

# METALS AND NON METALS (CLASS-8)

## INTRODUCTION-

Element is defined as the simplest form of matter which cannot be divided into still simpler form by any physical or chemical changes. Every element is made up of all same kind of atoms.

There are nearly 118 elements known to us till today. All these elements form a large number of compounds. Based on their properties the elements are classified into metals, non-metals, metalloids, inert gases and radio active elements. If we call an element as metal that shows some definite set of properties and if we call an element a non-metal then that also shows some other definite properties. In this chapter we will study about metals, non-metals and alloys with their properties uses.

Out of the 92 naturally occurring elements about 70 are identified as metals and 22 as non-metals. Elements with atomic number more than 92 are prepared in the lab through nuclear reaction called artificial transmutation. These are called transuranium or transuranic elements.

- a) lithium, sodium, potassium, rubidium, cesium are called **alkali metals**
- b) beryllium, magnesium, calcium, strontium, barium, are called **alkaline earth metals**
- c) fluorine, chlorine, bromine, iodine are called **halogens**
- d) oxygen, sulphur, selenium, polonium are called **chalcogens**
- e) nitrogen, phosphorous, arsenic, antimony, bismuth are called **pneacogens**

## OCCURRENCE OF METALS AND NON-METALS

**Metals** occur in free (native or uncombined) state or in the combined state.

(a) Native state: Metals which have very low tendency to react (or) less reactive can be found in free state in nature. Metals like gold, silver, platinum are few metals that exist in free state these are also known as Noble Metals.

(b) Combined state: The metals which are highly reactive generally occur in the earth's crust in the combined state as halides, sulphides, carbonates, sulphates, nitrates and are generally called as **minerals**.

**Non-Metals** occur both in free state and combined state. Like nitrogen exist as  $N_2$  (free form) in air and as  $NH_3$ ,  $HNO_3$  as combined form and oxygen exist as  $O_2$  (free form) in air and  $H_2SO_4$ ,  $H_2O$  as combined form.

**➤ PROPERTIES OF METALS AND NON – METALS :**
**Physical properties of metals and non–metals**

PROPERTY	METALS	NON–METALS
PHYSICAL STATE :	Metals are generally solids at room temperature .  Exception : Mercury is liquid at room temperature and gallium melts in our palm.	Non–metals exist in solid, liquid and gaseous state. Solid : C, S, P, I <sub>2</sub> Liquid : Br <sub>2</sub> Gas : Cl <sub>2</sub> , H <sub>2</sub> , O <sub>2</sub>
HARDNESS	Metals are generally hard . Exception : Na, K are very soft can be easily cut with a knife .	Non–metals are generally soft (brittle / delicate). Exception : Diamond(an allotrop of carbon) hardest non –metal .
LUSTRE (Shining) metals when they are freshly cut they have shining property	Metals are highly lusturous.	Non–metals are generally non – lusturous. Exception : Iodine and Graphite are lusturous non–metals.
DENSITY : $\left( \frac{\text{Mass}}{\text{Volume}} \right)$	Metals have high density. Osmium has the highest density Exception : Na, K has less density .	Non–metals are generally have less density than metals.
MALLEABILITY : (Metals are beaten into thin sheets)	Metals are generally malleable. Au & Ag are most malleable metals . Exception : Zn, As, Sb ,Co are brittle in nature	Non–metals are generally non malleable . They are brittle they break when hammered.
DUCTILITY : (Drawn into thin wire)	Metals are usually ductile Pt, Au, Ag, Cu, Iron are highly ductile Exception : Zn, As, Sb ,Co	Non–metals are non ductile.
MELTING POINT AND BOILING POINT	Metals have high melting point and boiling point. Because of this property most metals are solids at room temperature. Tungsten has highest melting point. Exception : Ga, Cs, Hg have low melting points.	Have low melting points and boiling points. Helium has lowest melting and boiling point.  Exception : diamond and graphite
TENSILE : (Ability to	Metals have high tensile	Non–metals have low

withstand stress) (The property due to which a substance can bear lot of weight with out breaking )	strength .	tensile strength .
SONORITY : (When struck with some hard material they produce sound)	Metals are sonorous. Exception : Gold is non-sonorous.	Non-metals are non-sonorous.
CONDUCTIVITY (Electrical/Thermal)	Metals are good conductors of heat & electricity . Silver is the best conductor of heat and lead is the poorest conductor of heat . Silver is a best conductor of electricity followed by copper, gold, aluminium. Bismuth, lead and tungsten are poor conductors of electricity.	Non-metals are bad-conductors of heat and electricity .  Exception : Graphite and gas carbon are good conductors of heat and electricity. Diamond is a good conductor of heat.
ALLOY FORMATION	Molten metals dissolve in each other to form a homogeneous mass called an alloy.	They do not form alloys. Exception: C, Si & P can dissolve in molten metals to form alloys of metals.



Sodium Metal

Magnesium  
RibbonBromine  
Liquid

Sulphur Powder



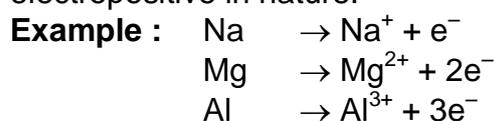
Carbon Fibre

## ☞ CHEMICAL PROPERTIES OF METALS AND NON-METALS

### FORMATION OF IONS

#### (i) Metals (Electropositive character)

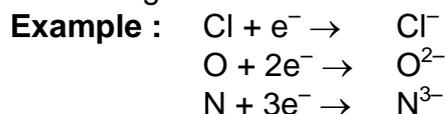
Metals form positive ions (or cations) by losing electrons. So they are electropositive in nature.



The number of electrons lost is the valency of the metal.

**(ii) Non-Metal (Electronegative character)**

Non-metals form negative ions (or anions) by gaining electrons. So they are electronegative in nature.



The number of electrons gained is the valency of the non-metal.

**Exception :** Hydrogen being a non-metal generally forms positively charged ion,  $\text{H}^+$ .

**⚡ REACTIVITY SERIES OF METALS :**

Arrangement of metals in a vertical column in decreasing order of their reactivity is called reactivity series. In this series most reactive metal is placed at the top whereas least reactive metal is placed at the bottom.

(i) Metal which have greater tendency to lose electrons are very reactive and that has less tendency to lose electrons are less reactive.

(ii) Metals which lie above hydrogen in the activity series can displace hydrogen from dilute acids and water.

(iii) Metals which lie below hydrogen in activity series cannot displace hydrogen from water and dilute acids.

(iv) Even though hydrogen is a non-metal it is placed in the reactivity series as it forms positive ions by losing electrons.

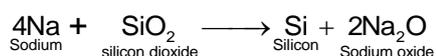
This series is also known as activity series.

K		
Na		(Most reactive)
Ca		
Mg		
Al		
Zn		Decreasing order of chemical reactivity
Fe		
Pb		
[H]		
Cu		
Hg		
Ag		(Least reactive)
Au		
Pt		

**1. OXIDISING AND REDUCING PROPERTY :**
**(i) Metals**

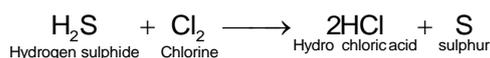
Metals ionize by losing electrons and hence are reducing agents.

**Example :** Sodium act as reducing agent and reduces silicon dioxide to silicon when heated in absence of air.


**(ii) Non – Metals**

They ionize by the gaining electrons and hence are oxidizing agents.

**Example :** Chlorine is an excellent oxidising agent it oxidizes hydrogen sulphide to sulphur.



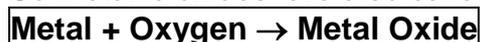
**Exception :** Carbon and hydrogen are strong reducing agents

## 2. REACTION WITH OXYGEN :

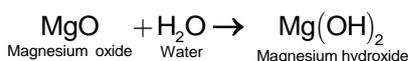
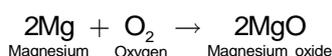
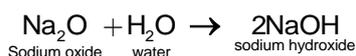
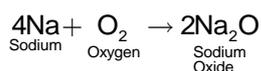
### (i) Metals

Almost all metals combine with oxygen to form metal oxide, These oxides dissolve in water and form bases.

So metallic oxides are also called basic oxides.

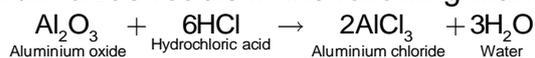


**Example :**



But some metal oxides, such as aluminium oxide ( $\text{Al}_2\text{O}_3$ ), zinc oxide ( $\text{ZnO}$ ) show both acidic as well as basic behaviour. Such metal oxides which react with both acid as well as base to produce salts and water are known as “Amphoteric Oxide”

**Example :** Aluminium oxide reacts in the following manner with Acids and Bases.

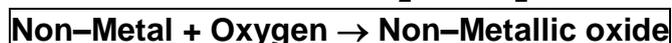


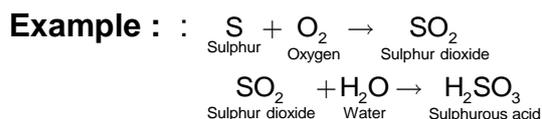
- All metals do not react with oxygen with same speed.
- Na and K react vigorously with  $\text{O}_2$ . It is a spontaneous reaction. To protect them they are preserved in Kerosene. Ca reacts with  $\text{O}_2$  slowly.
- Al, Mg, Zn, Sn, Pb will react with oxygen on burning.
- Hg reacts reversibly with  $\text{O}_2$ .
- Ag, Au do not react with oxygen even at high temperature.
- When metals like Mg, Al, Zn, Pb etc., are exposed to air at room temperature, a thin layer of oxide (passivation layer) is formed on their surface. This protective layer protects the metal from further oxidation.
- Cu does not burn in air, but hot copper gets coated with a layer of black solid  $\text{CuO}$ . Fe also does not burn when heated, but when iron fillings are sprinkled on flame, they burn vigorously.

### (ii) Non-Metals

Non – Metals on reaction with oxygen form non– metallic oxides which can be acidic or neutral. On adding small amounts of these oxides in water, acids are formed. So the non–metallic oxides are named as acidic oxides. ( $\text{CO}_2$ ,  $\text{SO}_2$ ,  $\text{P}_4\text{O}_{10}$ ).

Neutral oxides are  $\text{H}_2\text{O}$ ,  $\text{CO}$ ,  $\text{N}_2\text{O}$ ,  $\text{NO}$ .

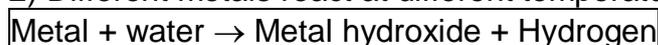




### 3. REACTION WITH WATER :

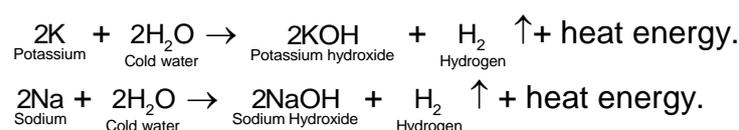
#### (i) Metal :

- 1) Metals react with water to form oxides or hydroxides along with hydrogen.
- 2) Different metals react at different temperatures.



(a) In case of sodium and potassium the reaction is so violent that the evolved hydrogen immediately catches fire.

Na, K and Ca react violently even with cold water.

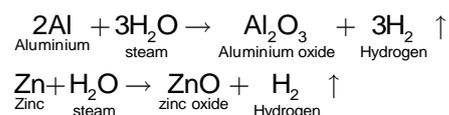


(b) Reaction of calcium with water is less violent, the heat evolved is not sufficient for the hydrogen to catch fire.

(c) Magnesium reacts with hot water / steam



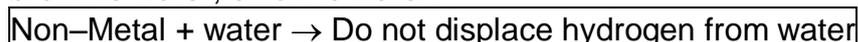
(d) Metals like Al, Fe, Zn do not react either with cold (or) hot water. But react with steam to form the metal oxide and hydrogen.



(e) Metals like lead, copper, silver, gold do not react with water or steam.

#### (ii) Non-Metals

Non-metals do not react with water. But some non-metals dissolve in water. For example, Oxygen present in water is called dissolved oxygen; like wise bromine water, chlorine water.



Non-Metals do not release hydrogen gas because in order to release hydrogen gas non-metals should give electrons to  $\text{H}^+$  ion. But non-metal cannot donate electrons but usually accept electrons.

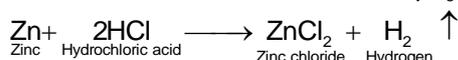
### 4. REACTION WITH DILUTE ACIDS :

#### (i) Metal

All metals however do not react with dilute acids at same speed. The extent of reaction of a metal with dilute acids depends on its chemical reactivity.

Metal + Dilute Acid → Salt + Hydrogen

Metals like Na, K, Ca react violently and liberate hydrogen gas. whereas Mg, Al, Zn and iron do not react violently.

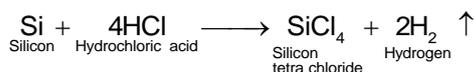


Metals like Cu, Ag, Au do not react with dilute acids.

**(ii) Non-Metal**

Unlike metals, non-metals cannot displace hydrogen because generally non-metals accept electrons but cannot donate electrons to release hydrogen gas.

**Exception :** Silicon reacts with hydrochloric acid forming silicon tetrachloride and hydrogen gas.

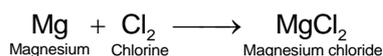
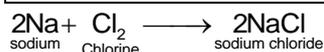


**5. REACTION WITH CHLORINE :**

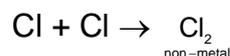
**(i) Metals**

Metals react with chlorine to form metallic chlorides.

Metal + Chlorine → Metallic chloride



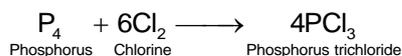
Metallic chlorides are good conductors of electricity that is they are electrolytes. When electricity is passed through fused (or) aqueous solution of metallic chlorides, metals are discharged at the cathode and chlorine at the anode.



**(ii) Non-metal :**

Non-metals react with chlorine to form non-metallic chlorides.

Non-metal + chlorine → Non-metallic chloride



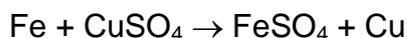
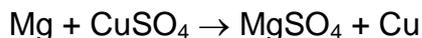
Non-metallic chlorides are non-electrolytes, they do not conduct electricity.

**Exception :** HCl is an exception because in solution form, it ionizes and hence conducts electricity.

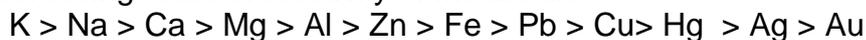


## METAL DISPLACES OTHER METAL

A metal can displace another metal, normally more reactive metal displaces the less reactive metals from its solution. For example, Mg can replace Cu from  $\text{CuSO}_4$ .



The decreasing order of reactivity of Metals are



## CORROSION AND ITS PREVENTION

Gradual deterioration of materials, usually metals, due to reaction with its environment is called **corrosion**.

It is a spontaneous irreversible process. It usually occurs at the surface of metal.

### Examples

- In the presence of moisture and atmospheric carbon dioxide, copper loses its shine and gets covered with a green layer of basic copper (II) carbonate,  $\text{CuCO}_3 \cdot \text{Cu}(\text{OH})_2$ . This layer protects rest of copper from further corrosion.  

$$2\text{Cu}_{(s)} + \text{O}_{2(g)} + \text{CO}_{2(g)} + \text{H}_2\text{O}_{(aq)} \rightarrow \text{CuCO}_3 \cdot \text{Cu}(\text{OH})_{2(s)}$$
- Silver articles acquire black tinge after some time when exposed to air. Because it reacts with hydrogen sulphide in air to form black coating of silver sulphide ( $\text{Ag}_2\text{S}$ ).  

$$2\text{Ag}_{(s)} + \text{H}_2\text{S}_{(g)} \rightarrow \text{Ag}_2\text{S}_{(s)} + \text{H}_{2(g)}$$
- Iron when exposed to moist air for a long time forms brown flaky substance on its surface called rust. Corrosion in case of iron is called rusting.  

$$4\text{Fe}_{(s)} + 3\text{O}_{2(g)} + x\text{H}_2\text{O}_{(aq)} \rightarrow 2\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O}_{(s)}$$
- Aluminium articles when exposed to air, a thin protective layer of white aluminium oxide ( $\text{Al}_2\text{O}_3 \cdot 2\text{H}_2\text{O}$ ) is formed on its surface. This layer protects the metal from further corrosion. Due to this property, aluminium is used in making utensils.

### Prevention of corrosion

The following methods are commonly used for the prevention of corrosion:

- Coating with oil or grease
- Covering with paint, plastic, rubber or ceramic
- Galvanisation
- Electroplating
- Anodising
- Connecting with a more electropositive metal
- Alloying
- Use of antirust solutions

### ✦ EXTRACTION OF METALS

Various steps involved in the extraction of metals from their ores as well as refining of crude metal is known as **Metallurgy**.

In order to extract the metal from its ore, several physical and chemical methods are to be followed. It is not possible to have a universal method for the extraction of all metals from their ores.

The methods used for the extraction of metal depends on –

- 1) nature of ore
- 2) properties of metal and
- 3) local conditions

**MINERALS-** Minerals are compounds of metals which are found in earth and in which metals are present in combined state( in the form of oxides, carbonates, sulphides, sulphates, nitrates, halides).

**ORE-** Ore is a mineral from which a metal can be extracted profitably and conveniently.

**“All ORES are minerals but all minerals are not ORES”.**

The word “profitable” is used while defining an ore because mining an ore and extracting a metal from it are expensive process.

**Some important ORES:**

<b>Oxide Ores:</b>	Zincite	ZnO
	Bauxite	$\text{Al}_2\text{O}_3 \cdot 2\text{H}_2\text{O}$
	Corundum	$\text{Al}_2\text{O}_3$
	Cuprite	$\text{Cu}_2\text{O}$
	Haematite	$\text{Fe}_2\text{O}_3$ (Ferric oxide)
	Magnetite	$\text{Fe}_3\text{O}_4$ (Ferroso Ferric oxide)
	Pyrolusite	$\text{MnO}_2$

<b>Halide Ores :</b>	Rock Salt	NaCl
	Horn Silver	AgCl
	Cryolite	$\text{Na}_3\text{AlF}_6$
	Fluorspar	$\text{CaF}_2$
	Carnalite	$\text{KCl}, \text{MgCl}_2 \cdot 6\text{H}_2\text{O}$

<b>Sulphide ores :</b>	Zinc blende	ZnS
	Galena	PbS
	Cinnabar	HgS
	Iron pyrites	$\text{FeS}_2$
	Copper pyrites	$\text{CuFeS}_2$
	Copper glance	$\text{Cu}_2\text{S}$
	Silver glance	$\text{Ag}_2\text{S}$

<b>Carbonate ores :</b>	Calamine	$\text{ZnCO}_3$
	Limestone	$\text{CaCO}_3$
	Magnesite	$\text{MgCO}_3$
	Dolomite	$\text{CaCO}_3 \cdot \text{MgCO}_3$
	Malachite	$\text{CuCO}_3 \cdot \text{Cu}(\text{OH})_2$

**Sulphate ores :** Gypsum  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$   
 Epsom  $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$   
 Barytes  $\text{BaSO}_4$

**Nitrate ores :** Bengal nitre  $\text{KNO}_3$   
 Chile Salt Peter  $\text{NaNO}_3$



**Bauxite ore**



**Haematite ore**



**Rock salt**



**Zinc blende**



**Gypsum**



**Lime Stone**

### Extraction of Metals

- ✧ Metals can be separated first by converting the compound into its oxide and then reducing the oxide at high temperatures or by using reducing agents.
- ✧ Reduction of oxides of metals depends on the reactivity of the metal in the activity series.

### Extraction of Metals based on activity series :

K Na Ca Mg Al	Oxides like K, Na, Ca, Mg, Al are stable to heat and do not decompose to give oxygen and these oxides cannot be reduced by common reducing agents like carbon, carbon monoxide and hydrogen. Hence these oxides are reduced by electrolysis. $2\text{NaCl} \xrightarrow[\text{molten}]{\text{electrolysis}} 2\text{Na} + \text{Cl}_2$ $2\text{Al}_2\text{O}_3 \xrightarrow{\text{Electrolysis}} 4\text{Al} + 3\text{O}_2$
Zn	$\text{ZnO} + \text{C} \rightarrow \text{Zn} + \text{CO}$ [ Zinc oxide is reduced by coke only]
Fe Pb Cu	Fe, Pb, Cu are obtained by heating their oxides with carbon, carbon monoxide and hydrogen. $\text{Fe}_2\text{O}_3 + 3\text{CO} \xrightarrow{\Delta} 2\text{Fe} + 3\text{CO}_2$
Hg Ag	Oxides of mercury and silver are reduced at high temperature ( $> 300^\circ\text{C}$ ) to form metal and oxygen. $2\text{Ag}_2\text{O} \rightarrow 4\text{Ag} + \text{O}_2$

## 🔗 ALLOYS AND THEIR USES

Most of the metals cannot be used in their purest form (**i.e. a 100% pure**). Pure metals cannot be used for making articles for various purposes. We have to mix with some other metals or non-metals which will result in desirable properties. Such a mixture is called an ALLOY.

### ALLOY

Is a homogeneous mixture of two(or) more other metals (or) one metal with certain non-metallic elements, fused together in the molten state in fixed proportions.

✧ Properties of alloys are often greatly different from those of the components.

### COMMONLY USED ALLOYS

S. No	Alloy	Composition	Properties of Alloying	Uses
A.	<b>Alloys of Copper</b> 1. Brass	60–80% Cu, 40–20% Zn	Zinc imparts hardness to copper	Musical instruments machine parts and electrical fittings.
	2. Bronze	80% Cu, 2% Zn, 18% Sn	Tin enhances the lusturous property of copper	Coins, medals, statues.
	3. German silver	50% Cu, 30% Zn, 20% Ni	Zinc imparts hardness, nickel imparts silvery appearance	Utensils, coins decorative pieces.
B.	<b>Alloys of Aluminium</b> 1. Duralumin	65% Al, 0.5% Mg 0.5% Mn, 4% Cu	Aluminium imparts lightness Magnesium imparts strength copper imparts corrosion resistance	Ships, air craft, pressure cookers.
	2. Magnalium	95%, Al, 5% Mg	Aluminium imparts lightness, magnesium imparts strength.	Aircraft, machine parts and instruments.
C.	<b>Alloys of Lead</b> 1. Solder	50% Pb, 50% Sn	Tin lowers the melting point of alloy.	Fuse, Soldering joint.
	2. Type metal	75% Pb, 5% Sn, 20% Sb	Tin and antimony imparts casting and expanding property.	Printing.

D	<b>Alloys of Iron</b> 1. Stainless Steel	75% Fe, 10% Ni, 15% Cr, 0.5–1%C	Nickel chromium imparts silvery appearance.	Utensils, surgical instruments machine parts.
	2.. Nickel Steel	97% Fe, 2% Ni, 1%C	Nickel imparts shining, carbon imparts tensile strength and corrosion resistance.	Automobile and air craft parts.



Article of Brass



Article made of German silver



Vehicle parts made of Duralumin



Solder an alloy of lead



Articles made of stainless steel



Use of Nickel steel

## CHAPTER PRACTICE QUESTIONS

### SUBJECTIVE

- Which among the following are metals ?  
 (a) iron                      (b) carbon      (c) nitrogen      (d) aluminium      (e) sulphur      (f) zinc  
 (g) phosphorus      (h) silver      (i) sodium.
- Give chemical name and formula of  
 (i) a carbonate ore of iron                      (ii) a sulphide and oxide ore of iron
- Explain :  
 (a) Ductility  
 (b) Malleability  
 (c) Acidic oxide  
 (d) Conductivity of metals with examples.
- Arrange the following metals in the increasing order of their reactivity.  
 Na, Al, Cu, Pb, Ag, K, Ca
- How oxides of Al, Na, Mg and calcium are reduced ?

### EXERCISE-1

- Name the constituents of  
 (a) Magnalium      (b) Bronze      (c) Stainless steel      (d) Solder.

5. Corundum is an ore of \_\_\_\_\_  
(A) sodium (B) aluminium (C) chromium (D) magnesium
6. 100% pure gold is expressed as \_\_\_\_\_ gold.  
(A) 24 carats (B) 26 carats (C) 18 carats (D) 20 carats
7. The alloy widely used for joining electrical wires is :  
(A) brass (B) duralumin (C) steel (D) solder
8. Which of the following metals are also known as noble metals ?  
(A) Na, K and Ca (B) Fe, Ni and Lo (C) Al and Hz (D) Au and Pt
9. The only nonmetal capable of losing as well as gaining an electron is :  
(A) Oxygen (B) Sulphur (C) Sodium (D) Hydrogen
10. \_\_\_\_\_ is the best conductor of electricity  
(A) Silver (B) Copper (C) Gold (D) Brass
11. Which of the following statements is correct ?  
(A) All minerals are ores (B) A mineral can't be an ore  
(C) An ore can't be a mineral (D) All ores are minerals
12. Which of the following can react with cold water ?  
(A) Ag (B) K (C) Al (D) none of the above
13. Chemically rust is :  
(A) Fe (B)  $\text{Fe}_2\text{O}_3$  (C)  $\text{F}_3\text{O}$  (D)  $\text{Fe}_2\text{O}_3\text{H}_2\text{O}$
14. Which of the following metals is generally found in its native state ?  
(A) Cu (B) Pt (C) Al (D) Fe
15. Metals do not occur in the native state in nature as they :  
(A) are reactive (B) do not form ionic compounds  
(C) are not reactive (D) none of the above
16. A mineral is called an ore if :  
(A) the metal present in the mineral is costly (B) a metal can be extracted from it  
(C) a metal can be profitably extracted from it (D) a metal can't be extracted from it
17. The elements to the left side of the periodic table are  
(A) Metalloids (B) Non-metals (C) Metals
18. Metals found in free state are  
(A) Least reactive (B) Most reactive (C) Moderate reactive

19. Which is the lightest metal which can even float on water ?  
 (A) Lithium (B) Aluminium (C) Gold
20. The most abundant metallic element in earth crust is  
 (A) Iron (B) Aluminium (C) Copper

## EXERCISE-2

### I. Choose the correct answer.

1. Zinc oxide is reduced by  
 (A) carbon monoxide (B) hydrogen (C) gaining electrons  
 (D) coke
2. The metal that is a liquid at room temperature  
 (A) sodium (B) magnesium (C) mercury (D) silver
3. The property of metals which make them useful for ringing bell is  
 (A) malleability (B) ductility (C) sonority (D) hardness
4. The alloy widely used for joining electrical wires is  
 (A) brass (B) duralumin (C) steel (D) solder
5. Aluminium, iron and zinc react with \_\_\_\_\_ to form metal oxide .  
 (A) cold water (B) hot water (C) steam (D) hydrogen
6. Non-Metals are  
 (A) electro positive elements (B) electro negative elements  
 (C) stable elements (D) both A and B
7. Metals react with water to form  
 (A) Metal oxide + Hydrogen (B) Metal oxide + Oxygen  
 (C) Metal hydroxide
8. Which gas is released when dilute acids react with metals ?  
 (A) carbon dioxide (B) Hydrogen (C) Oxygen
9. Why hydrogen gas is not evolved when metal reacts with nitric acid ?  
 (A) Because nitric acid is a strong oxidizing agent  
 (B) Because nitric acid is a strong reducing agent  
 (C) Neither a nor b (D) None of these
10. Aluminium, iron and zinc react with \_\_\_\_\_ to form metal oxide ?  
 (A) Cold water (B) Hot water (C) Steam

### II. FILL IN THE BLANKS

- Common aluminium ore is \_\_\_\_\_ .
- Graphite is a \_\_\_\_\_, yet conducts electricity.
- \_\_\_\_\_ metal is stored in kerosene.
- Metals form positive ions while non-metals form \_\_\_\_\_.
- $\text{Mg} + \text{_____} \rightarrow \text{Mg(OH)}_2 + \text{H}_2$  .
- \_\_\_\_\_ is used in printing.

### III. MATCH THE FOLLOWING

1.

Column – I		Column – II	
(A)	Acid oxide	(p)	Hydrogen gas
(B)	Zinc blende	(q)	Fertilizers
(C)	$\text{Na} + \text{HCl} \rightarrow$	(r)	Copper
(D)	Nitrogen	(s)	Ore of zinc
(E)	Good conductor	(t)	Non-metallic oxide
		(u)	Sulphur

2.

Column – I		Column – II	
(A)	Aluminium	(p)	Steel making
(B)	Lead	(q)	Aeroplane wings
(C)	Brass	(r)	Galvanizing
(D)	Iron	(s)	Radiation shielding
(E)	Zinc	(t)	Electrical fitting
		(u)	Electrical plates

### IV. STATE WHETHER THE FOLLOWING STATEMENTS ARE TRUE OR FALSE

- Galena is an ore of lead. [     ]
- The number of electrons gained is the valency of metal. [     ]
- Carbon fibre has good tensile strength. [     ]
- Sodium and potassium react violently with cold water. [     ]
- Non-metallic chlorides are good conductors of electricity. [     ]
- Liquid Hydrogen is used as rocket fuel. [     ]

## ANSWERS CHAPTER PRACTICE QUESTIONS

### OBJECTIVE

#### EXERCISE-1

- |       |       |       |       |
|-------|-------|-------|-------|
| 6. A  | 7. D  | 8. D  | 9. D  |
| 10. A | 11. D | 12. B | 13. D |
| 14. B | 15. A | 16. C | 17. C |
| 18. A | 19. A | 20. B |       |

#### EXERCISE-2

##### I. CHOOSE THE CORRECT ANSWER

- |      |       |      |      |
|------|-------|------|------|
| 1. D | 2. C  | 3. C | 4. D |
| 5. C | 6. B  | 7. A | 8. B |
| 9. A | 10. C |      |      |

##### II. FILL IN THE BLANKS

- |                  |                          |               |
|------------------|--------------------------|---------------|
| 1. Bauxite       | 2. Non-metal             | 3. Sodium     |
| 4. Negative ions | 5. $2\text{H}_2\text{O}$ | 6. Type metal |

##### III. MATCH THE FOLLOWING

- $A \rightarrow t ; B \rightarrow s ; C \rightarrow p ; D \rightarrow q ; E \rightarrow r$
- $A \rightarrow q ; B \rightarrow s ; C \rightarrow t ; D \rightarrow p ; E \rightarrow r$

##### IV. STATE WHETHER THE FOLLOWING STATEMENTS ARE TRUE OR FALSE

- |      |      |      |      |
|------|------|------|------|
| 1. T | 2. F | 3. T | 4. T |
| 5. F | 6. T |      |      |