SUBJECT : SCIENCE

CHAPTER-5:
**MORE ABOUT CHEMICAL
CHANGES**

TOPIC-1:
**PHYSICAL AND CHEMICAL
CHANGES**

PHYSICAL CHANGES & CHEMICAL CHANGES

PHYSICAL CHANGES: The changes in which only the physical properties of a substance change is known as physical changes.

Physical properties means-

- (a) State
- (b) Size
- (c) Colour
- (d) Shape

EXAMPLES: Melting of ice to liquid water,
Cutting a plastic scale into two pieces etc.

CHEMICAL CHANGES: The change in which new substances are produced is called chemical changes.

Examples: All chemical reactions are the examples of chemical changes where new substances are formed from reactants.

In a chemical reaction following may happen which are called characteristics of a chemical reaction:

- a. A gas may be produced
- b. sound or smell may be produced
- c. Colour may be changed.
- d. Heat or light may be produced

QUESTIONS: HOME ASSIGNMENT

QUESTION 1: What do you understand by physical change and chemical change?

QUESTION 2: Give any four examples of physical change?

QUESTION 3: Give any four examples of chemical change?

QUESTION 4: Write any two differences between physical and chemical change?

QUESTION 5: Painting an iron rod is a physical change? Give reason.

QUESTION 6: Hydrogen reacts with oxygen to form water. What kind of change it is? Give reason to support your answer.

QUESTION 7: Burning candle is a change. What kind of change it is? Give reason to support your answer.

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TOPIC-2:

**REACTANTS , PRODUCTS AND
CHEMICAL EQUATIONS**

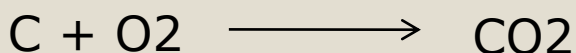
REACTANTS AND PRODUCTS

REACTANTS:

The substances that take part in a chemical reaction are called reactants.

PRODUCTS: The new substances formed as a result of the chemical reaction are called products.

Example :



Here Carbon (C) and Oxygen are reactants and carbon dioxide is Product.

Note:

1. The reactants and product can be either elements or compounds.
2. molecules (not atoms) take part in chemical reactions. Thus we should know the atomicity of elements taking part in the reaction
3. The atoms of reactant molecules only rearrange themselves to form product molecules. The total number of atoms of each kind remains the same after a reaction. Atoms are not lost or gained in the reaction.
4. The number of atoms in a molecule (of both elements and compounds) is fixed and cannot be changed. It means the chemical formula of molecules are fixed.

CHEMICAL EQUATIONS

A **chemical equation** represents a chemical reaction using chemical formulae.

A chemical equation is similar to a mathematical equation, but with a few differences.

Some important rules are followed when we write a chemical equation.

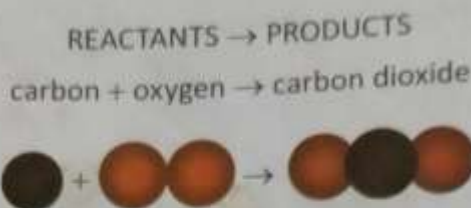
1. The reactants are written on the left-hand side (LHS) and the products are written on the right-hand side (RHS).
2. A '+' sign is placed between the reactants on the left-hand side and the products on the right-hand side.
3. An arrow (not an '=' sign) is placed between the reactants and products of an equation. It indicates the direction in which the reaction takes place.
4. The number of atoms of each element is equal on both sides of the arrow. Such an equation is called a **balanced equation**.

Let us look once again at the reaction between carbon and oxygen.

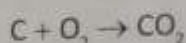
Step 1: First, write the reaction in words, with the reactants (carbon and oxygen) on the left-hand side and the product (carbon dioxide) on the right-hand side. This is called a **word equation**.

Let us look once again at the reaction between carbon and oxygen.

Step 1: First, write the reaction in words, with the reactants (carbon and oxygen) on the left-hand side and the product (carbon dioxide) on the right-hand side. This is called a **word equation**.



Step 2: Next, substitute the names of the reactants and products with their formulae.



Step 3: Count the number of atoms on both sides of the equation.

Element	No. of atoms	
	LHS	RHS
Carbon	1	1
Oxygen	2	2

In this equation, the number of atoms of carbon and oxygen is equal on both sides of the arrow. This equation is already balanced. **Unbalanced equations**, in which the number of atoms on both sides is not equal, need to be balanced.



Fig. 5.2 Diamond and graphite are forms of carbon

CHEMICAL EQUATIONS:

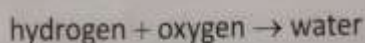
Balancing an Equation

Let us learn to balance an unbalanced equation. It may take more than one round to balance an equation. Make sure to count atoms and use tables carefully.

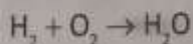
EXAMPLE 1: THE FORMATION OF WATER

The elements hydrogen and oxygen react explosively in the presence of a flame to form water (H_2O).

Step 1: Identify the reactants and products and write down the equation in words.

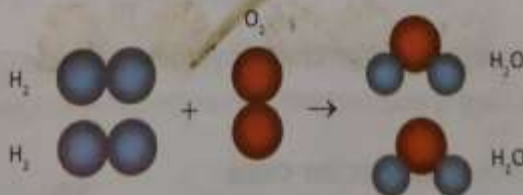


Step 2: Replace the names of the reactants and products with their formulae. The formulae for hydrogen and oxygen are H_2 and O_2 because they are diatomic molecules. They cannot exist as single atoms.

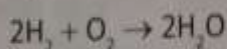


Step 3: Count the number of atoms on either side of the arrow. Note that there are two oxygen atoms on the left-hand side but there is only one on the right-hand side. *The extra oxygen atom on the left-hand side cannot exist by itself.* It will combine with another hydrogen molecule to form another water molecule. This whole process can be shown as below:

Element	LHS	RHS
Hydrogen	2	2
Oxygen	2	1



This can be represented by modifying the equation as shown:



Count the number of atoms of each kind again. The equation is now balanced.

Element	LHS	RHS
Hydrogen	4	4
Oxygen	2	2

Note: The number 2 written in front of the hydrogen and water molecules is called the **coefficient**. Coefficients are applicable only to the molecules in front of which they are written. On the left-hand

QUESTIONS: HOME ASSIGNMENT

Q1: What do you understand by reactants and products?

Q2: Write a chemical equation and identify the reactants and products in the reaction.

Q3: What do you mean by the following

(a) Chemical equation

(b) balanced chemical equation

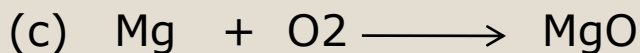
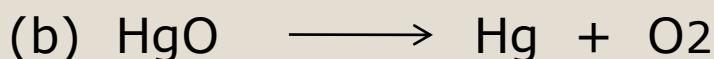
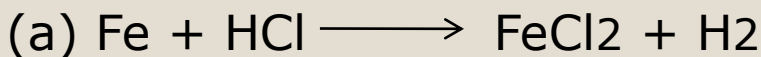
(c) unbalanced chemical equation

Q4: How to write a chemical equation?

Q5: How to balance a chemical equation?

Explain with an example

Q6: Balance the following equations



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TOPIC-3:

**TYPES OF CHEMICAL
REACTIONS AND BALANCING
EQUATIONS**

TYPES OF CHEMICAL REACTIONS AND BALANCING OF EQUATIONS

1. COMBINATION REACTION:

The type of reaction in which two reactants combine to give product is called combination reaction

Example : Hydrogen and oxygen combine to form water.



Balancing the equation:

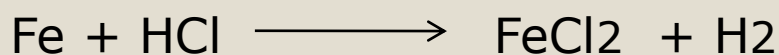


2. DISPLACEMENT REACTION:

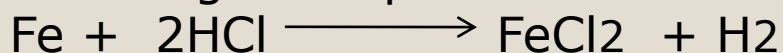
The type of chemical reaction in which one more reactive element displace a less reactive element from its compound is called displacement reaction(i.e. a reactant displaces a substance from another reactant)

Examples:

The reaction of Iron(Fe) and Hydrochloric Acid (HCl): Iron and hydrochloric acid react to form iron chloride and hydrogen gas.



Balancing the equation:



TYPES OF CHEMICAL REACTIONS AND BALANCING OF EQUATIONS:

3. **DECOMPOSITION REACTION:**

The kind of chemical reaction in which a compound breaks down to form two or more simple substances is called a decomposition reaction.

Example: When mercury oxide is heated it breaks down into mercury and oxygen.



Balancing the equation-



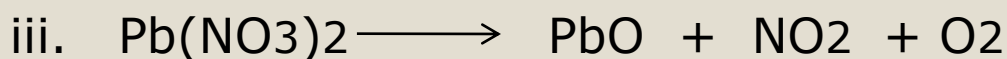
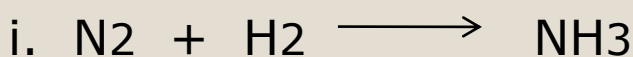
NOTE: 1. we can not change the chemical formula of molecule or compound.

2. Using coefficient in front of element, molecule or compound we balance a chemical equation.

QUESTIONS: HOME ASSIGNMENT

1. What is a balanced equation?
2. Is the following equation balanced?
$$\text{NaHCO}_3 + \text{HCl} \rightarrow \text{NaCl} + \text{H}_2\text{O} + \text{CO}_2$$
3. Write the chemical equations for the following reactions:
 - i. Hydrogen (H_2) and chlorine (Cl_2) react to form hydrochloric acid (HCl).
 - ii. Sodium (Na) and oxygen (O_2) react to give sodium oxide (Na_2O).
 - iii. Potassium (K) and water (H_2O) react to form potassium hydroxide (KOH) and hydrogen gas (H_2).
 - iv. Calcium carbonate (CaCO_3) decomposes to give calcium oxide (CaO) and carbon dioxide (CO_2).

4. Balance the following equations:



5. What do you mean by combination, displacement and decomposition reaction. Give example of each.

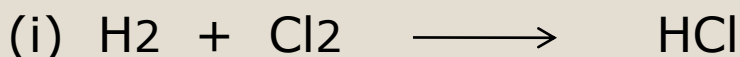
TYPES OF CHEMICAL REACTIONS AND BALANCING OF EQUATIONS :

Solution :

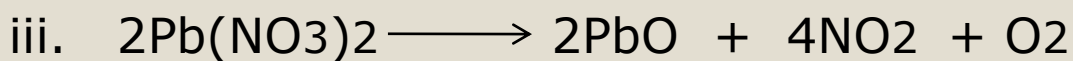
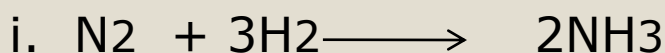
Ans-1: Balanced chemical equation: The chemical equation in which the number of atoms of each element is equal on both sides of the arrow is called balanced chemical equation.

Ans-2: yes , the equation is balanced equation.

Ans-3:



4. Balancing



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TOPIC-4:
**CHEMICAL CHANGES AND ITS
EXAMPLES**

CHEMICAL CHANGES AND ITS EXAMPLE

Chemical changes take place all around us and within us.

Examples:

- Digestion of food
- Browning of fruits and vegetables
- Rusting of iron
- Burning of fuel

BROWNING OF FRUITS:

The Browning of Fruits and Vegetables

Do it!



Cut an apple into two pieces. Place one piece in an empty bowl and leave it uncovered. Add a few drops of lime juice to a bowl of water and place the other piece in it. Observe the two pieces after one or two hours. You will observe that the surface of the piece of fruit that was left exposed to air turns brown.

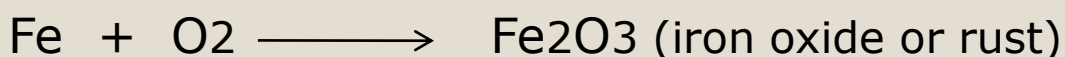
Certain substances present in the apple react with atmospheric oxygen to produce a brown pigment. Placing a piece in water reduces the amount of oxygen with which the apple comes in contact. Therefore, it will not show any significant colour change. Adding a spoonful of honey or lime juice to the water will prevent the apple from browning for a much longer time.

CHEMICAL CHANGES AND ITS EXAMPLE

RUSTING OF IRON:

When iron is exposed to moist air, it reacts with the oxygen and moisture in the atmosphere to form a reddish substance called iron oxide (rust). The following equation represent the reaction-

Reaction:

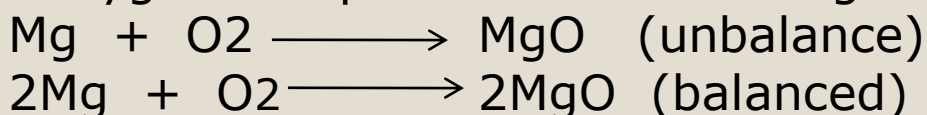


Important Note:

1. Iron will not rust in the absence of oxygen or moisture.
2. **Preventing rusting:** Rusting can be prevented by oiling iron surface, by regular painting and by galvanisation.
3. **Galvanisation** : The process of coating iron objects with a layer of molten Zinc is called galvanisation.

Combustion: The chemical process in which a substance reacts with oxygen(burning) and gives off heat and sometimes light is called combustion.

Example : When magnesium ribbon is kept near flame it burns. Here magnesium react with oxygen and produces heat and light.



CHEMICAL CHANGES AND ITS EXAMPLE

The reaction between Copper sulphate and Iron:

Copper sulphate solution (CuSO_4) is bright blue in colour. When iron is put in copper sulphate solution a displacement reaction takes place. As a result new substance iron sulphate (FeSO_4) is formed. Thus the colour turns into green. Iron sulphate solution (FeSO_4) has green colour . Reaction is :



It is a balanced equation.

QUESTIONS: HOME ASSIGNMENT

Q1. Why is rusting called a chemical change?

Q2. What happens when Iron react with copper sulphate. What kind of reaction it is?

Q3. What is the colour of copper sulphate solution and iron sulphate solution?

Q4. What do you understand by combustion?
Give example.

Q5. How does iron rust? How can you prevent the rusting of iron objects?

Q6. What is galvanisation?

Q7. Give any four examples of chemical changes and also write the required chemical equation.

Q8. Explain an activity that demonstrates that heat and light energy can be produced during a chemical reaction.

Instructions: 1. complete the Home assignment in your science note book.

2. Solve all the questions given in exercises

MCQ

1. The reason for a physical change to be named as such is that the:

- A) change occurs only in physical properties
- B) transfer of energy takes place
- C) is a reversible change
- D) All of the above

2. When ice is heated, it changes to water and water on further heating gets converted to steam. What happens when steam is condensed?

- A) A new substance is formed
- B) No new substance is formed
- C) Gaseous phase changes to liquid phase
- D) Both (b) and (c) are correct

3. A change is a chemical change when it is accompanied by:

- A) energy change
- B) formation of new substances
- C) change in chemical properties
- D) All of the above

4. Which of the following will be observed if an apple slice is left exposed to air?

- A) It undergoes oxidation and becomes brown in colour
- B) Appearance of brown colour on the surface of apple slice is caused by a chemical reaction between air and enzymes
- C) Both the above are correct
- D) None of these