Department of Anesthesia Techniques
Title of the lecture:- Redox titration

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Redox Titration

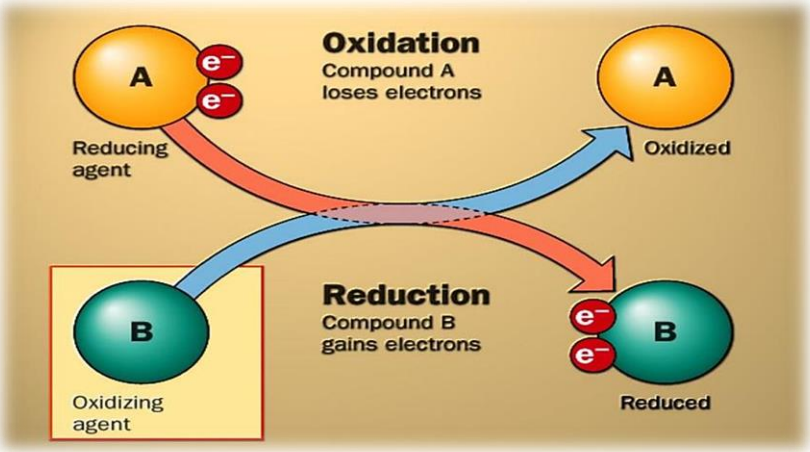
Redox Titration: is a titration which deals with a reaction involving oxidation and reduction of certain chemical species.

Oxidation process: involves loss of electrons.

Reduction process: involves gain of electrons.

Oxidizing agent: is one, which accepts electrons.

Reducing agent: is one, which loses the electrons.



Oxidation and reduction reactions always occur at the same time. One cannot take place in isolation from the other.

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Titration of Oxalic Acid with KMnO4

The titration of KMnO4 vs Oxalic acid is a good example of the oxidation – reduction reaction.

KMnO4 solution is considered a strong standard oxidizing agent and $H_2C_2O_4$ strong reducing agent.

The equation of oxidation reduction reaction is:

$$2KMnO_4 + 5H_2C_2O_4 + 3H_2SO_4 \longrightarrow 2MnSO_4 + K_2SO_4 + 10CO_2 + 8H_2O$$

Self – indicator:

If one of the reactants has some characteristic intense color, then no external indicator is added for the indication of completion of reaction. For example, KMnO4, which has an intense violet color. As soon as the reaction complete, only one extra drop of KMnO4 from burette is capable of changing the color of the solution.

Glassware:

Burette – Stand – Conical flask – Funnel – Beaker – Pipette – Graduated Cylinder – Dropper – Washing bottle.

Chemicals:

1- Potassium Permanganate ($KMnO_4$) solution
2- Oxalic acid $H_2C_2O_4$ (0.1N)
3- Sulfuric acid H_2SO_4 (2N) diluted
4- Distilled water D.W.

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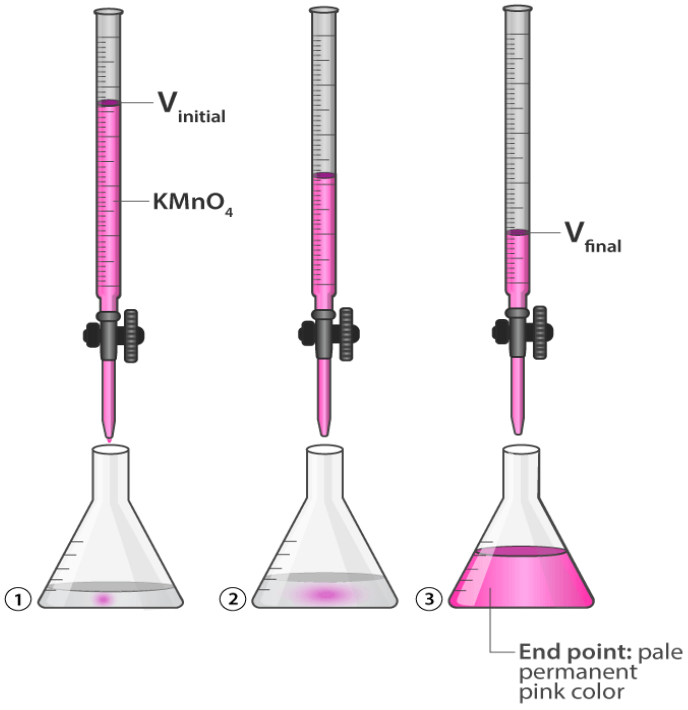
Procedure:

1. Transfer by a pipette 5ml of oxalic acid (0.1N) solution in the conical flask or beaker.
2. Add 2ml of dil. H_2SO_4 (2N).
3. Heat the reaction mixture to (60 – 70°C). (Do not boil).
4. Fill the burette with $KMnO_4$ solution to zero mark.
5. Titrate the hot reaction mixture directly with potassium permanganate $KMnO_4$ solution from the burette until the appearance of a pink color.
6. Repeat the titration for three times and record the results.



Calculations:

$$(N1 \times V1)_{H_2C_2O_4} = (N2 \times V2)_{KMnO_4}$$