Experiment 7: Size Dependent Color Variation of Cu_2O Nanoparticles by a Spectrophotometer

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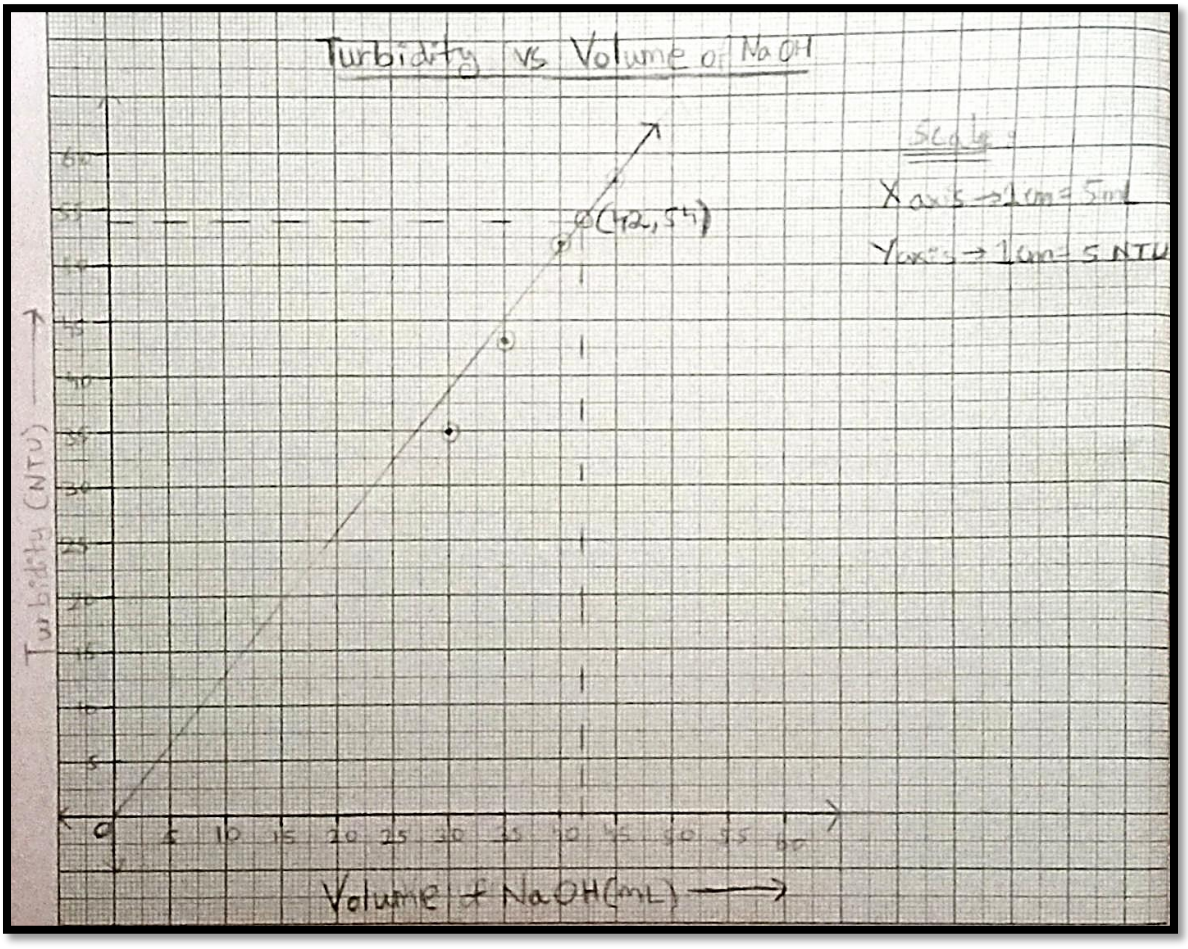
Observations:

Sample No.	Vol. of Benedict's reagent (mL)	Vol. of glucose solution (mL)	Vol. of NaOH 0.01 M (mL)	Turbidity (NTU)	Inference
A	0.5	4.5	45	57.7	Faster-reaction (size↑Turbidty↑)
B	1.0	9.0	40	52	
C	1.5	13.5	35	43.2	
D	2.0	18.0	30	35	Slower-reaction (size↓Turbidty↓)
E (Unknown Sample)	0.1*(50 – 42) = 0.8	0.9 (50 – 42) = 7.2	X (from the graph) = 42	54	

Graph:



Calculation:

Volume of Benedict reagent **:** Volume of sugar solution = 1 **:** 9

Total volume of Cu_2O solution = 50 mL

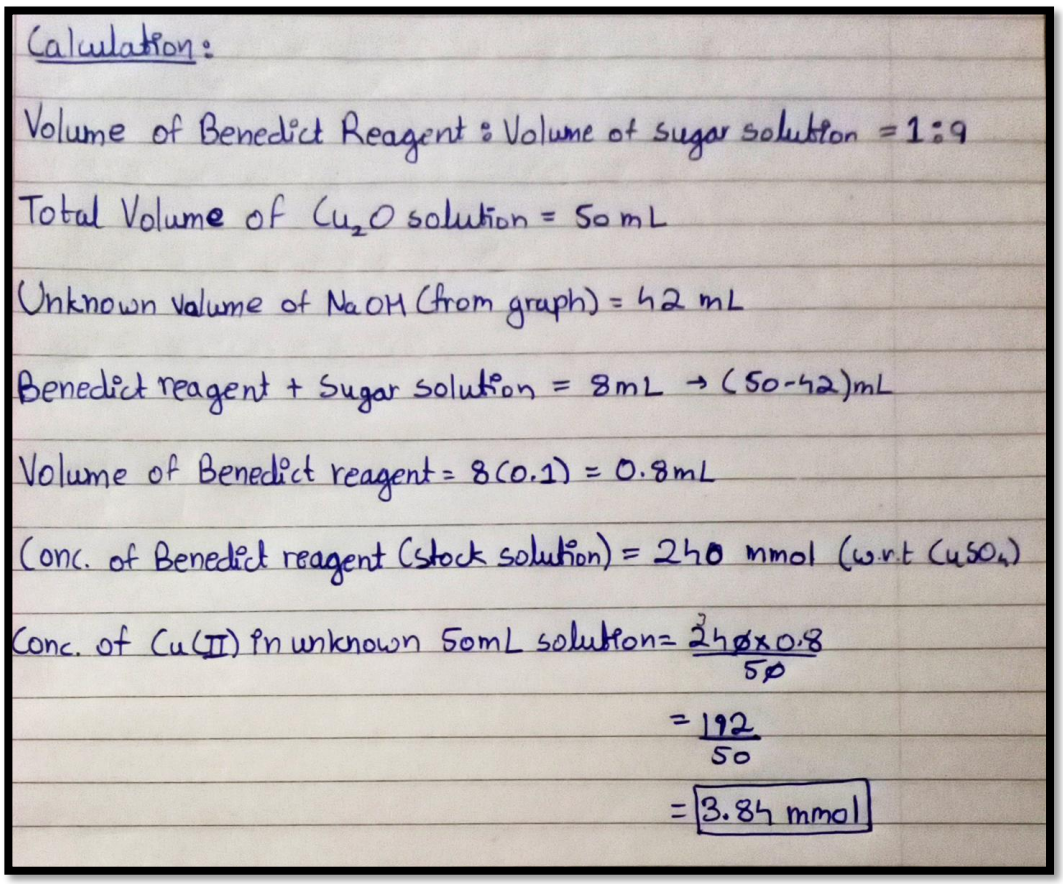
Unknown volume of NaOH = x mL = 42 mL

Benedict reagent + sugar solution = (50 – x) mL = 8 mL

Volume of benedict reagent = $\frac{(50-x)}{10}$ mL = 0.8 mL

Conc. of Benedict reagent (stock solution) = 240 mmol (w.r.t $CuSO_4$)

Conc. of Cu(II) in unknown 50 mL solution = $\frac{240 \times 0.8}{50}$ = **3.84 mmol**



Result:

1) The volume of NaOH for the unknown solution **42 mL**.
2) The concentration Cu(II) solution is **3.84 mmol**.