

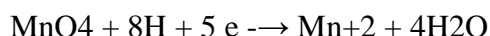
## Oxidation –Reduction Titration

### Preparation and standardization of (0.1M) KMnO<sub>4</sub>

Oxidimetry involves oxidation –reduction reaction associated with transfer of electrons. Oxidation involves the loss of electrons by a substance, and reduction involves the gain of electrons. In a reaction of this type the oxidizing agent gets electrons and is reduced and the reducing agent loses electrons and is oxidized. For example conversion of ( Fe<sup>2+</sup> into Fe<sup>3+</sup>, Cl<sup>-</sup> into Cl<sub>2</sub>, Cu<sup>0</sup> into Cu<sup>2+</sup> ). In any oxidation – reduction reaction, the number of electrons lost by the one substance is equal to the number gained by other.

#### Experiment:

The permanganate method is based on reaction of oxidation by the permanganate ion. Oxidation may proceed in acid or alkaline (or neutral) solution. No indicators are used for titration with permanganate because of its own indicator. When it is reduced in acid solution the color changes from purple to colorless, after end point a drop of permanganate solution will turn the solution to a pale pink color as in equation below:



Permanganate is not a primary standard solution, low equivalent weight. It is difficult to obtain in pure form. It is affected by light and heat (not stable) so it is reduced to MnO<sub>2</sub> because it is a strong oxidizing agent. Permanganate has a deep purple color, its own indicator. There are many primary standards that have been proposed for standardization of permanganate, they include H<sub>2</sub>C<sub>2</sub>O<sub>4</sub>, Na<sub>2</sub>C<sub>2</sub>O<sub>4</sub>, As<sub>2</sub>O<sub>3</sub>, K<sub>4</sub>[Fe(CN)<sub>6</sub>] etc. The most convenient of these is Na<sub>2</sub>C<sub>2</sub>O<sub>4</sub>. It is easy to purify by recrystallization from water and drying in (240-250) °C. It is not hygroscopic and it does not change on keeping.

#### Apparatus

• Burette. • Conical flask (C.F.). • Beaker. • Pipette. • Funnel. • White tile.

#### The Requirement Materials:

- 1- 0.1 M Sodium Oxalate (known concentration).
- 2- Potassium permanganate (unknown concentration).
- 3- Sulfuric acid.

**Procedure:**

- 1- Fill the burette with  $\text{KMnO}_4$  solution .
- 2- Take (5ml) of (0.1N)  $\text{Na}_2\text{C}_2\text{O}_4$  in conical flask and add to it (7.5ml) of diluted  $\text{H}_2\text{SO}_4$  .
- 3- Heat the flask to (80°C) .
- 4- Titrate with  $\text{KMnO}_4$  solution until a first drop gives a pink color . 5- Calculate the normality of  $\text{KMnO}_4$  solution.

$$N_1 * V_1 = N_2 * V_2$$