

CHEMICAL REACTIONS AND EQUATIONS

1) Write the differences between physical change and chemical change.

A. **Physical change:**

- i. Changes occurred in the physical properties like colour, shape, state etc. is called physical change.
- ii. No new substances are formed.
- iii. It is a temporary change.
- iv. **Ex:** Ice turns to water.

Chemical change:

- i. A change in which a substance undergoes a change in its chemical composition is called chemical change.
- ii. New substances are formed.
- iii. It is a permanent change
- iv. **Ex:** Rusting of iron

2) What is chemical reaction?

A. chemical reaction, a process in which one or more substances, the reactants, are converted to one or more different substances, the products.

3) How can you say a chemical reaction is completed?

A. We can identify the completion of chemical reaction by the following indications

- i Change in colour
- ii. Change in state of matter
- iii. Change in temperature
- iv. Evaluation of gases
- v. Formation of precipitate.

4) Define the following

A. **Reactants:** substances which are participating in chemical reaction are called reactants

Products: New substances which are formed after completion of a chemical reaction are called products

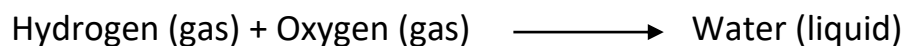
5) Explain with an activity to identify completion of chemical reaction by change in temperature?

- A. i. Take 5 grams of quick lime in a glass beaker and 50 ml of water in another glass beaker
- ii. Now touch both the beakers with hand
 - iii. Then add water into quick lime by continues stirring.
 - iv. Now touch the beaker, you feel warmth.
 - v. It indicates that the formation of new substance i.e. Completion of chemical reaction.

Calcium oxide (quick lime) + water \longrightarrow calcium hydroxide (slaked lime) + Heat

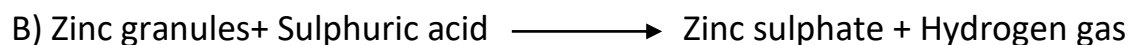
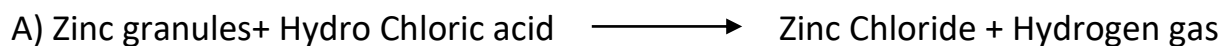
6) Explain with an activity to identify the completion of a chemical reaction by change in state of matter?

- A. i. Allow the hydrogen gas on the surface of a hot copper plate.
ii. Now we are observed that the formation of a liquid product water.
iii. Here hydrogen a gas reacts with oxygen to produce water a liquid product.



7) How can you show that a chemical reaction involves evolution of gas?

- A. i. Take a few zinc granules in a conical flask.
ii. Add dilute HCl or H_2SO_4 into the flask.
iii. Observe bubbles of hydrogen gas forming around the zinc granules.
iv. If a burning matchstick is brought near the mouth of the flask, then it burns with a pop sound.
v. It indicating that the evolution of hydrogen gas.



8) How can you say a chemical reaction is completed by change in colour?

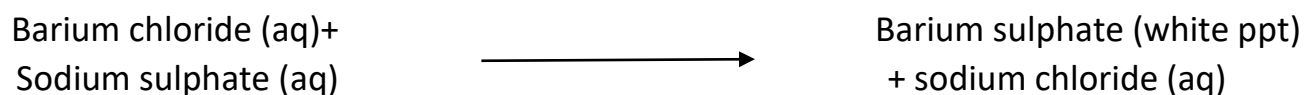
- A. i. Take some aqueous solution of copper sulphate which is in blue colour
ii. Now place a shiny iron nail in the copper sulphate solution.
iii. After some time we are observed that the colour of the solution turns into pale green and on the surface of iron nail shiny reddish brown colour layer is formed.
iv. The pale green solution is iron sulphate and shiny matter is copper.
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9) What is precipitate?

A. precipitate is an insoluble solid that forms when two solutions react chemically.

10) Explain precipitate reaction with an activity.

- A. i. Take some clear solutions of Barium chloride (BaCl_2) and sodium sulphate (Na_2SO_4) in two beakers
ii. Now mix these two solutions.
iii. Then we are observed that an insoluble white solid substance is formed as product.
iv. Here insoluble white solid is Barium sulphate a precipitate.



11) What is chemical equation?

- A. i. The short form of representation of a chemical reaction by using symbols elements and formulae of molecules involved in the chemical reaction.
ii. In a chemical reaction relation between reactants and products can represented with an arrow (\longrightarrow) from left to right.
iii. In chemical equation, reactants are written in left of the arrow and products are write in right of the arrow.
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12) State law of conservation of mass.

A. In a chemical reaction mass is neither be create nor be destroy i.e.

Mass of reactants= Mass of products

13) What is a skeletal chemical equation?

A. In a chemical equation number of atoms of each element in both reactants and products are not same is called skeletal chemical equation.

14) What is a balanced chemical equation? Why do we balance a chemical equation?

A. i. In a chemical equation, number of atoms of each element in both reactants and products is equal, called balanced chemical equation

ii. We balance a chemical equation to satisfy the law of conservation of mass,

15) Write the symbols using in chemical equations become more informative.

A. Solid (**s**), liquid (**l**), gas (**g** and upward arrow in products side), aqueous solution (**aq**), precipitate (**ppt**), diluted acid (**dil**), concentrated acid (**con**), heat (**Q** or triangle-**▲**).

16) What is catalyst?

A. A chemical substance doesn't participate in a chemical reaction but changes the rate of reaction is called catalyst.

17) Write a short note on thermo chemical reactions.

A. If there is an involvement of heat energy in a chemical reaction, such reactions are called thermo chemical reactions. They are two types

a) Exothermic reaction b) Endothermic reaction

a) Exothermic reaction: In a chemical reaction heat energy is liberated along with products is called exothermic reaction.

Ex. 1. Respiration

2. Combustion of fuel

3. Neutralization reaction

4. Degradation of vegetables peels etc.

b) Endothermic reaction: A chemical reaction is completed by gain of heat energy by reactants is called Endothermic reaction.

Ex: 1. Photo synthesis

2. Addition reaction of alkanes with halogens

3. Electrolysis reactions

18) Why respiration is an exothermic reaction.?

A. i. Respiration is an exothermic process because it releases heat and energy

ii. During respiration, Carbohydrates present in food are broken down to form glucose.

iii. Glucose combines with oxygen in the cells of our body and provides energy.

iv. Therefore, respiration is an exothermic reaction.

v. The chemical reaction of respiration is



19) How many different types of chemical reaction?

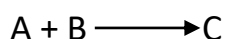
A. Basically chemical reactions are four types. They are

- a) Chemical composition (or) combination
 - b) Chemical decomposition
 - c) Chemical displacement
 - d) Chemical double displacement (or) double decomposition
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20) Write a short note on chemical combination.

A. i. Two or more substances are combined together and produce only one product. Such reactions are called chemical combination

ii. Combination reaction is represented as follows



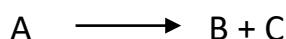
iii. **Examples:**

- a. $2\text{Mg} + \text{O}_2 \longrightarrow 2\text{MgO}$
 - b. $2\text{H}_2 + \text{O}_2 \longrightarrow 2\text{H}_2\text{O}$
 - c. $\text{CaO} + \text{H}_2\text{O} \longrightarrow \text{Ca}(\text{OH})_2$
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21) Write a short note on chemical decomposition.

A. i. In a chemical reaction a compound splits into two or more simple compounds or its constituent elements.

ii. A decomposition reaction can be represented as follows



iii. **Examples:**

- a. $\text{CaCO}_3 \xrightarrow{\text{HEAT}} \text{CaO} + \text{CO}_2$
 - b. $2\text{H}_2\text{O} \xrightarrow{\text{Electrolysis}} 2\text{H}_2 + \text{O}_2$
 - c. $2\text{AgCl} \xrightarrow{\text{Sun Light}} 2\text{Ag} + \text{Cl}_2$
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NOTE: Generally, decomposition reactions are Endothermic reactions.

22) Write examples for decomposition reactions by using various forms of energy

A. a) **Thermo chemical decomposition:** A decomposition reaction is completed by using heat energy is called thermo chemical decomposition

Examples:

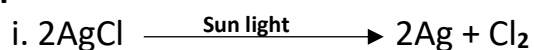
- i. $2\text{FeSO}_4 \text{ (green)} \xrightarrow{\text{HEAT}} \text{Fe}_2\text{O}_3 \text{ (black or reddish brown)} + \text{SO}_2 + \text{SO}_3$
- ii. $2\text{Pb}(\text{NO}_3)_2 \xrightarrow{\text{HEAT}} 2\text{PbO} + 4\text{NO}_2 \text{ (Brown fumes)} + \text{O}_2$

b) **Electro chemical decomposition:** A decomposition reaction is completed by using electric current is called electro chemical decomposition

Examples:

- i. $2\text{NaCl} \xrightarrow{\text{Electrolysis}} 2\text{Na}(\text{cathode}) + \text{Cl}_2(\text{anode})$
- ii. $2\text{H}_2\text{O} \xrightarrow{\text{Electrolysis}} 2\text{H}_2(\text{cathode}) + \text{O}_2(\text{anode})$

C) **Photo chemical decomposition:** A decomposition reaction is completed by using Sun light is called photo chemical decomposition

Examples:

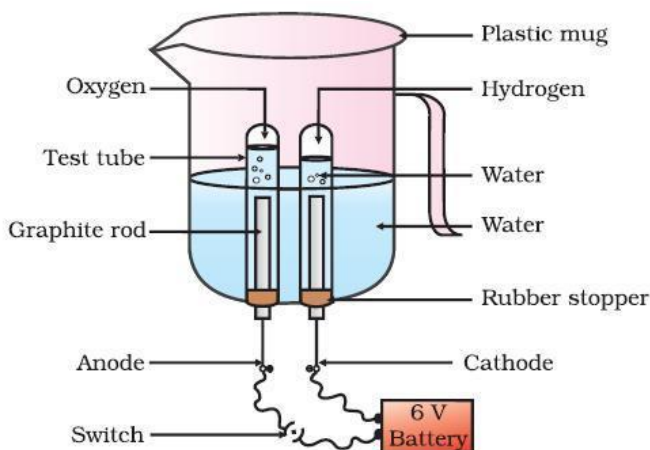
NOTE: These two chemical reactions are used in black and white photo graphs

23) What is electrolysis of water? Explain it with an activity

A. Splitting of water into hydrogen gas and oxygen gas in the presence of electric current is called electrolysis of water.

AIM: To study about electrolysis of water

APPARATUS: Plastic mug, two graphite rods, two test tubes, 6V battery, connecting wires, distilled water, common salt, burning splinter

**PROCEDURE:**

- i. Take a plastic mug. Drill two holes in the bottom of the mug
- ii. Insert two rubber corks into the holes
- iii. Arrange two test tubes in an inverted position so that the carbon electrodes are in the test tubes
- iv. Add water to the mug so that the electrodes are submerged
Add a pinch of common salt into the water
- v. Connect the electrodes to a 6-volt battery and a switch
- vi. Turn on the current and leave the apparatus undisturbed for a while

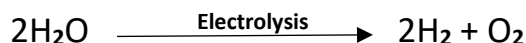
Observations:

The level of water in the test tubes will decrease i.e. The empty space is fill with gas.

Test of gases:

- i. Place a burning splinter near the gas evolved at anode, splinter burning with brighter, therefore the gas is oxygen.
- ii. Like that place burning splinter near the gas evolved at cathode, the splinter put off with pop sound, therefore the gas is hydrogen

Conclusion: From this we can conclude that water is formed by the combination of hydrogen and oxygen gases with volumetric composition 2: 1 ratio.



24) "Decomposition reaction is opposite reaction of combination reaction". Do you agree the statement? Explain.

A. **Combination reaction:**

i. Two or more substances are combined together and produce only one product is called combination reaction.

ii. Reactants are two or more

iii. Only one product is existed

iv. **Ex:** $2\text{H}_2 + \text{O}_2 \longrightarrow 2\text{H}_2\text{O}$

Decomposition reaction:

i. A single compound splits into two or more simple compounds or its constituent elements is called decomposition reaction

ii. Only one reactant is existed

iii. Products are two or more

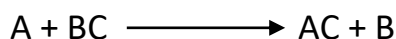
iv. $2\text{H}_2\text{O} \xrightarrow{\text{Electrolysis}} 2\text{H}_2 + \text{O}_2$

"By the above analysis decomposition reaction is opposite reaction of combination reaction"

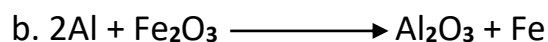
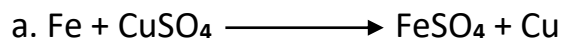
25) Write a short note on chemical displacement.

A. i. In a chemical reaction a highly reactive element displaces a low reactive element from its compound is called chemical displacement reaction (or) A highly reactive metal displaces a low reactive metal from its compound is called chemical displacement

ii. This reaction can be represented as follows



iii. **Examples:**



NOTE: Displacement reactions are generally using in metallurgy to extract a low reactive metal from its ore by using highly reactive metal

26) Complete the following table

A.

	CuSO_4	FeSO_4	ZnSO_4
Zn	✓	✓	×
Fe	✓	×	×
Cu	×	×	×

✓ \longrightarrow Reaction occurred

× \longrightarrow Reaction doesn't occur

Order of reactivity: $\text{Zn} > \text{Fe} > \text{Cu}$

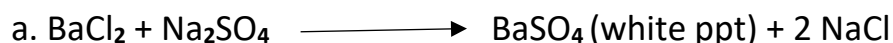
27) Write a short note on chemical double displacement reaction. (Or) double decomposition reaction

A. i. In a chemical reaction, ions of reactants are mutually interchanged then produce two compounds as products is called chemical double displacement reaction (or) double decomposition reaction

ii. This reaction can be represented as follows



iii. **Examples:**



NOTE: Neutralization reaction also a double displacement reaction



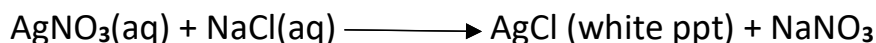
28) Why a double displacement reaction is also called as double decomposition reaction?

A. In double displacement reaction, mutually interchanged ions are obtained by the decomposition of two reactants, that's why double displacement reaction is also called as double decomposition reaction.

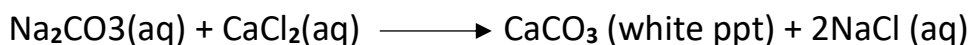
29) What is precipitate chemical reaction? Give examples.

A. precipitation reaction is a chemical reaction that occurs when two ionic compounds in an aqueous solution combine to form an insoluble solid, called a precipitate.

Examples: i. When silver nitrate and sodium chloride are mixed, a white precipitate of silver chloride forms. The equation for this is



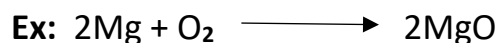
ii. When sodium carbonate and calcium chloride are mixed, calcium carbonate is produced as a precipitate. The equation is



30) Write a short note on oxidation and reduction reactions.

A. **Oxidation:**

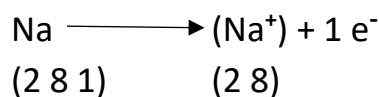
i. Addition of oxygen to any substance is called oxidation



ii. Removal of hydrogen from a compound is called also called oxidation



iii. Loss of electrons by atom of an element is also called oxidation

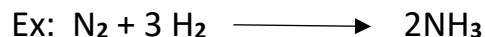


Reduction:

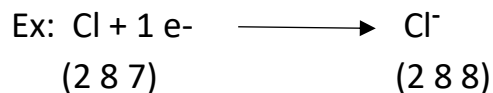
i. Removal of oxygen from a compound is called reduction



ii. Addition of hydrogen to a substance is also called reduction



iii. Gain of electron by atom of an element is also called as reduction



31) Write a short note on Red ox reaction.

A. i. In some of chemical reactions which involve oxidation and reduction both simultaneously are known as oxidation and reduction/ Redox reaction.



a) In this reaction CuO is reduced into Cu by loss of oxygen.

b) And 'H₂' is oxidised into H₂O by gain of oxygen.

c) Here both oxidation and reduction reactions are occurred



a) In this reaction H₂S is oxidised into S by loss of hydrogen

b) Br₂ is reduced into HBr by gain of hydrogen

c) Here both oxidation and reduction reactions are occurred



a) In this reaction MnO₂ is reduced by loss of oxygen

b) HCl is oxidised by loss hydrogen

c) Here both oxidation and reduction reactions are occurred

32) Write a short note on oxidising agent and reducing agent.

A. Oxidising agent:

1. A Substance which is helpful for oxidation is called oxidising agent.

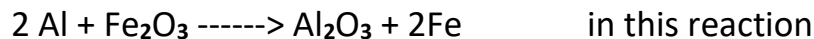
2. Generally reduced substance is oxidising agent

Reducing agent:

1. A substance which is helpful for reduction is called reducing agent.

2. Generally oxidised substance is reducing agent

Example:



i. Fe₂O₃ is reduced into Fe

ii. Al is oxidised into Al₂O₃

iii. Fe₂O₃ is oxidising agent

iv. Al is reducing agent

33) List some effects of oxidation reaction in our daily life.

A. i. Corrosion

ii. Combustion

iii. Rancidity

iv. Change in colour of vegetables and fruits when they are peeled and cut in to pieces

v. Raise the dove when you add yeast

34) What is corrosion?

A. corrosion is the gradual destruction or deterioration of metals due to a chemical reaction with oxygen and other acidified gases in the presence of moisture in air.

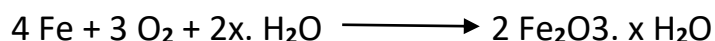
Examples:

- i. Rusting of iron
 - ii. Tarnish on silver, and the blue-green patina that develops on copper.
-

35) What is Rusting of iron? How can you prevent rusting of iron?

A. Formation of reddish brown colour matter on the surface of iron articles due to reaction between iron on surface of articles and oxygen in the air in the presence of moisture.

Chemical equation is



Preventive methods of Rusting of iron:

- i. Painting, oiling and greasing on surface of iron articles
 - ii. Galvanization
 - iii. Alloying etc.....
-

36) Write some effects of iron rusting in our daily life.

- A.
- i. Weakening of bridges, iron railings etc.
 - ii. Damaging of car bodies and machinery parts.
 - iii. Failure of key components of machines causes failure of their functioning.
-

37) What is rancidity? How can you prevent rancidity?

A. Spoilage of taste and smell of food made with oil and fat due to oxidation is called rancidity.

Preventive methods of rancidity.

- i. Add antioxidants: Antioxidants are substances that prevent oxidation

Ex: Butylated hydroxy anisole (**BHA**) and butylated hydroxytoluene (**BHT**)

- ii. Store in airtight containers.
 - iii. Refrigerate food.
 - iv. Replace oxygen with another gas: For example, chips manufacturers flush the bags with nitrogen gas.
 - v. Store food away from light.
-

38) Why packets of food like chips are flushed (filled) with nitrogen gas?

- A.
- i. Nitrogen is a harmless gas that is used in the packing process.
 - ii. Nitrogen gas has inert nature and does not allow food to oxidize.
-

39) Why should magnesium ribbon be cleaned before using?

- A.
- i. Magnesium ribbon should be cleaned before burning.
 - ii. Because it reacts with oxygen in the air to form a white layer of magnesium oxide on its surface.
-

40) A solution of substance X is using for white wash.

i. Name the substance X and write its chemical formula?

ii. Write the reaction between X and water.

A. i. X \longrightarrow is quick lime and its chemical formula is CaO

ii. $\text{CaO} + \text{H}_2\text{O} \longrightarrow \text{Ca}(\text{OH})_2$

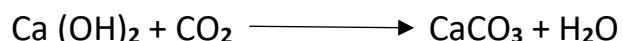
41. Why do walls become white after whitewash?

A. i. The whitewash contains calcium hydroxide.

ii. It forms a thin layer of calcium carbonate a white precipitate on the walls by slowly reacting with carbon dioxide in the air.

iii. As a result, after three to four days, the walls have a shiny white finish.

iv. The chemical equation as follows



42) Write the differences between types of chemical reactions

A.

Chemical Combination	Chemical Decomposition	Chemical Displacement	Chemical Double Displacement
i. Two or more substances are combined together and produce one product is called chemical composition or combination	i. A compound splits into two or more substances is called chemical decomposition	i. A chemical reaction in which a more reactive element displaces a less reactive element from its compound is called a displacement reaction.	i. A chemical reaction in which where two compounds exchange ions to produce two new compounds
ii. Generally it can be represented as $\text{A} + \text{B} \longrightarrow \text{C}$	ii. Generally it can be represented as $\text{A} \longrightarrow \text{B} + \text{C}$	ii. Generally it can be represented as $\text{AB} + \text{C} \longrightarrow \text{CB} + \text{A}$	ii. Generally it can be represented as $\text{AB} + \text{CD} \longrightarrow \text{CB} + \text{AD}$
iii. In this reaction reactants are two or more. They are either elements or compounds.	iii. In this reaction, there is only one compound as a reactant.	iii. In this reaction there are two reactants, one of them is an element and the other one is a compound.	iii. In this reaction there are two reactants, both are compounds.
iv. In this reaction only one product is formed.	iv. In this reaction products are two or more.	iv. In this reaction there are two products, one of them is an element and the other one is a compound.	iv. In this reaction there are two products, both are compounds.

v. Usually combination reaction is exothermic reaction.	v. Usually decomposition reactions are Endothermic	v. Displacement reactions are generally exothermic.	v. A double displacement reaction can be either exothermic or endothermic.
vi. Examples: a) $2\text{H}_2 + \text{O}_2 \longrightarrow 2\text{H}_2\text{O}$ b) $\text{MgO} + 2\text{H}_2\text{O} \longrightarrow \text{Mg}(\text{OH})_2$	vi. Examples: a) $\text{CaCO}_3 \xrightarrow{\text{Heat}} \text{CaO} + \text{CO}_2$ b) $2\text{Pb}(\text{NO}_3)_2 \xrightarrow{\text{Heat}} 2\text{PbO} + 4\text{NO}_2 + \text{O}_2$	vi. Examples: a) $\text{Zn} + 2\text{HCl} \longrightarrow \text{ZnCl}_2 + \text{H}_2$ b) $\text{Fe} + \text{CuSO}_4 \longrightarrow \text{FeSO}_4 + \text{Cu}$	vi. Examples: a) $\text{BaCl}_2 + \text{Na}_2\text{SO}_4 \longrightarrow \text{BaSO}_4 + 2\text{NaCl}$ b) $\text{Pb}(\text{NO}_3)_2 + 2\text{KI} \longrightarrow \text{PbI}_2 + 2\text{KNO}_3$

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