46. A solution of KMnO₄ on reduction yields either a colourless solution or a brown precipitate or a green solution depending on pH of the solution. What different stages of the reduction do these represent and how are they carried out?

46. Oxidising behaviour of KMnO₄ depends on pH of the solution.

In acidic medium (pH < 7)

$$MnO_4^- + 8H^+ + 5e^- \longrightarrow Mn^{2+} + 4H_2O_4$$
(Colourless)

In alkaline medium (pH>7)

$$MnO_4^- + e^- \longrightarrow MnO_4^{-2}$$
(Green)

In neutral medium(pH=7)

$$MnO_4^- + 2H_2O + 3e^- \longrightarrow MnO_2^- + 4OH^-$$
(Brown precipitate)

65. When a chromite ore (A) is fused with sodium carbonate in free excess of air and the product is dissolved in water, a yellow solution of compound (B) is obtained. After treatment of this yellow solution with sulphuric acid,

65.
$$A = FeCr_2O_4$$
 $B = Na_2CrO_4$ $C = Na_2Cr_2O_7.2H_2O$ $D = K_2Cr_2O_7$

$$4FeCr_2O_4 + 8Na_2CO_3 + 7O_2 \longrightarrow 8Na_2CrO_4 + 2Fe_2O_3 + 8CO_2$$
(A) (B)
$$2NaCrO_4 + 2H^* \longrightarrow Na_2Cr_2O_7 + 2Na^* + H_2O$$

$$Na_2Cr_2O_7 + 2KCl \longrightarrow K_2Cr_2O_7 + 2NaCl$$
(C) (D)