Organic Pharmaceutical Chemistry

3rd Stage 2st Semester

Lab No:1

The Preparation and Standardization of 0.1 N Potassium Permanganate Solution

Prepared by:

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Introduction:

- **Potassium permanganate** ($KMnO_4$, m.wt.=158.0g/mol): is a dark purple or brownish black powder or almost black crystals. It is soluble in cold water and freely soluble in boiling water.

- Potassium permanganate is a **strong oxidizing agent** and It is decomposes on contact with certain organic substances.

Introduction:

- Due to its oxidizing abilities it has disinfectant and deodorizing properties. it is also astringent.

- It is widely used as a standard (volumetric) oxidizing solution because of its intense color which serves as an indicator in titrations besides its low cost.

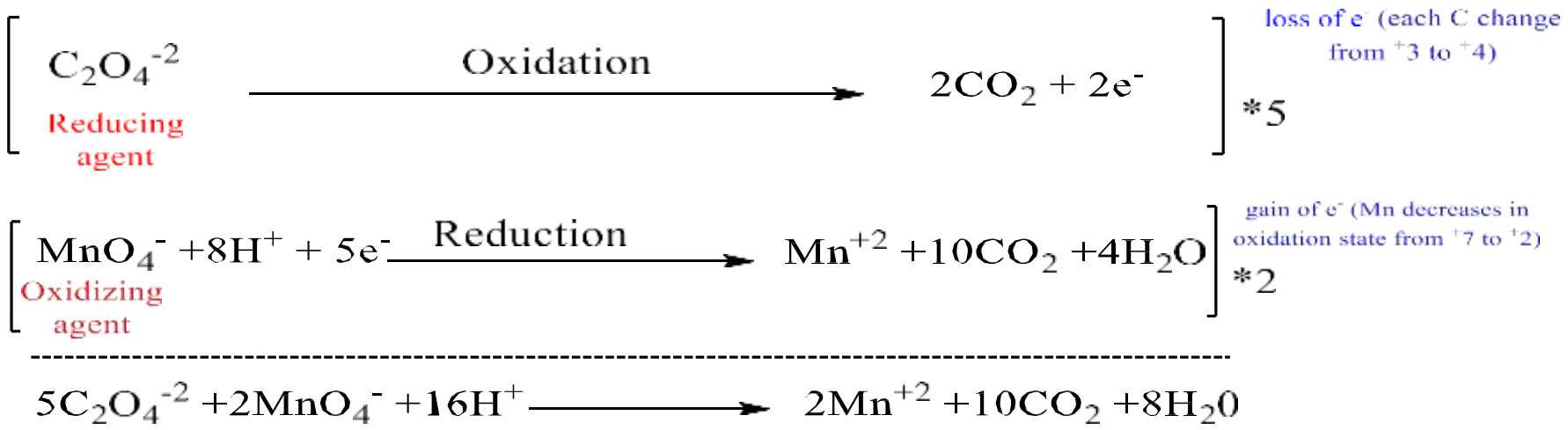
Aim of the experiment:

- One liter of 0.1 N potassium permanganate solution is to be prepared.

Chemical principle:

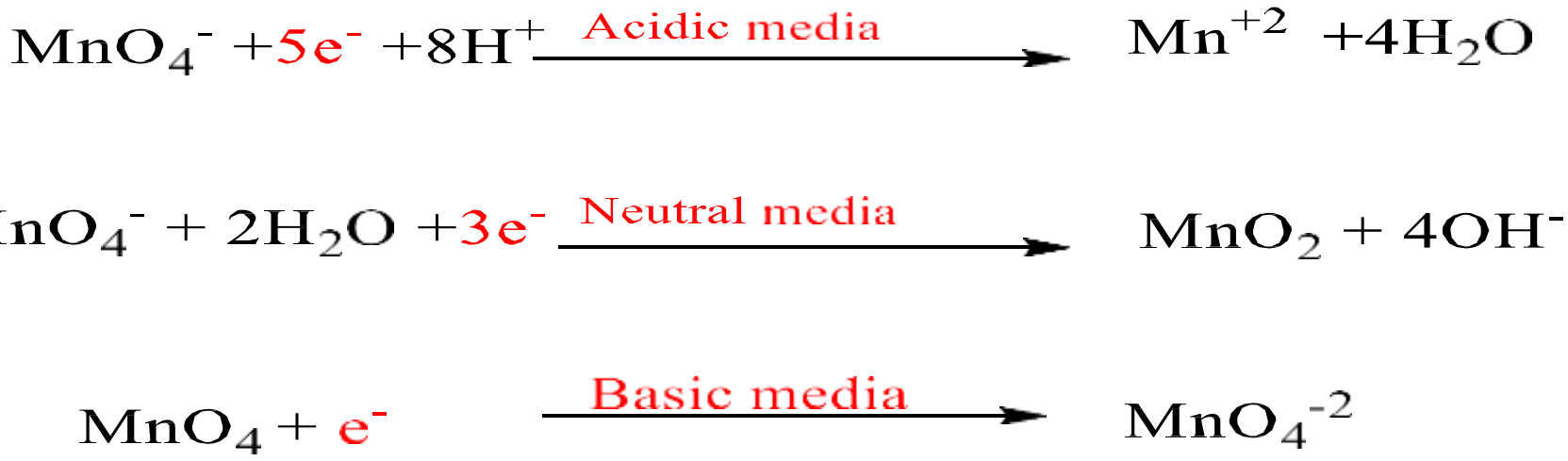
- Standardization of potassium permanganate with anhydrous sodium oxalate (as the primary standard why?) follows **oxidation- reduction reaction**.

- In which potassium permanganate is the oxidizing agent where as sodium oxalate is the reducing agent.



Chemical principle:

- The titration is carried out in acid medium(why?).



Procedure:

A. Preparation of 1000 ml of 0.1 N KMnO4 solution:

1- Weight accurately the appropriate amount of potassium permanganate (3.16g, why?).

$$N = \frac{Wt}{eq.\ wt} * \frac{1000}{V} \qquad eq.\ wt = \frac{M.\ wt}{n}$$

$$0.1 = \frac{Wt}{\frac{158}{5}} * \frac{1000}{1000}$$

2- Transfer into a 250- mL beaker containing water and stir thoroughly breaking up the crystals with a glass rod, to effect solution.

-Add more water to the beaker and repeat the process several times until all the potassium permanganate has dissolved.

Procedure:

- Transfer the solution by using a funnel in to a one- liter volumetric flask, leaving the undissolved residues in the beaker.

5- Finally when the powdered KMnO4 is complete dissolved, make up the solution up to the mark 1L(1000ml) by addition of water, then store in a dark clean closed- container

Procedure:

B. Standardization with Sodium Oxalate :

Weight accurately **0.1g** of anhydrous sodium oxalate **(M.wt=134g/mol)** previously dried to **110^0C** and dissolve in **100ml** of water.

Transfer the solution and add sulphuric acid into a conical flask and then heat (about 70^0C, why?) Because the Oxidation of Sodium Oxalate is Rapid enough at such temperature.

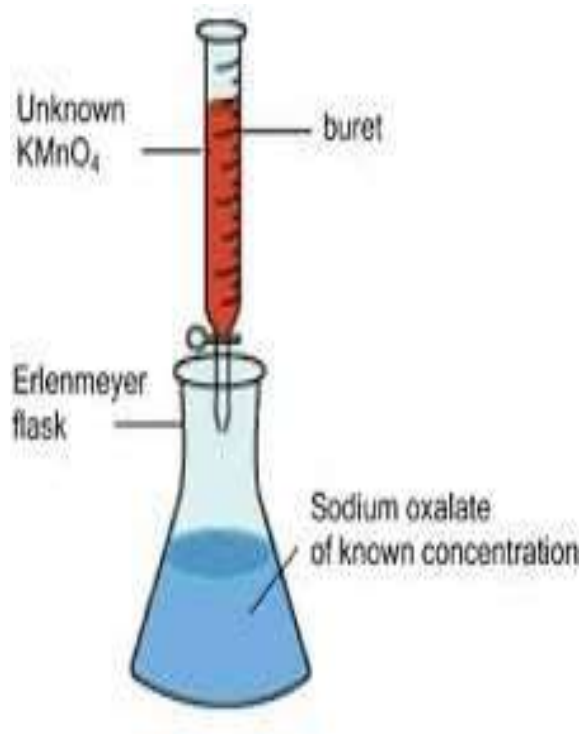
Procedure:

Add KMnO4 from the burette with continuous stirring of the solution in the conical flask.

The first few drops result in a pink color persisting for about 20 seconds, wait until the color disappears and then continue the titration in the usual manner.

The end point is reached when a faint pink persists for about 30 seconds upon shaking the flask .

Record the volume of KMnO4 solution used in the titration .



Calculation:

(N1 * V1) $KMnO_4$ = (N2 * V2) $Na_2C_2O_4$

Where:

N1 :the normality of $KMnO_4$ Solution to be Calculated **(unknown)**

V1 :the volume of $KMnO_4$ the volume descender from the burette

N2 :the normality of Sodium Oxalate solution **(in our lab 0.01 N)**

V2 : volume of Sodium Oxalate solution **((in our lab : 5ml))**


Thank
you