CHEMISTRY

ALDEHYDES AND KETONES, METALLURGY

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1. Ans: B

Sol. **(I)** $4Au / Ag\ (s) + 8CN^{-}(aq) + 2H_2O(aq) + O_2(g) \longrightarrow 4[Au / Ag\ (CN)_2]^{-}(aq) + 4OH–(aq)$

$2[Au / Ag\ (CN)_2]^{-}(aq) + Zn(s) \longrightarrow 2Au / Ag\ (s) + [Zn(CN)_4]^{2-}\ (aq)$

(II) This method is based on the fact that gangue and ore particles have different degree of wettability with water and pine oil; the gangue particles are preferentially wetted by water while the ore particles are wetted by oil.

(III) Electrolytic reduction (Hall-Heroult process) :

The purified Al_2O_3 is mixed with Na_3AlF_6 (cryolite) or CaF_2 (fluorspar)) which lowers the melting point of the mixture and increases conductivity. The fused matrix is electrolysed. The electrolytic reactions are :

Cathode : $Al^{3+}\ (melt) + 3e^{-} \longrightarrow Al(l)$

Anode : $C(s) + O^{2-}\ (melt) \longrightarrow CO(g) + 2e^{-}$

$C(s) + 2O^{2-}\ (melt) \longrightarrow CO_2\ (g) + 4e^{-}$

(IV) This process is used when metals are required in very high purity, for specific application. For example pure Si and Ge are used in semiconductors and hence are purified by this method. Zone refining method is based on the principle that an impure molten metal on gradual cooling will deposit crystals of the pure metal, while the impurities will be left in the remaining part of the molten metal.

2. Ans: A

3. Ans: C

4. Ans: C

5. Ans: B

6. Ans: B

7. Ans: B

8. Ans: C

9. Ans: C

Sol. S^{2-} acts as reducing species in self reduction reaction

$2Cu_2O + Cu_2S \longrightarrow 6Cu + SO_2$

10. Ans: A

Sol. Molten iron from blast furnace is taken in to sand pigs for solidification. Therefore iron obtained from blast furnace is called pig iron.

11. Ans: D

12. Ans: C

Sol. (C) It is true that this statement has no significance for roasting sulphide ores to the oxides.

The Gibb's energies of formation of most sulphides are greater than that for CS_2. In fact, CS_2 is an endothermic compound. There, the $\Delta_f G^\Theta$ of M_xS is not compensated. So reduction of M_xS is difficult. Hence it is common practice to roast sulphide ores to corresponding oxides prior to reduction.

13. Ans: C

Sol. Anode mud contains Ag, Pt, Sb, Se, Te and Au as impurities. (NCERT)

14. Ans: B

15. Ans: A

16. Ans: C

17. Ans: A

18. Ans: C

19. Ans: B

20. Ans: D

21. Ans: D

22. Ans: C

23. Ans: B

24. Ans: B

25. Ans: B

Sol. $Ti\ (impure) + 2I_2\ (g) \xrightarrow{50-250^\circ C} TiI_4\ (g) \xrightarrow[\text{Tungsten filament}]{1400^\circ C} Ti\ (pure) + 2I_2\ (g)$

26. Ans: A

Sol. Lighter gangue particles are washed in a current of water by a process called levigation. In levigation the powdered ore is agitated with water or washed with a upward stream of running water, the lighter particles of sand , clay etc are washed away leaving behind heavier ore particles.

27. Ans: A

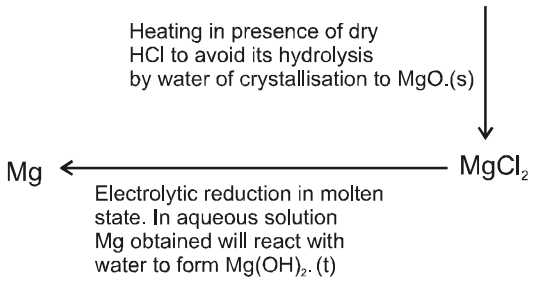
Sol. An ore of tin containing $FeCr_2O_4$ is concentrated by magnetic separation as $FeCr_2O_4$ is ferromagnetic.

28. Ans: D

Sol. Electrolytic reduction method is used in the extraction of highly electropositive elements as they themselves are stronger reducing agents. They lie above hydrogen in electrochemical series. The heat of formation of Al_2O_3 is very high and therefore, at higher temperature there will be the possibility of formation of Al_4C_3 with carbon.

29. Ans: C

Sol. $MgCl_2 + Ca(OH)_2(p) \rightarrow Mg(OH)_2\downarrow + HCl(q) \rightarrow MgCl_2 + H_2O \xrightarrow{\text{crystallisation}} MgCl_2.6H_2O\ (r)$



30. Ans: A

Sol. In actual process the ore is heated in a reverberatory furnace after mixing with silica. In the furnace, iron oxide 'slags off' as iron silicate and copper is produced in the form of copper matte which contains mostly Cu_2S and some FeS.