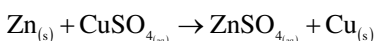
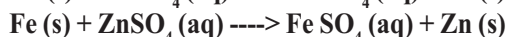
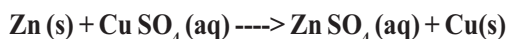


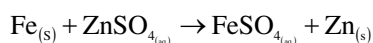
## CHAPTER - 1

**CHEMICAL REACTIONS AND EQUATIONS**

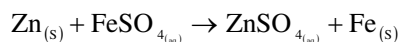
1. State which of the following chemical reactions will take place or not, giving suitable reason for each.



In this reaction, zinc displaces copper from copper sulphate solution so that copper is set free. This displacement reaction takes place because zinc is more reactive than copper.



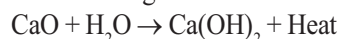
This reaction does not take place because Fe is less reactive than Zn.



In this reaction, Zn displaces Fe from  $\text{FeSO}_4$  solution so that Fe is set free. This displacement reaction takes place because zinc is more reactive than Fe.

2. A housewife wanted her house to be white-washed. She bought 10kg of quick lime from the market and dissolved it in 30 litres of water. On adding lime to water she noticed that the water started boiling even when it was not being heated. Give reason for her observation. Write the corresponding chemical equation and name the product formed.

Reaction between quick lime (CaO) and water is highly exothermic, so the water started boiling even when it was not being heated.



Calcium hydroxide (slaked lime)

3. Four metals A, B, C and D are, in turn, added to the following solutions one by one. The observations made are tabulated below:

| Metal | Iron II Sulphate | Copper II Sulphate | Zinc Sulphate | Silver Nitrate |
|-------|------------------|--------------------|---------------|----------------|
| A     | No reaction      | Displacement       | ----          | ----           |
| B     | Displacement     | ----               | No reaction   | -----          |
| C     | No reaction      | No reaction        | No reaction   | Displacement   |
| D     | No reaction      | No reaction        | No reaction   | No reaction    |

Answer the following questions based on above information.

- Which is the most active metal and why?
- What would be observed if B is added to a solution of copper (II) sulphate and why?
- Arrange the metals A, B, C and D in order of increasing reactivity.
- Container of which metal can be used to store both zinc sulphate solution and silver nitrate solution.
- Which of the above solutions can be easily stored in a container made up of any of these metals?

## CHAPTER - 2

**ACIDS, BASES AND SALTS**

1. During summer season, a milkman usually adds a very small amount of baking soda to fresh milk. Give one reason.

A milk man adds a small amount of baking soda to fresh milk to delay the curdling of milk. In alkaline medium the bacterial action involving the conversion of milk to curd gets slow down.

2. Baking soda is used in small amount in mak-

ing bread and cake. It helps to make these soft and spongy. An aqueous solution of baking soda turns red litmus blue. It is also used in soda acid fire extinguisher.

Use this information to answer the following questions:

- How does Baking Soda help to make cakes and bread soft and spongy?

## Chemistry

(ii) How does it help in extinguishing fire?

(iii) Is the pH value of baking soda solution lesser than or greater than 7?

(i) When baking powder is mixed with water (present in dough used for baking cake or bread), then sodium hydrogen carbonate reacts with tartaric acid to evolve  $\text{CO}_2$  gas. This  $\text{CO}_2$  gas thus produced gets trapped in the wet dough and bubbles out slowly while baking. This makes the cake (or bread) to 'rise' and it becomes soft and spongy.

(Baking powder is a mixture of baking soda (sodium hydrogen carbonate) and a mild, edible acid such as tartaric acid.)

(ii) Soda acid type fire extinguishers contain a solution of sodium hydrogen carbonate and  $\text{H}_2\text{SO}_4$  in separate containers inside them. When the knob of the fire extinguisher is pressed, then  $\text{H}_2\text{SO}_4$  mixes with sodium hydrogen carbonate solution to produce a lot of  $\text{CO}_2$  gas. The pressure of this  $\text{CO}_2$  gas forces a stream of liquid and falls on the burning substance. The  $\text{CO}_2$  gas forms a blanket around the burning substance and cuts off the supply of air to the burning substance. Since the supply of air is cut off, the process of burning stops and fire gets extinguished.

3. Answer the following:

(a) Why is Plaster of Paris written as  $\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$ ? How is it possible to have half a water molecule attached to  $\text{CaSO}_4$ ?

(b) Why is Sodium Hydrogen Carbonate an essential ingredient in antacids.?

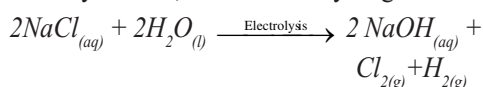
(c) When electricity is passed through an aqueous solution of sodium chloride, three products are obtained. Why is the process called chlor-alkali?

(a) It is not possible to have half a molecule of water. The formula  $\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$  actually means that two molecules of  $\text{CaSO}_4$  share one molecule of water so that the effective water of crystallisation for one  $\text{CaSO}_4$  unit comes to half a molecule of water. The formula of plaster of Paris can be written as  $(\text{CaSO}_4)_2 \cdot \text{H}_2\text{O}$ .

(b) Sodium hydrogen carbonate is used as an antacid in medicine to remove acidity of the stomach. Being sodium hydrogen carbonate a mild alkali it neutralises the excess acid present in the stomach

and relieves indigestion.

(c) When electricity is passed through a concentrated solution of sodium chloride, it decomposes to form sodium hydroxide, chlorine and hydrogen.



The process of electrolysis of sodium chloride solution is called chlor-alkali process because of the products formed are chlorine (chlor) and sodium hydroxide (alkali).

4. Dry Hydrogen Chloride gas does not turn blue litmus red whereas Hydrochloric acid does. Give one reason.

Dry HCl gas does not contain any hydrogen ions in it, so it does not show acidic behaviour. Hence dry HCl does not change the colour of dry litmus paper. However when HCl gas dissolves in water, it forms hydrogen ions and hence changes the colour of blue litmus to red.

5. What happens when a few drops of water are added to anhydrous copper sulphate? Explain with the help of an equation?

When water drops are added to anhydrous copper sulphate, it gets hydrated and turns blue due to the formation of hydrated copper sulphate.

The crystalline shape is regained

$$\text{CuSO}_4 + 5\text{H}_2\text{O} \rightarrow \text{CuSO}_4 \cdot 5\text{H}_2\text{O}$$

Anhydrous copper sulphate      water      Hydrated copper sulphate

Thus anhydrous copper sulphate turns blue on adding water. This property of anhydrous copper sulphate is used to detect the presence of moisture (water) in chemical substances.

6. Consider the following salts:

$\text{Na}_2\text{CO}_3$ ,  $\text{NaCl}$ ,  $\text{NH}_4\text{Cl}$ ,  $\text{CH}_3\text{COONa}$ ,  $\text{K}_2\text{SO}_4$ ,  $(\text{NH}_4)_2\text{SO}_4$ .

Which of these salts will give:

(a) acidic solutions      (b) neutral solutions and  
(c) basic or alkaline solution.

(a)  $\text{NH}_4\text{Cl}$ ,  $(\text{NH}_4)_2\text{SO}_4$

(b)  $\text{NaCl}$ ,  $\text{K}_2\text{SO}_4$

(c)  $\text{Na}_2\text{CO}_3$ ,  $\text{CH}_3\text{COONa}$ .

## CHAPTER - 3

**METALS AND NON-METALS**

1. Alloys are used in electrical heating devices rather than pure metals. Give one reason.

Resistivity of an alloy is higher than that of pure metals which form the alloy.

2. A student has been collecting silver coins and copper coins. One day she observed a black coating on silver coins and a green coating on copper coins. Which chemical phenomenon is responsible for these coatings? Write the chemical name of black and green coatings.

The black coating on silver coin and green coating on copper coin are due to corrosion.

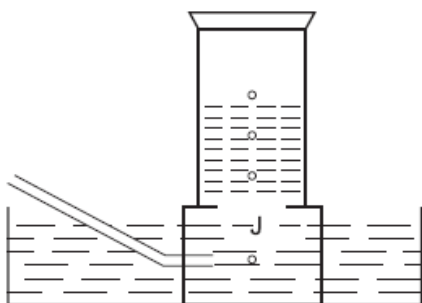
- ♦ Silver coin becomes black on exposure to air, because it reacts with sulphur in the air to form a coating of silver sulphide.
  - ♦ Copper coin reacts with moist carbon dioxide in the air to produce a green coating. This green substance is copper carbonate.
3. A metal M forms an oxide having the formula  $M_2O_3$ . It belongs to the 3rd period of the modern periodic table. Write the atomic number and valency of the metal.

Atomic number of the metal = 13 (Al)

Valency of the metal = 3

(The electronic configuration of Aluminium is 2, 8, 3. It can lose its 3 valence electrons to achieve the nearest inert gas electronic configuration 2, 8. So its valency is 3.)

4. A metal is treated with dilute sulphuric acid. The gas evolved is collected by the method shown in the following figure.



Answer the following.

- (i) Name the gas.
  - (ii) Name the method of collection of the gas.
  - (iii) Is the gas soluble or insoluble in water?
  - (iv) Is the gas lighter or heavier than air?
- (i) Hydrogen gas.  
 (ii) Downward displacement of water.  
 (iii) Insoluble in water. (iv) Hydrogen is lighter than air.
5. In a solution of silver nitrate, a copper plate was dipped. After some time, silver from the solution was deposited on the copper plate. Which metal is more reactive, copper or silver? How?

A more reactive metal displaces a less reactive metal from its salt solution. Here, copper metal is displacing silver from silver nitrate solution (which then gets deposited on copper plate), therefore, copper metal is more reactive than silver metal.

6. An element react with oxygen to form an oxide which dissolves in dilute hydrochloric acid. The oxide formed also turns a solution of red litmus blue. Is the element a metal or a non-metal? Explain your answer.

Here the oxide of the given element dissolves in an acid, therefore, the oxide must be basic in nature. Moreover, since the oxide turns red litmus solution blue, this also confirms that the oxide is basic in nature. Basic oxides are formed by metals, so the element in this case is a metal.

7. Four elements A, B, C and D have the following electron arrangements in their atom.

A 2, 8, 6      B 2, 8, 8      C 2, 8, 8, 1

D 2, 7

- (a) What type of bond is formed when element C combines with element D? (b) What will be the formula of the compound formed by the reaction of A and C?

(a) Ionic bond      (b)  $C_2A$

# CARBON AND ITS COMPOUNDS

1. An organic compound 'A' is widely used as a preservative in pickles and has a molecular formula  $C_2H_4O_2$ . This compound reacts with ethanol to form a sweet smelling compound 'B'.

- Identify the compound 'A'
- Write the chemical equation for its reaction with ethanol to form compound 'B'.
- How can we get compound 'A' back from 'B'?
- Name the process and write corresponding chemical equation.
- Which gas is produced when compound 'A' reacts with washing soda? Write the chemical equation.

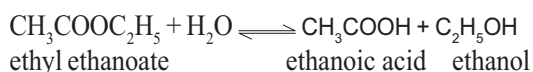
(i) Compound is  $CH_3COOH$

(ii)  $CH_3COOH + C_2H_5OH \rightleftharpoons CH_3COOC_2H_5 + H_2O$   
 (Ethanoic acid) Ethanol (B) Ethyl ethanoate Water  
 (sweet smelling)

(iii) On hydrolysis of compound B, we get compound A and ethanol.

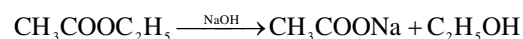
(iv) Hydrolysis of Ester

A carboxylic ester gets hydrolysed to give parent carboxylic acid and alcohol when heated with aqueous solution of an acid or alkali.



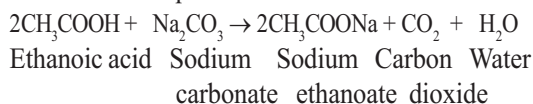
Hydrolysis in the presence of alkali is much faster than that in the presence of an acid. This is because  $OH^-$  acts as a catalyst.

Esters on hydrolysis yield corresponding salt of carboxylic acid and alcohol.



(v)  $CO_2$  gas

The chemical equation is



2. (a) Why does carbon form largest number of compounds?

(b) Why are some of these compounds called saturated and other unsaturated?

(c) Which of these two is more reactive?

(d) Write the names of the compounds.

(i)  $CH_3 - CH_2 - Br$

(ii)  $\begin{array}{cccc} H & H & H & H \\ | & | & | & | \\ H - C - C - C - C - C \equiv C - H \\ | & | & | & | \\ H & H & H & H \end{array}$

a. Carbon forms largest number of compounds because, carbon atoms can link with one another by means of covalent bonds to form long chains (rings) of carbon atoms. This property is known as catenation.

b. A hydrocarbon in which the carbon atoms are connected by only single bonds is called a saturated hydrocarbon.

A hydrocarbon in which the carbon atoms are connected by a 'double bond' or a 'triple bond' is called unsaturated hydrocarbon.

c. Unsaturated compounds are highly reactive.

d. (i) Bromoethane

(ii) 1-hexyne

3. Two carbon compounds A and B have the molecular formula  $C_3H_8$  and  $C_3H_6$  respectively.

Which one of the two is most likely to show addition reaction? Justify your answer. Explain with the help of a chemical equation. How an addition reaction is useful in vegetable ghee industry.

Compound A :  $CH_3 - CH_2 - CH_3$

Compound B :  $CH_3 - CH = CH_2$

Compound B is most likely to show addition reaction. It is an unsaturated compound. Addition reactions are shown by all unsaturated hydrocarbons containing a double bond or a triple bond.

The addition of hydrogen to the vegetable oil leads to the formation of vegetable ghee.

