CHAPTER 3

Metals and Non Metals

1. OBJECTIVE QUESTIONS

1. Which of the following metal has highest melting point?
(a) Copper (b) Silver
(c) Sodium (d) Tungsten

Ans : (d) Tungsten

Tungsten has the highest melting point among the metals.

2. The composition of aqua-regia is
(a) Dil.HCl : Conc. HNO_3 :: 3 : 1
(b) Conc. HCl : Dil. HNO_3 :: 3 : 1
(c) Conc. HCl : Conc. HNO_3 :: 3 : 1
(d) Dil.HCl : Dil. HNO_3 :: 3 : 1

Ans : (c) Conc. HCl : Conc. HNO_3 :: 3 : 1

Conc. HCl and conc. HNO_3 in 3 : 1 ratio form aqua-regia. Aqua-regia is a highly corrosive, fuming liquid. It can dissolve all metals even gold and platinum also.

3. Food cans are coated with tin and not with zinc because
(a) zinc is costlier than tin.
(b) zinc has a higher melting point than tin.
(c) zinc is more reactive than tin.
(d) zinc is less reactive than tin.

Ans : (c) zinc is more reactive than tin.

4. An element reacts with oxygen to give a compound with a high melting point. This compound is soluble in water. The element is likely to be-
(a) calcium (b) carbon
(c) silicon (d) iron

Ans : (a) calcium

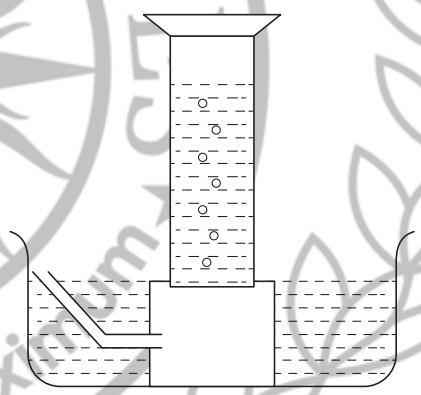
$$2Ca + O_2 \longrightarrow CaO \text{ (ionic compound)}$$
$$CaO + H_2O \longrightarrow Ca(OH)_2$$

5. Which of the following is a characteristic of metals?
(a) They have one to three valence electrons
(b) They have 4 to 8 valence electrons
(c) They are brittle
(d) They are capable to form anions easily

Ans : (a) They have one to three valence electrons

Metal can easily given up their electrons and form electropositive ions. They have one to three valence electrons. They are not brittle and do not form anions.

6. A reactive metal (M) is treated with H_2SO_4(dil). The gas is evolved and is collected over the water as shown in the figure.



The correct conclusion drawn is/are
(a) the gas is hydrogen
(b) the gas is lighter than air
(c) the gas is SO_2 and is lighter than air
(d) Both (a) and (b)

Ans : (d) Both (a) and (b)

When any reactive metal (M) reacts with the acid H_2SO_4(dil), it evolves hydrogen gas (H_2). It is lighter than air.

$$M(s) + H_2SO_4(\text{dil.}) \longrightarrow M\text{-sulphate} + H_2(g)$$

7. An alloy is
(a) an element
(b) a compound
(c) a homogeneous mixture
(d) a heterogeneous mixture

Ans : (c) a homogeneous mixture

An alloy is a homogeneous mixture of different metals or a metal and a non-metal.

8. When iron filings are heated in a steam of dry hydrogen chloride, the compound formed is $FeCl_x$ where x is-
(a) 1 (b) 2
(c) 3 (d) 4

Ans : (b) 2

9. Silver articles become black on prolonged exposure to air. This is due to the formation of
(a) Ag_3N (b) Ag_3O
(c) Ag_3S (d) Ag_3S and Ag_3N

Ans : (c) Ag_3S

Silver aricle become black because silver reacts with H_2S gas present in air to form black coating of Ag_2S. The reaction is

$$\underset{\text{Silver}}{Ag} + \underset{\text{Hydrogen sulphide}}{H_2S} \longrightarrow \underset{\text{Silver sulphide (black)}}{Ag_2S} + H_2$$

10. The best malleable metal is-
(a) aluminium (b) silver
(c) gold (d) lead

Ans : (c) gold

11. Which of the following only contain non-metals?
(a) Carbohydrates (b) Proteins
(c) Alloys (d) Both (a) and (b)

Ans : (d) Both (a) and (b)

Carbohydrates contain carbon (C), hydrogen (H) and oxygen (O) as their components, while proteins contain carbon (C), nitrogen (N), hydrogen (H) and oxygen (O) but alloys are mixture of metals and may be some non-metals. Hence, option (d) is the correct answer.

12. Which of the following is not a property of non-metals?
(a) They are neither malleable nor ductile
(b) They are brittle
(c) They are sonorous
(d) They are poor conductor of heat and electricity (except graphite)

Ans : (c) They are sonorous

Almost all the non-metals produce no metallic sound on hitting. Thus, they are not sonorous.

13. Which of the following metal will not give $H_2(g)$ with H_2O?
(a) $Na(s) + 2H_2O \longrightarrow$ (b) $Mg(s) + 2H_2O \longrightarrow$
(c) $Zn(s) + H_2O \longrightarrow$ (d) $Cu + H_2O \longrightarrow$

Ans : (d) $Cu + H_2O \longrightarrow$

Metals placed below the hydrogen in reactivity series, will not give $H_2(g)$ with water (H_2O). Decreasing order of reactivity of metals is
$Na > Mg > Zn > Cu$

14. Metals are refined by using different methods. Which of the following metals are refined by electrolytic refining?
1. Au 2. Cu
3. Na 4. K
(a) 1 and 2 (b) 1 and 3
(c) 2 and 3 (d) 2 and 4

Ans : (a) 1 and 2

Electrolytic refining is used for metals like Cu, Zn, Ag, Au etc.

The method to be used for refining an impure metal depends on the nature of the metal as well as on the nature of impurities present in it.

15. Beakers A, B and C contain zinc sulphate, silver nitrate and iron (II) sulphate solutions respectively. Copper pieces are added to each beaker. Blue colour will appear in case of
(a) beaker A (b) beaker B
(c) beaker C (d) all the beakers

Ans : (b) beaker B

Copper is more reactive than silver thus, displaces silver from its salt solution.

16. Galvanisation is a method of protecting iron from rusting by coating it with a thin layer of
(a) gallium (b) aluminium
(c) zinc (d) silver

Ans : (c) zinc

Galvanisation is a method of protecting iron from rusting by coating it with a thin layer of zinc (Zn) metal.

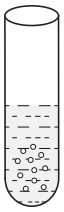
17. Aluminium does not oxidise readily in air because-
(a) it is high in the electrochemical series
(b) it is low in the electrochemical series
(c) the metal does not combine with oxygen
(d) the metal is covered with a layer of oxide which does not rub off

Ans : (d) the metal is cover4ed with a layer of oxide which does not rub off

18. In each test tubes A, B, C and D, 2mL of solution of $Al_2(SO_4)_3$ in water was filled. Clean pieces of zinc was placed in test tube A, clean iron nail was put in test tube B, silver (Ag) was placed in test tube C and a clean copper wire was placed in test tube D.
Which of the following option (s) is/are correct about above experiment?
(a) Zinc is more reactive than aluminium
(b) Copper is more reactive than aluminium
(c) Zinc is more reactive than copper

(d) Zinc, iron, silver and copper are less reactive than aluminium

Ans : (d) Zinc, iron, silver and copper are less reactive than aluminium



$Al_2(SO_4)_3 + Zn$

(A)

$Al_2(SO_4)_3 + Fe$

(B)

$Al_2(SO_4)_3 + Ag$

(C)

$Al_2(SO_4)_3 + Cu$

(D)

Zn, Fe, Ag and Cu are less reactive than aluminium. Aluminium resides at the top of the activity series. While Zn, Fe, Ag and Cu lies below aluminium in the activity series. Thus, being less reactive than aluminium, they cannot displace Al from its salt solution i.e. $Al_2(SO_4)_3$ solution.

19. On the basis of the sequence of the given reactions identify the most and least reactive elements:

$$X + YA \longrightarrow XA + Y \quad ...(1)$$
$$X + YB \longrightarrow XB + Y \quad ...(2)$$
$$Z + XA \longrightarrow ZA + X \quad ...(3)$$

(a) X and Z (b) Y and Z
(c) Z and X (d) Z and Y

Ans : (d) Z and Y

'Z' is the more reactive element and Y is the least reactive element Z easily displaces X, while X easily displaces Y.

20. A metal M has electronic configuration 2, 8, 3 and occurs in earth's crust and its oxide M_2O_3. It is more reactive than zinc. Which of the following options (s) is/are correct?

(a) The metal M is iron
(b) The metal M is lead
(c) The ore form which metal M is extracted in haematite.
(d) The ore form which metal M is extracted is bauxite.

Ans : (d) The ore form which metal M is extracted is bauxite.

Electronic configuration of $M = 2, 8, 3$

Hence, the outer orbital consist of 3 electrons. It is more reactive than zinc. So, it should be aluminium (atomic number = 13). The ore from which metal M is extracted is bauxite.

21. Metal M reacts with oxygen to form metallic oxide MO. This oxide reacts with moisture and carbon dioxide of the atmosphere to form a basic carbonate metal M. The metal 'M' is

(a) Cu (b) Fe
(c) Zn (d) Cr

Ans : (a) Cu

Since, the metal forms an oxide MO, the metal is divalent. Since it forms a basic carbonate when exposed to moisture and carbon dioxide, therefore it must be copper.

$$2Cu + \underbrace{CO_2 + O_2 + H_2O}_{\text{From moist air}} \longrightarrow \underset{\text{Basic (copper carbonate)}}{CuCO_3 \cdot Cu(OH)_2}$$

22. Which of the following methods is suitable for preventing an iron frying pan from rusting?

(a) applying grease
(b) applying paint
(c) applying a coating of zinc
(d) all of the above.

Ans : (c) applying a coating of zinc

23. A student mistakenly used a wet gas jar to collect sulphur dioxide. Which one of the following tests of the gas is likely to fail?

(a) Odour
(b) Effect on acidified $K_2Cr_2O_7$ solution
(c) Solubility test
(d) None of these

Ans : (d) None of these

24. A student puts one big iron nail each in four test tubes containig solutions of zinc sulphate, aluminium sulphate, copper sulphate and iron sulphate. A reddish brown coating was observed only on the surface of iron nail which was put in the solution of

(a) zinc sulphate (b) iron sulphate
(c) copper sulphate (d) aluminium sulphate

Ans : (c) copper sulphate

Fe displaces copper from copper sulphate ($CuSO_4$) solution.

$$CuSO_4 + Fe \longrightarrow FeSO_4 + \underset{\text{Reddish brown}}{Cu}$$

25. Which of the following is not a characteristics of metal?

(a) Malleable
(b) Electro-positive nature
(c) Ductile
(d) None of these

Ans : (d) None of these

All are characteristics of metal.

26. Which of teh following reactions not occur?

(a) $2AgNO_3(aq) + Zn(s) \longrightarrow Zn(NO_3)_2(aq) + 2Ag(s)$
(b) $CuSO_4(aq) + Zn(s) \longrightarrow ZnSO_4(aq) + Cu(s)$

(c) $2AgNO_3(aq) + Fe(s) \longrightarrow Fe(NO_3)_2(aq) + 2Ag(s)$
(d) $CuSO_4(aq) + 2Ag(s) \longrightarrow Cu(s) + Ag_2SO_4(aq)$

Ans : (d) $CuSO_4(aq) + 2Ag(s) \longrightarrow Cu(s) + Ag_2SO_4(aq)$

Silver is less reactive than copper, hence cannot displace copper from its salt solution.

27. Pure gold is-
(a) 24 carats (b) 22 carats
(c) 20 carats (d) 18 carats

Ans : (a) 24 carats

28. When a metal is added to dilute HCl solution, there is no evolution of gas. Metal is-
(a) K (b) Na
(c) Ag (d) Zn

Ans : (c) Ag

Ag is below hydrogen in reactivity series.

29. The correct order of increasing chemical reactivity is-
(a) Zn<Fe<Mg<K (b) Fe<Mg<Zn<K
(c) Fe<Mg<K<Zn (d) Fe<Zn<Mg<K

Ans : (d) Fe<Zn<Mg<K

30. The metal that reacts with cold water is-
(a) mercury (b) sodium
(c) zinc (d) tungsten

Ans : (b) sodium

31. Froth floatation method is used for the concentration of-
(a) oxide ores (b) sulphide ores
(c) sulphate ors (d) halide ores

Ans : (b) sulphide ores

32. Heating of concentrated ore in absence of air for conversion into oxide ore is known as-
(a) roasting (b) calcination
(c) reduction (d) none of these

Ans : (b) calcination

Calcination involves heating of the ore below its of the ore below its fusion temperature in absence of air.

33. Removal of impurities from ore is known as-
(a) crushing and grinding (b) concentration of ore
(c) calcination (d) roasting

Ans : (b) concentration of ore

34. The only metal that is liquid at room temperature is-
(a) mercury (b) sodium
(c) zinc (d) tungsten

Ans : (a) mercury

35. $Zn + H_2O(Steam) \longrightarrow A + B$, In the equation A and B are⁻
(a) Zn, H only (b) ZnH_2 and O_2
(c) ZnH_2 and O_2 (d) ZnO & H_2

Ans : (d) ZnO & H_2

36. Hydrogen gas is not widely used as a reducing agent because
(a) hydrogen decomposes to atomic hydrogen at higher temperature
(b) risk of explosion with water
(c) hydrogen isomerises to ortho hydrogen at higher temperature.
(d) many metals form hydrides at lower temperatures.

Ans : (b) risk of explosion with water

Hydrogen reacts with oxygen to form water and the reaction takes place with explosion.

37. Alloys are homogeneous mixtures of a metal with a metal or non-metal. Which among the following alloys contain non-metal as one of its constituents?
(a) Brass (b) Bronze
(c) Amalgam (d) Steel

Ans : (d) Steel

Steel alloy contain non-metal as one of its constituent. It contains 99.95% of iron and 0.05% of carbon.

38. Silicon is used in
(a) solar energy devices (b) semiconductors
(c) transistors (d) all of these

Ans : (d) all of these

39. E is an element that's ore is rich in E_2O_3 • E_2O_3 is not affected by water. It forms two chlorides, ECl_2 and ECl_3. The element E is
(a) copper (b) zinc
(c) aluminium (d) iron

Ans : (d) iron

The element E is iron (Fe). Since the metal E forms an oxide of formula E_2O_3. Therefore, the valency of the metal is three i.e. metal is trivalent. Out of metals listed, only Al and Fe are trivalent. Since, the E_2O_3 is not affected by water, E may be either aluminium or iron. Since it forms two chlorides, ECl_2 and ECl_3, therefore, metal E must be iron, since it shows a varible valency of 2 and 3. Hence, it forms iron (II) chloride, $FeCl_2$ and iron (III) chloride, $FeCl_3$.

40. What is anode mud?
(a) fan of anode
(b) metal of anode
(c) impurities collected at anode in electrolysis during purification of metals
(d) all of these

Ans : (c) impurities collected at anode in electrolysis during purification of metals

41. Which of the following pairs will give displacement reactions?
(a) $ZnSO_4$ solution and Aluminium metal
(b) $MgCl_2$ Solution and aluminium metal
(c) $FeSO_4$ solution and silver metal
(d) $AgNO_3$ solution and copper metal.

Ans : (d) $AgNO_3$ solution and copper metal.

Copper is more reactive than silver hence displaces

silver from silver nitrate solution.

2. FILL IN THE BLANK

1. Metals combine with oxygen to form ..... oxides.
Ans : Basic

2. On hammering change of metal into thin sheets, is called .....
Ans : Melleability

3. A list of common metals arranged in order of their decreasing reactivity is known as an .....
Ans : Activity series

4. Metals are ..... conductors of heat and electricity. Non-metals are generally .....
Ans : good, insulators

5. Metals above hydrogen in the Activity series can displace ..... from dilute acids.
Ans : Hydrogen

6. The main ore of copper is .....
Ans : Copper pyrites

7. The extraction of metals from their ores and then refining them for use is known as ..... .
Ans : Metallurgy.

8. An alloy is a ..... mixture of two or more metals, or a metal and a non-metal.
Ans : Homogeneous

9. The surface of some metals, such as iron, is corroded when they are exposed to moist air for a long period of time. This phenomenon is known as .....
Ans : Corrosion.

10. Metal oxides which react with both acids as well as bases to produce salt and water are called ..... oxides.
Ans : amphoteric

11. The best conductors of electricity are copper and .....
Ans : Silver

12. Most metals have ..... melting points.
Ans : High

13. Formula of rust is .....
Ans : $Fe_2O_3 \cdot xH_2O$

14. A non-metal, which is liquid at non temperature is .....
Ans : Bromine

15. A ..... reactive metal displaces a ..... reactive metal from its salt solution.
Ans : more, less

16. Bronze is an alloy of copper and .....
Ans : Tin

17. Unwanted material with ore is called as .....
Ans : Gangue

18. Solder is an alloy of ..... and .....
Ans : Tin, lead

19. In electrolytic refining, impure metal is used as .....
Ans : Anode

20. The method of removing volatile matter from carbonate ores is known as .....
Ans : Calcination

21. Most metal oxides are ..... in nature whereas non-metal oxides are ..... or .....
Ans : basic, acidic, neutral

22. An example of a metal which can be cut with a knife is .....
Ans : Sodium

23. Manganese and ..... react with very dilute nitric acid to evolve hydrogen gas.
Ans : Magnesium

24. Froth floatation process is used for the concentration of ..... ores.
Ans : Sulphide

25. $^{35}_{17}B$ is a .....
Ans : non-metal

26. ..... is a metal used for galvanising.
Ans : Zinc

27. An alloy of any metal with mercury is called ..... and the electrical conductivity of an alloy is ..... than that of pure metals.
Ans : Amalgam, less

28. Al_2O_3 and ZnO are ..... oxides.
Ans : amphoteric

29. Stainless steel contains ....., ... and .....
Ans : Iron, chromium, carbon

3. TRUE/FALSE

1. Reaction is done for sulphide areas
Ans : True

2. Aluminium is the most abundant metal in the earth's crust.
Ans : True

3. Reaction takes place in aluminothermic process is also known as thermite reaction
Ans : True

4. Metals can form positive ions by losing electrons to non-metals.
Ans : True

5. Mercury and zinc are purified by liquation method.
Ans : False

6. The presence of carbon in pig iron makes it very soft and malleable.
Ans : False

7. Different metals have same reactivities with water and dilute acids.
Ans : False

8. A more reactive metal displaces a less reactive metal from its salt solution.
Ans : True

9. Metals occur in nature only as free elements.
Ans : False

10. Non-metals have properties similar to that of metals.
Ans : False

11. Hydrogen is the most abundant element in the universe.
Ans : False

12. Non-metals are good conductors of heat and elecrtricity.
Ans : False

13. Non-metals are electronegative elements as they form negative ions by gaining electrons.
Ans : True

14. Gallium and Cesium metals have low melting points.
Ans : True

15. Copper reacts with dilute sulphuric acid to form copper sulphate and hydrogen gas.
Ans : False

16. Aqua-regia can dissolve gold.
Ans : True

17. Silver metal displaces copper from copper nitrate solution to form silver nitrate and copper metal.
Ans : True

18. Ionic compounds are formed by transfer of electrons from a metal atom to a non-metal atom.
Ans : True

19. Electrovalent compounds can conduct electricity in solid state as they have ions.
Ans : True

20. Aluminium oxide can be reduced to aluminium, using carbon (coke) as a reducing agent.
Ans : True

21. In electrolytic refining of copper, pure copper is taken as anode.
Ans : False

22. Solder is an alloy of lead and tin.
Ans : True

23. Iron does not rust in boiled distilled water.
Ans : False

24. Sodium, magnesium and calcium are obtained by electrolysis of their molten chlorides.
Ans : True

25. Lead, copper and silver cannot react with water at all.
Ans : True

4. MATCHING QUESTIONS

DIRECTION : Each question contains statements given in two columns which have to be matched. Statements (A, B, C, D) in column-I have to be matched with statements (p, q, r, s) in column II.

1.

Column I		Column II	
(A)	CaO	(p)	Amphoteric oxide
(B)	Al_2O_3	(q)	Neutral oxide
(C)	SO_2	(r)	Basic oxide
(D)	H_2O	(s)	Acidic oxide

Ans : A-r, B-p, C-s, D-q

2.

Column I		Column II	
(A)	Iodine	(p)	liquid metal
(B)	Diamond	(q)	liquid non-metal
(C)	Mercury	(r)	lustrous
(D)	Bromine	(s)	hardest substance

Ans : A-r, B-s, C-p, D-q

3.

Column I		Column II	
(A)	Good conductor of Electricity	(p)	Hydrogen
(B)	Food preservative	(q)	Copper
(C)	Allotrope of carbon	(r)	Nitrogen
(D)	Manufacture of ammonia	(s)	Graphite

	A	B	C	D
(a)	p	s, r	q, r	q, r
(b)	p	s	q	r
(c)	q	s	r	p
(d)	q, s	r	s	r, p

Ans : (d) A-q, s B-r, C-s, D-r, p

4.

Column I		Column II	
(A)	Steel	(p)	Copper
(B)	Brass	(q)	Zinc
(C)	Bronze	(r)	Iron
(D)	Magnalium	(s)	Aluminium

	A	B	C	D
(a)	p	s	q, r	q, r
(b)	r	p, q	p	s
(c)	q	s	p	r
(d)	s	q	r	p

Ans : (b) A-r, B-p, q; C-p, D-s

5.

Column I Ore		Column II Elements	
(A)	Chalcopyrite	(p)	Copper
(B)	Cuprite	(q)	Iron
(C)	Magnetite	(r)	Sulphur
(D)	Chalcocite	(s)	Oxygen

	A	B	C	D
(a)	p, q, r	p, s	q, s	p, r
(b)	p	q	s	p, r
(c)	r	s	p	q
(d)	s	q	r	p

Ans : (a) A-p, q, r, B-p, s C-q, s D-p, r

5. ASSERTION AND REASON

DIRECTION : In the following questions, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
(b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).
(c) Assertion (A) is true but reason (R) is false.
(d) Assertion (A) is false but reason (R) is true.
(e) Both Assertion and Reason are false.

1. **Assertion :** Different metals have different reactivities with water and dilute acids.
Reason : Reactivity of a metal depends on its position in the reactivity series.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

The metals placed at the top of the series are most reactive.

2. **Assertion :** When zinc is added to a solution of iron (II) sulphate, no change is observed.
Reason : Zinc is less reactive than iron.

Ans : (d) Assertion (A) is false but reason (R) is true.

Both Assertion and Reason are false. Zinc being more reactive than iron displaces iron from iron (II) sulphate solution.

Thus, the green colour of the solution fades and iron metal gets deposited.

$$\underset{\text{Zinc}}{Zn(s)} + \underset{\text{Green}}{FeSO_4(aq)} \longrightarrow \underset{\text{(Colourless)}}{ZnSO_4(aq)} + \underset{\text{(Iron deposited)}}{Fe(s)}$$

3. **Assertion :** Gas bubbles are observed when sodium carbonate is added to dilute hydrochloric acid
Reason : Carbon dioxide is given off in the reaction.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Gas bubbles are observed when sodium carbonate is added to dilute hydrochloric acid as CO_2 gas is released.

4. **Assertion :** Food cans are coated with tin and not with zinc.
Reason : Zinc is more reactive than tin.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Food cans are coated with tin not with zinc because zinc is more reactice than tin, it can react with organic acids present in food.

5. **Assertion :** Platinum, gold and silver are used to make jewellery.
Reason : Platinum, gold and silver are least reactive metals.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion

(A).

Platinum, gold and silver are highly malleable lustraus and least reactive, i.e. noble metals, so they are not corroded by air and water easily.

6. **Assertion :** Iron is found in the free state n nature.
Reason : Iron a highly reactive element.
Ans : (d) Assertion (A) is false but reason (R) is true.

7. **Assertion :** Carbon reacts with oxygen to form carbon dioxide which is an acidic oxide.
Reason : Non-metals form acidic oxides.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Carbon being a non-metal form acidic oxides, i.e., their aqueous solution turns blue litmus solution red.

8. **Assertion :** Metals are sonorous.
Reason : They are generally brittle in the solid state; they break into pieces when hammered.
Ans : (c) Assertion (A) is true but reason (R) is false.

Metals are sonorous and hard, while non-metals are brittle.

9. **Assertion :** Coke and flux are used in smelting.
Reason : The phenomenon in which ore is mixed with suitable flux and coke is heated to fusion is known as smelting.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

Smelting is a process of applying heat to ore in order to extract a base metal. It is used to extract many metals from their ores, including silver, iron, copper, and other base metals.

10. **Assertion :** Leaching is a process of reduction.
Reason : Leaching involves treatment of the ore with a suitable reagent so as to make it solube while impurities remains insoluble.
Ans : (d) Assertion (A) is false but reason (R) is true.

11. **Assertion :** Lead, tin and bismuth are purified by liquation method.
Reason : Lead, tin and bismuth have low m.p. as compared to impurities.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

12. **Assertion :** Leaching is a process of reduction.
Reason : Leaching involves treatment of the ore with a suitable reagent so as to make it soluble while impurities remains insoluble.
Ans : (d) Assertion (A) is false but reason (R) is true.

Leaching is a process where ore is soluble and impurities are insoluble, widely used extractive metallurgy technique which converts metals into soluble salts in aqueous media.

13. **Assertion :** Levigation is used for the separation of oxide ores from impurities.
Reason : Ore particles are removed by washing in a current of water.
Ans : (c) Assertion (A) is true but reason (R) is false.

Levigation method is commonly used for oxide ores such as haematite, tin stone and native ores of Au, Ag, etc.

14. **Assertion :** Zinc is used in the galvanisation of iron.
Reason : Its coating on iron articles increases their life by protecting them from rusting.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

15. **Assertion (A) :** When a piece of copper metal is added to dilute sulphuric acid, the solution turns blue.
Reason (R) : Copper reacts with dilute sulphuric acid to form copper (II) sulphate solution.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

When a piece of copper metal is added to dilute sulphuric acid, the solution turns blue. It is becasue, copper reacts with dilute sulphuric acid to form blue copper (II) sulphate solution.

16. **Assertion :** Froth floatation process is based on the different wetting nature of ore and gangue particles.
Reason : Mustard oil is used as frother in froth floation process.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

17. **Assertion :** Zinc becomes dull in most air.
Reason : Zinc is coated by a thin film of its basic carbonate in moist air.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

18. **Assertion :** Bronze is an alloy of lead and tin.
Reason : Alloys are heterogeneous mixture of metals with other metals and non-metals.
Ans : (c) Assertion (A) is true but reason (R) is false.

19. **Assertion :** A mineral is called ore, when metal is extracted from it conveniently and economically.
Reason : All ores are minerals but all minerals are not ores.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

Minerals are naturally occurring chemical substance in the earth's crust obtained by mining. But a mineral is called an ore only when the metal can be extracted from it conveniently and economically. Thus, all ores minerals but all minerals are not ores.

20. **Assertion :** In alumino thermite process, the metals

like iron melts due to the heat evoloved in the reaction.
Reason : The reaction is
$Fe_2O_3 + 2Al \longrightarrow Al_2O_3 + 2Fe$

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Large amount of heat is evolved which melts iron and can be used for welding.

21. **Assertion :** Zinc oxide amphoteric in nature.
Reason : Zinc oxide reacts with both acids and bases.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

22. **Assertion :** Zinc can easily displace Copper on reacting with a solution of copper sulphate.
Reason : Copper is more reactive metal as compared to Zinc.

Ans : (c) Assertion (A) is true but reason (R) is false.

23. **Assertion :** Magnesium chloride is an ionic compound.
Reason : Metals and non-metals react by mutual transfer of electrons.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

24. **Assertion :** Gold is isolated from other impurities by Arndt forest cyanide process.
Reason : The cyanide which is used here dissolve all possible impurities.

Ans : (c) Assertion (A) is true but reason (R) is false.

The cyanide dissolves gold by forming a complex.

25. **Assertion :** In the metallurgy of Al, purified Al_2O_3 is mixed with Na_3AlF_6 or CaF_2.
Reason : It lowers the melting point of the mixture and brings conductivity.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

In the metallurgy of aluminium, purified Al_2O_3 is mixed with Na_3AlF_3 or CaF_2 which lowers the melting point of the mix and brings conductivity.

26. **Assertion :** Zinc carbonate is heated strongly in presence of air to form zinc oxide and carbon dioxide.
Reason : Calcination is the process in which a carbonate ore is heated strongly in the absence of air to convert into metal oxide.

Ans : (d) Assertion (A) is false but reason (R) is true.

27. **Assertion :** Iron pyrite is not useful in the extraction of Fe.
Reason : SO_2 polluting gas is produced during extraction.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Pyrite is composed of iron and sulphur. The sulphur content during extraction may contaminate the metal and reduces the strength.

28. **Assertion :** Usually the sulphide ore is converted to oxide before reduction.
Reason : Reduction of oxides occurs easier.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Usually the sulphide ore is converted to oxide before reduction as oxides are easier to reduce.

29. **Assertion :** While the extraction of copper, one of the steps involved is
$Cu_2S + 2Cu_2O \longrightarrow 6Cu + SO_2$
Reason : In this reaction Cu_2S is the reducing agent whereas Cu_2O is the oxidising agent.

Ans : (c) Assertion (A) is true but reason (R) is false.

The Cu^{2+} ion in both the compounds gets reduced while sulphur gets oxidised.

6. ONE MARK QUESTIONS