EXPERIMENT NO: **DATE:**

Colourimetric Estimation of copper

PRINCIPLE: When a monochromatic light of intensity I_0 is incident on a transparent medium, a part I_a of it is absorbed, a part I_r of it is reflected and the remaining part I_t is transmitted. This is given as $\mathbf{I_0 = I_a + I_r + I_t}$.

For a glass air interface I_r is negligible, therefore $I_0 = I_a + I_t$. $I_t / I_0 = T$ is called the transmittance, log $1 / T = \log I_0 / I_t$ is called the absorbance or optical density.
The relation between absorbance A, concentration c (expressed in mol / dm^3) and path length t (expressed in cm) is given by Beer - Lambert's law $A = \log I_0 / I_t = €ct$
where € is the molar extinction co-efficient, t is the path length *c* is concentration
and A is absorbance of a substance at a given wavelength. *If t, the path length is kept constant, then A ∝c. Hence a plot of absorbance against concentration gives a straight line.*
A series of standard solutions of copper salt is treated with ammonia to get blue cuprammonium complex and is diluted to a definite volume. The absorbance of each of these solutions is measured at 620nm since the complex shows maximum absorbance at this wavelength. The absorbance values are plotted against concentration to get a calibration curve.
An unknown volume of the test solution is treated with strong ammonia and diluted to the same volume as above. The absorbance of this solution at 620nm is measured and its concentration is determined from the calibration curve.

PROCEDURE:

Transfer the given copper sulphate solution (stock solution) to a burette and draw out 5,10,15,20 and 25cm^3 of solution into 50cm^3 volumetric flasks. Add 5cm^3 of ammonia solution (***using 50*** cm^3 ***burette, don't use pipette***) to each of them and dilute upto the mark with ion exchangewater. Stopper the flasks and mix the solution well. To the test solution given in a 50cm^3 measuring flask, add 5cm^3 of ammonia solution, then dilute upto the mark with ion exchange water and mixwell. Prepare a blank solution by diluting 5cm^3 of ammonia solution in 50cm^3 volumetric **flask and dilute up to the mark with ion exchange water and mixing well. After 10 minutes,** measure theabsorbance of the solutions against blank at 620nm using a photo electric colorimeter. Tabulate thereadings as shown. Draw a calibration curve, find out the volume of copper sulphate given i.e. thevolume of test solution and calculate the amount of copper in the given test solution.
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REPORT: Amount of copper present in the given unknown solution is = g

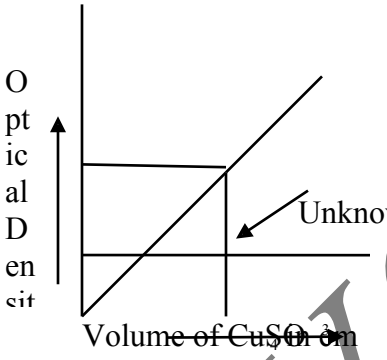
Signature of the teacher

Experiment no:

Observation and Calculations

Weight of copper sulphate pentahydrate present in 100cm^3 of its solution= (W) g
Weight of copper sulphate pentahydrate present in 1cm^3 = W/100 g
249.54 g of copper sulphate pentahydrate contains 63.54 g of Copper
Weight of copper present in 1cm^3 of the solution = **$\frac{W \times 63.54}{100 \times 249.54}$=…….(X)g**

Serial number	Volume of copper sulphate solution	Weight of copper	Optical density
1	5 cm^3		
2	10 cm^3		
3	15m^3		
4	20m^3		
5	25cm^3		
6	Test solution		
7	Blank Solution		



From the graph unknown volume of test solution is = cm^3

Result: Amount of copper in unknown volume of test solution is= g

Signature of the teacher