CHAPTER 3

ANSWERS

Multiple Choice Questions

1. (c) **2.** (a) **3.** (d) **4.** (d)

5. (c) **Hint—** 3 Fe (s) + 4 H_2O (g) $\rightarrow$ Fe_3O_4 (s) + 4 H_2 (g)

6. (d) **7.** (c) **8.** (c) **9.** (b)

10. (b) **11.** (c) **12.** (a) **13.** (c)

14. (c) **15.** (a) **16.** (b) **17.** (d)

18. (d) **19.** (d)

20. (b) **Hint—** Reactivity series Mg> Zn> Cu> Ag

21. (b) **22.** (c) **23.** (b) **24.** (a)

25. (b) **26.** (d) **27.** (b) **28.** (d)

29. (b) **30.** (d) **31.** (c) **32.** (b)

33. (c) **34.** (b) **35.** (d) **36.** (c)

Short Answer Questions

37. The produced gas can be identified by bringing a burning match stick near the reaction vessel, a pop sound is produced

$M + 2NaOH \rightarrow Na_2MO_2 + H_2$

$M + 2HCl \rightarrow MCl_2 + H_2$

The element is a metal

38. (a) Anode : Impure silver
Cathode : Pure silver

(b) Electrolyte: Silver salt, such as $AgNO_3$

(c) We get pure silver at cathode

39. It is easier to obtain metal from its oxide, as compared from its sulphides and carbonates.

40. It is because HNO_3 is a strong oxidising agent. It oxidises the H_2 produced to H_2O.

41. (a) X — Fe_2O_3 (b) Thermite reaction

(c) $Fe_2O_3(s) + 2Al(s) \rightarrow 2Fe(l) + Al_2O_3(s) + Heat$

42. X — Na, Y — NaOH, Z — H_2

$2Na + 2H_2O \rightarrow 2NaOH + H_2 + Heat\ energy$

43. X — Carbon; Y — Diamond and Z — Graphite

44. (a) No, because oxygen is added to aluminium therefore, it is getting oxidised

(b) No, since manganese has lost oxygen therefore, it is getting reduced.

45. Solder is an alloy of lead and tin. Low melting point of solder makes it suitable for welding electrical wires.

46. A — Al; B — Al_2O_3

$Al_2O_3 + 6HCl \rightarrow 2AlCl_3 + 3H_2O$

$Al_2O_3 + 2NaOH \rightarrow 2NaAlO_2 + H_2O$

47. Metals low in activity series can be obtained by reducing their sulphides or oxides by heating. Mercury is the only metal that exists as liquid at room temperature. It can be obtained by heating cinnabar (HgS), the sulphide ore of mercury.

The reactions are as follows:

$2HgS + 3O_2 \xrightarrow{Heat} 2HgO + 2SO_2$

$2HgO \xrightarrow{Heat} 2Hg + O_2$

48. (a) Mg_3N_2 (b) Li_2O (c) $AlCl_3$ (d) K_2O

49. (a) It undergoes calcination. The chemical reaction can be given as

$ZnCO_3 \xrightarrow{Heat} ZnO + CO_2$

(b) It undergoes auto reduction forming copper and sulphur dioxide

$2Cu_2O + Cu_2S \xrightarrow{Heat} 6Cu + SO_2$

50. (a) A is carbon, B is carbon monoxide and C is carbon dioxide

(b) A belongs to Group – 14 of the Periodic Table

51. (a) Good conductor : Ag and Cu

(b) Poor conductor : Pb and Hg

52. Metal – Mercury (Hg); Non-metal – Bromine (Br)

Two metals with melting points less than 310K are Cesium (Cs) and Gallium (Ga)

53. A — Ca; B— $Ca(OH)_2$; C — CaO

$Ca(s) + 2H_2O \rightarrow Ca(OH)_2(aq) + H_2(g)$

$Ca(OH)_2 \xrightarrow{Heat} CaO + H_2O$

54. A — Na; B — NaOH; C — $NaAlO_2$

$2Na + 2H_2O \rightarrow 2NaOH + H_2$

$Al_2O_3 + 2NaOH \rightarrow 2NaAlO_2 + H_2O$

55. (a) $2ZnS(s) + 3O_2 \xrightarrow{Heat} 2ZnO(s) + 2SO_2(g)$

(b) $ZnCO_3(s) \xrightarrow{Heat} ZnO(s) + CO_2(g)$

56. M = Cu; Black product— CuO

$2Cu + O_2 \rightarrow 2CuO$

57. Since an oxide of element is acidic in nature, therefore, A will be a non-metal.

58. Fe is more reactive as compared to Cu. Therefore, Fe displaces Cu from $CuSO_4$ and forms $FeSO_4$.

$Fe + CuSO_4 \rightarrow FeSO_4 + Cu$

Long Answer Questions

59. (a) A — N_2; B — NH_3; C — NO; D — HNO_3

(b) Element **A** belongs to Group –15 of the Periodic Table

60.

Sulphide ore of low reactivity metal
↓ Roasting
Metal
↓ Refining
Pure metal

Sulphide ore of medium reactivity metal
↓ Roasting
Oxide of metal
↓ Reduction
Metal
↓ Refining
Pure metal

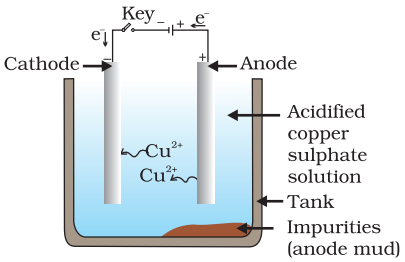
61. **Hint—** (a) Due to the formation of a layer of oxide i.e., Al_2O_3

(b) Na or Mg are more reactive metals as compared to carbon

(c) In solid NaCl, the movement of ions is not possible due to its rigid structure but in aqueous solution or molten state, the ions can move freely.

(d) To protect from corrosion

(e) They are highly reactive



62. (i) (a) Roasting of sulphide ore

(i) $2Cu_2S(s) + 3O_2(s) \xrightarrow{Heat} 2Cu_2O(s) + 2SO_2(g)$

(b) $2Cu_2O + Cu_2S \xrightarrow{Heat} 6Cu(s) + SO_2(g)$

This reaction is known as auto-reduction

(c) Reaction for electrolytic refining

At cathode: $Cu^{2+}(aq) + 2e^- \rightarrow Cu(s)$

At anode: $Cu(s) \rightarrow Cu^{2+}(aq) + 2e^-$

(ii) Diagram for electroytic refining of copper

63. X is alkali metal, Na or K

Y is alkaline earth metal, Mg or Ca

Z is Fe

Increasing reactivity series: Na > Mg> Fe

64. A = Na; B = Cl_2; C = NaCl; D = NaOH

$2Na + Cl_2 \rightarrow 2NaCl$

$2NaCl\ (aq) + 2H_2O\ (l) \rightarrow 2NaOH\ (aq) + Cl_2\ (g) + H_2\ (g)$

65. Since ore A gives CO_2 and ore B gives SO_2. Therefore, ores are MCO_3 and MS.

A can be obtained

$MCO_3 \xrightarrow{Calcination} MO + CO_2$

$MO + C \xrightarrow{Reduction} M + CO$

B can be obtained

$2MS + 3O_2 \xrightarrow{Roasting} 2MO + 2SO_2$

$MO + C \rightarrow M + CO$