EXPERIMENT: 18

AIM:

TO PERFORM ASSAY OF COPPER SULPHATE (REDOX TITRATION) BY IODOMETRY AND STANDARDIZATION OF TITRANT

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REQUIREMENTS

A. Glassware & Instruments

1. Pipette
2. Pipette filler
3. Burette
4. Filter funnel
5. Conical flask
6. White tile
7. Graduated cylinders
8. Retort stand
9. Clamp

B. Chemicals & Reagents

1. Copper sulphate
2. Sulphuric acid
3. Potassium iodide
4. Acetic acid
5. Sodium thiosulphate
6. Starch solution
7. Sodium thiocynate

THEORY

Based on the oxidation-reduction reaction of iodine/thiosulphate, the test is conducted. A copper sulphate solution is initially treated with potassium iodide and acetic acid.

Cuprous iodide (CuI) is produced from iodine, and the free iodine is titrated using 0.1N sodium thiosulphate..

PRINCIPLE

It is a redox titration. Iodine is a oxidising agent and when it reacts with indicator to get end point it becomes colourless. The solution from faint blue is converted to colourless. The solution is oxidised to become colourless.

PROCEDURE

For standardization of Na_2SO_3 solution

- Pipette out 10ml of 0.1N KIO_3 solution into iodine flask and add 2g of KI and 5 ml of dil. H_2SO_4.
- Keep the flask in dark for 10 mins and titrate with $Na_2S_2O_3$ solution using starch indicator.
- Repeat the titration for concordant values.

For Assay

- Weigh accurately about 1gm $CuSO_4$ and dissolve in 50ml of H_2O, add 3gm of KI, 5ml of acetic acid and titrate the liberated I_2 with 0.1N Na_2SO_3, using starch solution as indicator.
- Continue titrating until just a faint blue tint remains, then add 2 g of potassium thiocyanate.
- Continue stirring and titrating until the blue colour vanishes.
- Repeat the titration for concordant values.

REACTION

$$2CuSO_4 + 4KI \longrightarrow 2CuI_2 + 2K_2SO_4$$

$$2CuI_2 \text{ (Unstable cupric iodide)} \longrightarrow Cu_2I_2 \text{ (Stable cuprous iodide)} + I_2$$

$$2Na_2S_2O_3 + I_2 \longrightarrow Na_2S_4O_6 + 2NaI$$

CALCULATION

Observation table

S. No	Vol of 0.1N KIO_3 (ml)	Burette Reading (Initial)	Burette Reading (Final)	Vol of $Na_2S_2O_3$ Rundown (ml)
1				
2				

The normality of $Na_2S_2O_3$ solution was calculated using formula:

N1V1=N2V2

where,

V1= vol. of KIO_3 solution= 10ml

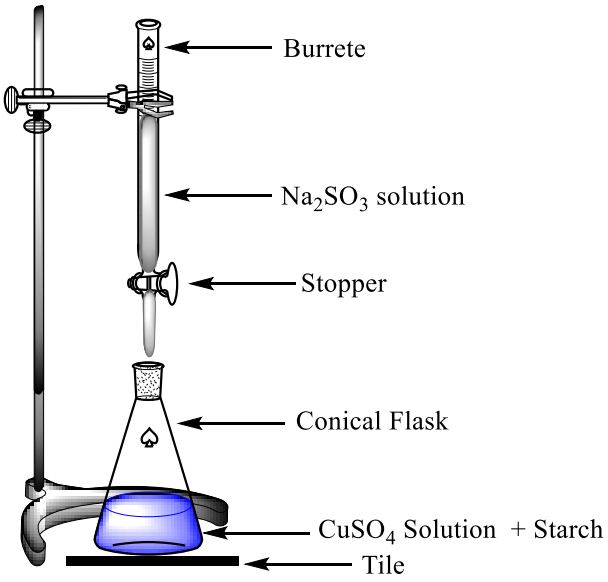
N1=N of KIO_3 solution= 0.1N

V2= vol of $Na_2S_2O_3$ rundown= (As average of all reading)

N2= N of $Na_2S_2O_3$=?

N2= N1V1/V2

DIAGRAM



APPLICATIONS

1. The several types of iodometry are incredibly beneficial for volumetric analysis.
2. The determination of copper (Oxidation number-2), chlorate, hydrogen peroxide, and dissolved oxygen are some examples.
3. Commonly, iodometry is used to assess the active quantity of hypochlorite in bleach that is responsible for bleaching.

RESULT

Normality of Na_2SO_3 is ……..