16.(A) When bauxite ore is digested with connected NaOH solution, alumina (Al_2O_3) dissolves.

$$Al_2O_3(s) + 2NaOH(ag) + 3H_2O(\ell) \xrightarrow{473-523\,K} \underset{\text{Sodium meta-aluminate}}{\underset{(X)}{2Na[Al(OH)_4](aq)}} \xrightarrow{CO_2} \underset{\text{Hydrated alumina}}{\underset{(Y)}{Al_2O_3 \cdot xH_2O(s)\downarrow}} + 2NaHCO_3(aq)$$

17.(B) In the extraction of copper from its sulphide ore, the metal is obtained by auto-reduction. A part of sulphide ore is converted into oxide which then reacts with remaining sulphide to give the metal.

$$2Cu_2S + 3O_2 \longrightarrow 2Cu_2O + 2SO_2$$

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

18.(B) $2Cu_2S + 3O_2 \xrightarrow{\Delta} 2Cu_2O + 2SO_2$

This reaction is roasting of Cu_2S.

19.(C) Copper pyrite : $CuFeS_2$

20.(B) The metal whose curve lie below can reduce the metal oxide whose curve lie above in Ellingham diagram.

21.(C) Siderite is $FeCO_3$, Kaolinite is $Al_2Si_2O_5(OH)_4$ Calamine is $ZnCO_3$, Malachite is $CuCO_3 \cdot Cu(OH)_2$

22.(B) Refer NCERT

23.(D) Cryolite $= Na_3[AlF_6]$

24.(A) Ellingham diagram tells us about ΔG values (feasibility) of thermal reduction of an ore using suitable reducing agents.

25.(C) Fact

26.(B) $Al_2O_3 + \text{impurity of } SiO_2 \xrightarrow[\Delta]{NaOH_{aq}} Na[Al(OH)_4] + Na_2SiO_3$ [Hall-Heroult's process]

27.(A) Aniline is a froth stabilizer.

28.(A) Bauxide $\rightarrow Al_2O_3$, Malachite $\rightarrow CuCO_3 \cdot Cu(OH)_2$

Siderite $\rightarrow FeCO_3$, Calamine $\rightarrow ZnCO_3$

29.(A) Assertion is correct as Haematite ore is used for extraction of Fe.

Haematite is an oxide ore, so reason is incorrect.

30.(C) $\underset{\text{impure}}{Ni(s)} + 4CO(g) \xrightarrow{50^\circ C} [Ni(CO)_4]$

$$[Ni(CO)_4] \xrightarrow{200^\circ-250^\circ C} \underset{\text{pure}}{Ni(s)} + 4CO(g)$$

31.(B) Theory based

32.(A) $FeO + SiO_2 \longrightarrow FeSiO_3$, $FeO \xrightarrow{\Delta} Fe + \frac{1}{2}O_2$ } These reactions don't occur in the blast furnace during extraction of Fe

33.(C) In the given diagram, the plot for $A + O_2 \rightarrow AO_2$ is below the plot for $B + O_2 \rightarrow BO_2$ when $T > 1400^\circ C$, which shows that A can spontaneously reduce BO_2.

34.(B) Fact