

CHEMISTRY STUDY MATERIALS FOR CLASS 12

(NCERT BASED NOTES OF CHAPTER -8)

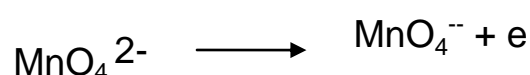
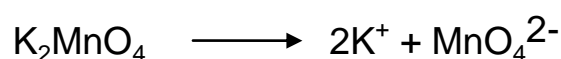
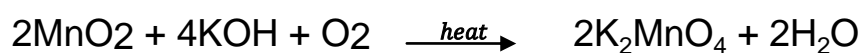
GANESH KUMAR

DATE:- 11/08/2021

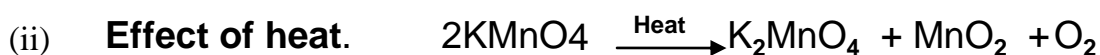
The d & f - Block Elements

Potassium permanganate, KMnO₄:

It is prepared by fusing pyrolusite ore (MnO₂) with KOH in the presence of atmospheric oxygen or an oxidizing agent like KNO₃ or KClO₃ to get potassium manganate, K₂MnO₄ (green mass). The green mass is extracted with water and is oxidized to potassium permanganate, either electrolytically or by passing chlorine or ozone into the solution. The purple solution is



- (i) Potassium permanganate exists as dark purple black prismatic crystals having a greenish metallic lustre. It melts at 523 K. It is moderately soluble in water at room temperature giving a purple solution. However, its solubility in water increases with temperature.



- (iii) **Oxidising properties.**

- (a) In acidic medium :



- (b) In neutral medium :



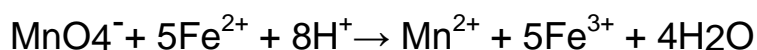
- (c) In basic medium :



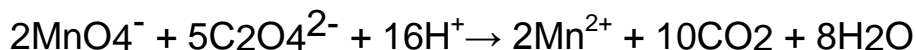
In basic medium, MnO₄⁻ (manganate ions) is further reduced to MnO₂ in the presence of reducing agent. As such equivalent weight of KMnO₄ in basic medium is same as in neutral medium.

In acidic medium potassium permanganate oxidises.

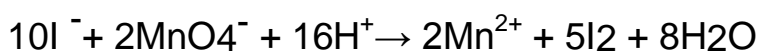
- (i) Ferrous to ferric salt



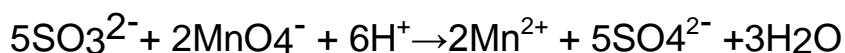
- (ii) Oxalates to carbon dioxide



- (iii) Iodides to iodine



- (iv) Sulphites to sulphates



In alkaline solution

- (i) Iodides to iodates

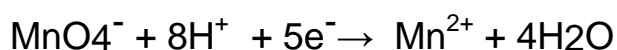


Uses.

- (i) As oxidizing agent in laboratory and industry.
- (ii) In volumetric estimation of ferrous salts, oxalates and other reducing agents in redox titration.
- (iii) As disinfectant in water.
- (iv) For qualitative detection of halides, oxalates, tartarates.

Use of KMnO_4 in redox – titrations:

Potassium permanganate is a powerful and versatile oxidizing agent and is widely used for titration against reducing agents like oxalic acid and Mohr's salt. During the titration, the reduction of potassium permanganate by a reducing agent e.g., oxalic acid or Mohr's salt, produces manganous ions which are nearly colourless.

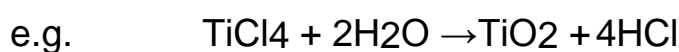


As the titration proceeds and when the whole of the reducing agent is consumed up, then the addition of an excess drop of potassium permanganate solution gives its own colour (pink) to the solution. Therefore, at the end point the colour changes from colourless to pink. Thus, potassium permanganate acts as a self indicator.

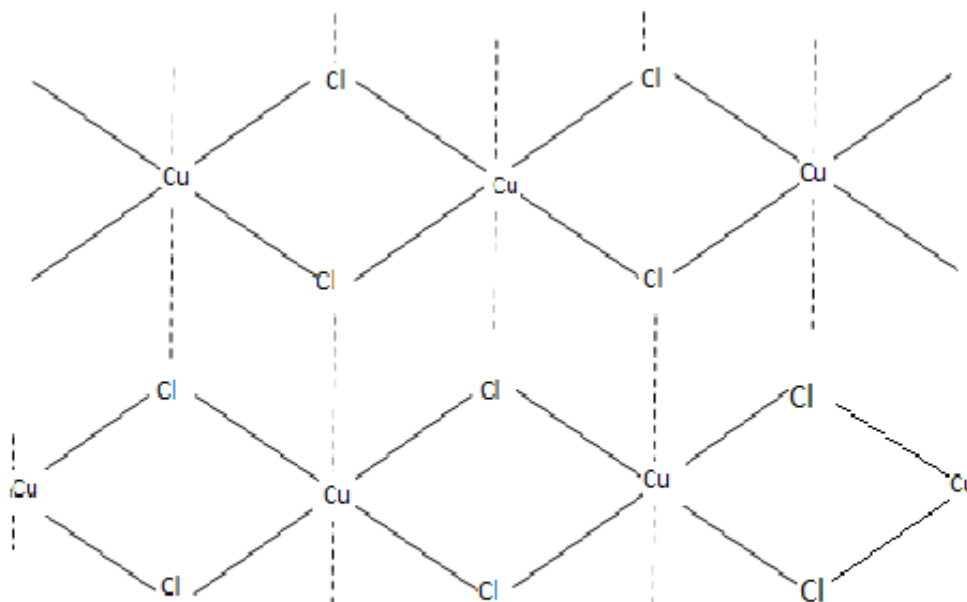
SOME OTHER COMPOUNDS OF TRANSITION METALS :

Halides of transition metals:

- (i) Halides of transition metals in higher oxidation states exhibit a greater tendency to hydrolysis



- (ii) Bonding in fluorides is essentially ionic. In the chlorides, bromides and iodides, the ionic character decreases with increase in atomic mass of the halogens. For example CuF_2 is ionic while CuCl_2 and CuBr_2 are covalent compounds consisting of infinite chains. The structure of copper (II) chloride is given below.



Structure Of Copper (II) Chloride
