COLORIMETERIC ESTIMATION OF COPPER

EXPT NO 8

AIM:

To estimate the amount of copper present in the given solution by colorimetric method.

Principle:

Colorimetric analysis depends upon the measurement of quantity of light absorbed by a colored solution. Quantitative analysis by colorimetry is based on Beer-Lambert law, which can be expressed by the relation $\log\left(\frac{I_O}{I_T}\right) = \varepsilon\, c\, l$

Where

$I_O = Intensity\ of\ the\ incident\ light$

$I_T = Intensity\ of\ the\ transmitted\ light$

$c = Concentration\ of\ the\ colored\ constituent\ in\ the\ solution$

$l = thickness\ of\ the\ colored\ medium$

$\varepsilon = molar\ absorption\ coefficeint$

The term, $\log\left(\frac{I_O}{I_T}\right)$ is called the absorbance or optical density of the light absorbing medium. Since ε is a constant and if thickness l is kept constant, absorbance changes linearly with concentration within a specific concentration range.

Cupric ions (Cu^{2+}) react with ammonia to give a deep blue colour due to the formation of cuprammonium complex ion

$$Cu^{2+} + 4NH_3 \rightarrow [Cu(NH_3)_4]^{2+}$$

Deep blue

Procedure :

Pipette out 2.5, 5.0, 7.5, 10.0, 12.5ml of the standard copper sulphate solution into 50ml standard flasks. Add 10ml of 1:1 ammonia solution into each of them and make up to the mark with distilled water and shake well. Select a filter (620 nm) in the colorimeter and adjust the initial to zero absorbance with distilled water as blank in the sample tube. Fill the sample tube with standard solution of lowest concentration and measure the absorbance. Repeat for other standard solution also. Plot absorbance versus concentration. Develop Colour for the given unknown solution by adding 10ml of 1:1 ammonia and make up to the mark with distilled water. Measure the absorbance and transmittance using the colorimeter at the same wavelength. From the graph determine concentration of the unknown solution.

Observations:

Sr. no.	Concentration (c) moles/L	Absorbance
1	2.5	
2	5.0	
3	7.5	
4	10.0	
5	12.5	
6	Unknown	

Results:

From the graph, the unknown solution contains _____ mg of cu