

**Chapter: 8**

**Q.1 Textbook activity question**

**10**

**1** What are the physical properties of metals and nonmetals?

**Ans** A metal in chemistry is an element that creates positive ions readily and has metallic bonds. Metals are sometimes represented by a cloud of delocalized electrons as a lattice of positive ions.

Non-metals are the elements that form negative ions by accepting or gaining electrons. Non-metals usually have 4, 5, 6 or 7 electrons in their outermost shell.

**Physical Properties of Metals**

- i. All the metals are good conductors of heat and electricity. Cooking utensils and irons are made up of metals as they are good conductors of heat.
- ii. Ductility is the ability of the material to be stretched into a wire. This ability allows metals to be drawn into wires and coupled with their durability, find applications as cable wires and for soldering purposes. Because Metals can be drawn into wires we can say that metals are ductile.
- iii. Malleability is the property of substances that allows them to be beaten into flat sheets. Aluminium sheets are used in the manufacturing of Aircraft because of their lightweight and strength. Other metals sheets are used in automobile industries, for making utensils, etc. Therefore, metals are malleable.
- iv. Metals are sonorous because it produces a deep or ringing sound when struck with another hard object.
- v. Usually, all the metals have a shiny appearance but these metals can also be polished to have a shiny appearance.

**Physical Properties of Non-Metals**

- i. Ductility is the property of the material to be stretched into wires but non-metals are not ductile except for carbon, as carbon fibres find uses in a wide variety of industries including sports and music equipment.
- ii. Another property characteristic to metals is absent in non-metals called malleability. They can't be drawn into sheets as they are brittle and break on applying pressure.
- iii. They are not lustrous as they do not have any shiny appearance.
- iv. They are not sonorous and do not produce a deep ringing sound when they are hit with another material. They are also bad conductors of heat and electricity except for graphite.

**2** What is the electronic definition of oxidation and reduction?

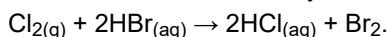
**Ans** Definition in terms of electrons transfer.

Oxidation means loss of electrons.

Reduction means gain of electrons.

**3** In the reaction between chlorine and HBr a transformation of HBr into Br<sub>2</sub> takes place. Can this transformation be called oxidation? Which is the oxidant that brings about this oxidation?

**Ans** When chlorine react with hydrobromic acid, bromine is formed.



Yes, this transformation is called oxidation, as hydrobromide acid loses hydrogen. In this reaction Cl<sub>2</sub> is the oxidizing agent.

**4** What are the moderately reactive metals?

**Ans** In the middle of the reactivity series, metals such as iron, zinc, lead, copper are moderately reactive.

**5** Can we permanently prevent the rusting of an iron article by applying a layer of paint on its surface?

**Ans** No, we cannot protect the articles permanently from rusting by painting on them.

**6** Which measures would you suggest to stop the corrosion of metallic articles or not to allow the corrosion to

start?

**Ans** Various methods are used to protect metals from corrosion. To stop the corrosion of metallic articles, they should be kept isolated from a direct contact with air.

**7** What is done so to prevent rusting of iron windows and iron doors of your house?

**Ans** (a) The rusting of iron can be prevented by painting, oiling, greasing or varnishing its surface.  
(b) Galvanisation is another method of protecting iron from rusting by coating it with a thin layer of zinc.

**8** In which form do the moderately reactive metals occur in nature?

**Ans** The moderately reactive metals generally occur in the form of their sulphides or carbonates.

**9** What are the properties that the alloy used for minting coins should have?

**Ans** Alloys used for minting coins should be ductile and malleable.

**10** What are the various alloys used in daily life? Where are those used?

**Ans** i. Alloy of gold .As pure gold is too much soft . alloy contains 22 carat gold and rest are carbon and others.  
ii. Bronze of copper and tin . used as Utensils.  
iii. Stainless steel of iron and chromium.

**Q.2 Match the pair**

<b>1</b>	<table><tr><th>Column "A"</th><th>Column "B"</th></tr><tr><td>i. Sulphur</td><td>a. Soluble in water</td></tr><tr><td>ii. Neon</td><td>b. Combustible</td></tr><tr><td></td><td>c. No chemical reaction</td></tr></table>	Column "A"	Column "B"	i. Sulphur	a. Soluble in water	ii. Neon	b. Combustible		c. No chemical reaction
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ii. Gold	b. Soluble in water
	c. High ductility

**Ans**

i. Potassium bromide	Soluble in water
ii. Gold	High ductility

**Q.3 State True or False**

1

1 Ionic compounds are soluble in kerosene.

**Ans** False. Ionic compounds are soluble in water and insoluble in kerosene

**Q.4 Name the following**

7

1 The device used for grinding an ore.

**Ans** ball mill / grinding mill

2 Molecular formula of common ore of aluminium.

**Ans**  $\text{Al}_2\text{O}_3 \cdot n\text{H}_2\text{O}$

3 Alloy of sodium and mercury.

**Ans** Sodium amalgam

4 A non-metal that having electrical conductivity.

**Ans** Graphite

5 The oxide that forms salt and water by reacting with both acid and base.

**Ans** Aluminium oxide ( $\text{Al}_2\text{O}_3$ )

6 The reagent that dissolves noble metals.

**Ans** Aqua regia

7 The nonmetal having electrical conductivity.

**Ans** Graphite

**Q.5 Give scientific reasons**

8

1 Lemon or tamarind is used for cleaning copper vessels turned greenish.

**Ans**

- Copper undergoes oxidation in air to form black copper oxide. This copper oxide reacts with carbon dioxide in air and gains a green coat of copper carbonate.
- Thus copper gets tarnished or corroded due to the formation of green copper carbonate.
- Lime juice or tamarind contains weak acid i.e citric acid and tartaric acid.
- When these tarnished vessels are rubbed with lime juice or tamarind, the weak acid present in them dissolves the green copper carbonate and makes it shiny again.

2 Generally ionic compounds have high melting points.

**Ans**

- Ionic compounds are solids and they are hard due to strong electrostatic force of attraction between positively and negatively charged ions in the molecules.
- A considerable amount of energy is required to break the strong intermolecular attraction.
- Hence, the ionic compounds have melting points.

3 Pine oil is used in froth floatation method.

**Ans**

- The froth floatation process is based on the two opposite properties, hydrophilic and hydrophobic, of the particles.
- The ore is mixed with water and pine oil and pressurized air is bubbled through the mixture, leading to froth formation.
- The mineral particles in the ore are preferentially wetted by the oil and float on the top in the froth.
- The gangue particles are wetted by water and settle down. Thus, the minerals can be separated from the

gangue.

4 Anodes need to be replaced from time to time during the electrolysis of alumina.

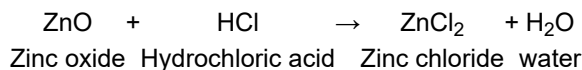
- Ans**
- During electrolysis of alumina, the oxygen gas is liberated at the anode reacts with graphite rods and forms carbon dioxide.
  - As the anode gets oxidized during electrolysis of alumina, it gets eroded.
  - Hence, it is necessary to replace anodes from time to time.

**Q.6 Chemical reactions with equations.**

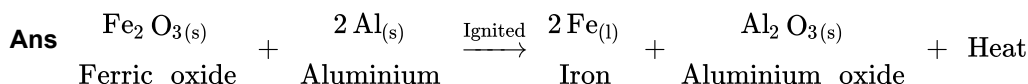
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1 Zinc oxide is dissolved in dilute hydrochloric acid.

**Ans** Zinc oxide is dissolved in dilute hydrochloric acid, zinc chloride and water are formed .



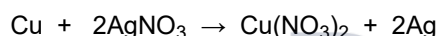
2 A reaction was brought about between ferric oxide and aluminium.



3 When copper coin is dipped in silver nitrate solution, a glitter appears on the coin after some time. Why does this happens? Write the chemical equation.

- Ans**
- Copper is more reactive than silver.
  - When copper coin is dipped in silver nitrate solution, copper being more reactive than silver, displaces silver from silver nitrate solution.
  - Silver hence gets deposited on the copper coin and hence a glitter appears on the coin after sometime. This is an example of Displacement reaction.

vi. **Chemical reaction:**



4 Electrolysis of alumina is done.

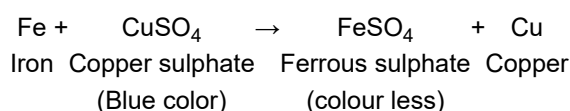
**Ans** During electrolysis of alumina, aluminium is deposited at the cathode. Molten aluminium being heavier than the electrolyte, is collected at the bottom of the tank. Oxygen gas is liberated at the anode.

Anode reaction :  $2\text{O} \rightarrow \text{O}_2 + 4\text{e}^-$  (Oxidation)

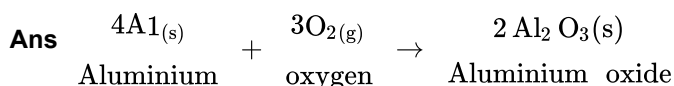
Cathode reaction :  $\text{Al}^{3+} + 3\text{e}^- \rightarrow \text{Al}$  (Reduction)

5 What happens when Iron filings are dropped in aqueous solution of copper sulphate?

**Ans** When iron nails are dropped in copper sulphate solution, iron being more reactive, displaces copper from copper sulphate solution. The iron nails gets coated with reddish brown copper metal and the blue color of copper sulphate fades gradually and ferrous sulphate is formed.



6 Aluminium came in contact with air.



**Q.7 Complete the given flow chart / table / diagram**

12

1 Make pairs of substances and their properties.

Substance	Property
(a) Potassium bromide	(i) Combustible
(b) Gold	(ii) Soluble in water
(c) Sulphur	(iii) No chemical reaction
(d) Neon	(iv) High ductility

Ans	Substance	Property
	(a) Potassium bromide	Soluble in water
	(b) Gold	High ductility
	(c) Sulphur	Combustible
	(d) Neon	No chemical reaction

2 Magnetic separation method.

Ans

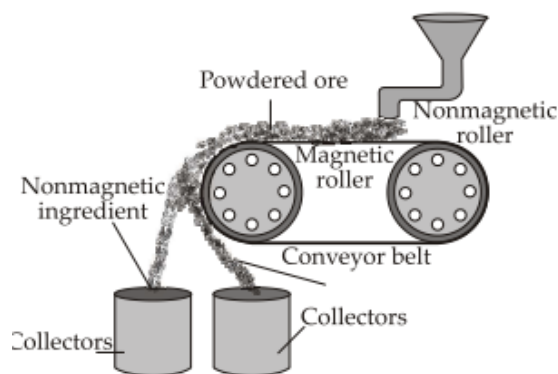


Fig. Magnetic separation

3 Divide the metals Cu, Zn, Ca, Mg, Fe, Na, Li into three groups namely reactive metals, moderately reactive metals and less reactive metals.

Ans	Reactive metals	Moderately reactive metals	Less reactive metals
	Ca, Na, Li	Zn, Mg, Fe	Cu

4 Froth floatation method

Ans

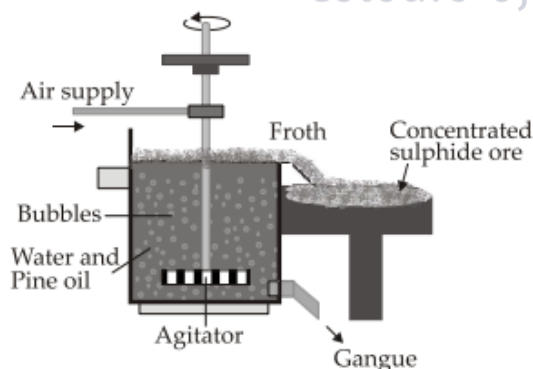


Fig. Froth floatation method

5 Electrolytic reduction of alumina.

Ans

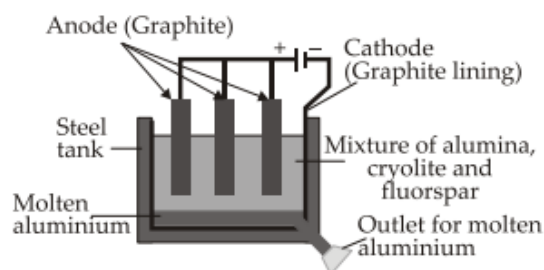


Fig. Extraction of aluminium

6 Hydraulic separation method.

Ans

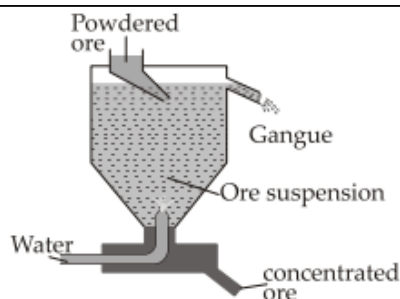


Fig. Hydraulic separation

**Q.8 Explain with the help of examples**

6

1 Explain the term with the help of examples.

- (a) Metallurgy
- (b) Ores
- (c) Gangue

Ans (a)

- i. The extraction of metals from their ores and then refining them for use is known as metallurgy.
- ii. Metallurgy involves several processes such as grinding of ores, concentration of ores, reduction of ores and refining.

(b)

- i. The minerals from which metals can be profitably extracted are called ores. There can be many minerals from which a metal can be extracted.
- ii. However, only those minerals from which a metal can be extracted profitably are called ores.
- iii. For example, aluminium can be extracted profitably from its bauxite ore. Hence, bauxite is an ore of aluminium.

(c)

- i. The unwanted impurities of sand, soil, rocky substances, etc., present in the ore are called gangue.
- ii. For example, bauxite ore contains impurities of silica ( $\text{SiO}_2$ ), ferric oxide ( $\text{Fe}_2\text{O}_3$ ) and titanium oxide ( $\text{TiO}_2$ ). These impurities are called gangue.
- iii. The gangue is generally separated from the ore at the site itself by various methods.

2 Explain with the help of examples. Or Explain the terms.

Minerals

- Ans
- i. The elements or compounds which occur naturally in the earth's crust are known as minerals.
  - ii. Most of the metals are found in combined state.
  - iii. A particular metal can be found in several compounds in nature. These compounds are called minerals.
  - iv. For example, cryolite and bauxite are minerals of aluminium.

**Q.9 Answer the following**

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1 Complete the following statement using given options.

During the extraction of aluminium,

Chemical reaction of transformation of bauxite into alumina by Hall's process.

- Ans
- i. In Hall's process, the ore is powdered and then leached by heating with aqueous sodium carbonate in the digester to form water soluble sodium aluminate.
  - ii. Then the insoluble impurities are filtered out the filtrate is warmed and neutralized by passing carbon dioxide gas through it.
  - iii. This results in the precipitation of aluminium hydroxide.
  - iv.  $\text{Al}_2\text{O}_3 \cdot 2\text{H}_2\text{O} + \text{Na}_2\text{CO}_3 \rightarrow 2\text{NaAlO}_2 + \text{CO}_2 + 2\text{H}_2\text{O}$ .
  - v.  $2\text{NaAlO}_2 + 3\text{H}_2\text{O} + \text{CO}_2 \rightarrow 2\text{Al}(\text{OH})_3 + \text{Na}_2\text{CO}_3$ .
  - vi. The precipitate of  $\text{Al}(\text{OH})_3$  obtained is filtered, washed, dried and then calcined by heating at  $1000^\circ\text{C}$  to obtain alumina.
  - vii.  $2\text{Al}(\text{OH})_3 \rightarrow \text{Al}_2\text{O}_3 + 3\text{H}_2\text{O}$ .

2 Complete the following statement using given options.

During the extraction of aluminium,

Ingredients and gangue in bauxite.

- Ans**
- Aluminium is extracted from its ore Bauxite( $\text{Al}_2\text{O}_3 \cdot n\text{H}_2\text{O}$ ).
  - Bauxite contains 30% to 70% of  $\text{Al}_2\text{O}_3$  and remaining part is gangue.
  - Silica( $\text{SiO}_2$ ), ferric oxide ( $\text{Fe}_2\text{O}_3$ ) and titanium oxide ( $\text{TiO}_2$ ) are the impurities present in bauxite.
  - Separation of these impurities is done by leaching process.

- 3** Complete the following statement using every given options.  
 During the extraction of aluminium, .....  
 Heating the aluminium ore with concentrated caustic soda.

- Ans**
- In Bayer's process, the ore is first grounded in a ball mill.
  - Then it is leached by heating with concentrated solution of caustic soda( $\text{NaOH}$ ) at  $140^\circ\text{C}$  to  $150^\circ\text{C}$  under high pressure for 2 to 8 hours in a digester. Aluminium oxide being amphoteric in nature, it reacts with the aqueous solution of sodium hydroxide to form water soluble sodium aluminate. Thus bauxite is leached by sodium hydroxide solution.
  - $\text{Al}_2\text{O}_3 \cdot 2\text{H}_2\text{O} + 2\text{NaOH} \rightarrow 2\text{NaAlO}_2 + 3\text{H}_2\text{O}$ .
  - The iron oxide in the gangue does not dissolve in aqueous sodium hydroxide. It is separated by filtration.
  - However, silica in the gangue dissolves in aqueous sodium hydroxide to form water soluble sodium silicate.

- 4** Complete the following statement using given options.  
 During the extraction of aluminium,  
 Use of leaching during the concentration of ore.

- Ans**
- Leaching is a chemical process of concentration of ore.
  - Here the ore dissolves in a chemical solution. The minerals will react, and dissolve leaving behind the impurities which filter out.
  - And the metal will be obtained from the chemical solution.
  - For example: bauxite is leached by sodium hydroxide solution in Bayer's process.

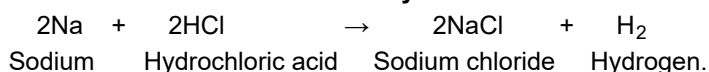
**Q.10 Answer the following in detail**

5

- 1** The electronic configuration of metal 'A' is 2,8,1 and that of metal 'B' is 2,8,2. Which of the two metals is more reactive ? Write their reaction with dilute hydrochloric acid.

- Ans**
- Metal A is Sodium with atomic no -11 (2,8,1).
  - Metal B is Magnesium with atomic no- 12 (2,8,2).
  - Sodium is more reactive than Magnesium because it has only one electron in its outermost shell, while magnesium has two electrons in its outermost shell. The metal which has less number of electrons in its outermost shell, is more reactive.

**iv. Reaction of Sodium with dilute hydrochloric acid.**



**v. Reaction of Magnesium with dilute hydrochloric acid.**

