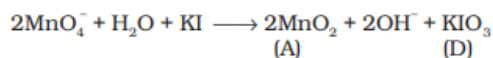
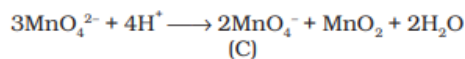
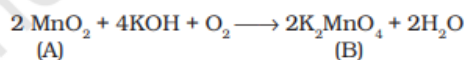
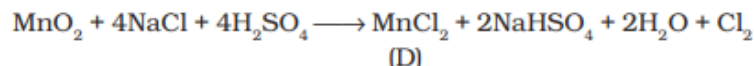
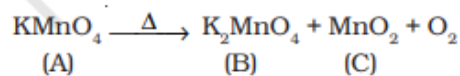


66. A =  $\text{MnO}_2$  (B)  $\text{K}_2\text{MnO}_4$  (C)  $\text{KMnO}_4$  (D)  $\text{KIO}_3$



**71.** A violet compound of manganese (A) decomposes on heating to liberate oxygen and compounds (B) and (C) of manganese are formed. Compound (C) reacts with KOH in the presence of potassium nitrate to give compound (B). On heating compound (C) with conc.  $\text{H}_2\text{SO}_4$  and NaCl, chlorine gas is liberated and a compound (D) of manganese along with other products is formed. Identify compounds A to D and also explain the reactions involved.

71. A =  $\text{KMnO}_4$  B =  $\text{K}_2\text{MnO}_4$  C =  $\text{MnO}_2$  D =  $\text{MnCl}_2$



## NCERT PROBLEMS

(iii) The transition metals generally form coloured compounds.

Most of the complexes of transition metals are colored. This is because of the absorption of radiation from visible light region to promote an electron from one of the d-orbitals to another. In the presence of ligands, the d orbitals split up into two sets of orbitals having different energies. Therefore, the transition of electrons can take place from one set to another. The energy required for these transitions is quite small and falls in the visible region of radiation. The ions of transition metals absorb the radiation of a particular wavelength and the rest is reflected, imparting color to the solution.

**Q14 :**

Describe the preparation of potassium dichromate from iron chromite ore.

What is the effect of increasing pH on a solution of potassium dichromate?

**Answer :**

Potassium dichromate is prepared from chromite ore ( $\text{FeCr}_2\text{O}_4$ ) in the following steps.

**Step (1):** Preparation of sodium chromate



**Step (2):** Conversion of sodium chromate into sodium dichromate

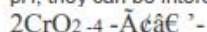


**Step(3):** Conversion of sodium dichromate to potassium dichromate



Potassium dichromate being less soluble than sodium chloride is obtained in the form of orange coloured crystals and can be removed by filtration.

The dichromate ion ( $\text{Cr}_2\text{O}_7^{2-}$ ) exists in equilibrium with chromate ( $\text{CrO}_4^{2-}$ ) ion at pH 4. However, by changing the pH, they can be interconverted.



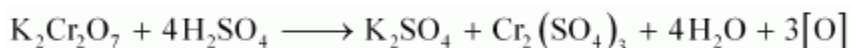
**Q15 :**

**Describe the oxidising action of potassium dichromate and write the ionic equations for its reaction with:**

**(i) iodide (ii) iron(II) solution and (iii) H<sub>2</sub>S**

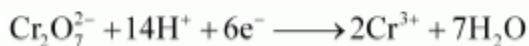
**Answer :**

$\text{K}_2\text{Cr}_2\text{O}_7$  acts as a very strong oxidising agent in the acidic medium.

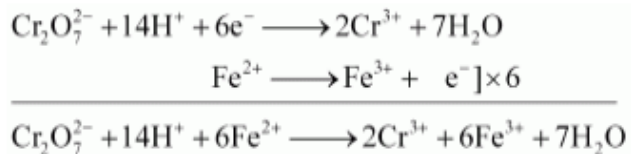


$\text{K}_2\text{Cr}_2\text{O}_7$  takes up electrons to get reduced and acts as an oxidising agent. The reaction of  $\text{K}_2\text{Cr}_2\text{O}_7$  with other iodide, iron (II) solution, and  $\text{H}_2\text{S}$  are given below.

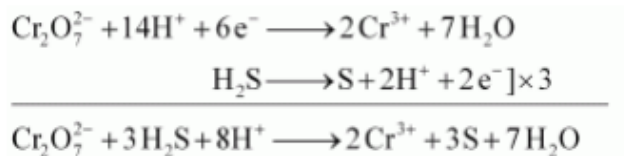
(i)  $\text{K}_2\text{Cr}_2\text{O}_7$  oxidizes iodide to iodine.



(ii)  $\text{K}_2\text{Cr}_2\text{O}_7$  oxidizes iron (II) solution to iron (III) solution i.e., ferrous ions to ferric ions.



(iii)  $\text{K}_2\text{Cr}_2\text{O}_7$  oxidizes  $\text{H}_2\text{S}$  to sulphur.



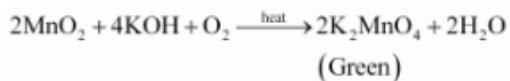
**Q16 :**

Describe the preparation of potassium permanganate. How does the acidified permanganate solution react with (i) iron(II) ions (ii)  $\text{SO}_2$  and (iii) oxalic acid?

Write the ionic equations for the reactions.

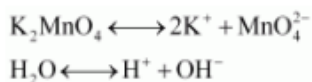
**Answer :**

Potassium permanganate can be prepared from pyrolusite ( $\text{MnO}_2$ ). The ore is fused with  $\text{KOH}$  in the presence of either atmospheric oxygen or an oxidising agent, such as  $\text{KNO}_3$  or  $\text{KClO}_4$ , to give  $\text{K}_2\text{MnO}_4$ .

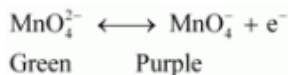


The green mass can be extracted with water and then oxidized either electrolytically or by passing chlorine/ozone into the solution.

Electrolytic oxidation



At anode, manganate ions are oxidized to permanganate ions.



Oxidation by chlorine

