

Part-C: Calculation

Normality of sodium thiosulphate = 'Y' cm³Volume of sodium thiosulphate = 'X' cm³1000 cm³ 1N sodium thiosulphate = 63.54 g of copperTherefore 'X' cm³ of 'Y' N sodium thiosulphate = $\frac{63.54 \times X \times Y}{1000}$ g of copperAmount of copper in 25 cm³ of sample solution = "A" g of Copper

Amount of copper in given PCB sample is = 10 "A" g of Copper

Model Procedure:

Part A: Preparation of Standard solution* known weight of Na₂S₂O₃ is added to the flask and then water is added to make a solution• calculate the Normality of Na₂S₂O₃ solutionPart B: Estimation of Cu in given solution of PCB

• Take 25 cc of PCB soln in the flask and add a spatula of fused (micro)

• Heat it to a boil and bring it back to room temp; then add 1 L of distilled water

• Then Add 2-3 drops of NH₄OH. We get light blue ppt. Add 1/4 ml of CH₃COOH to dissolve the ppt. Then Add 1% 17.1 of KI solution. Solution turns brown. Start titration against Na₂S₂O₃

• when the solution turns pale yellow. Add Starch (Indicator) to get blue soln

• Continue titration till blue disappears

• Note the readings of burette.

Model Calculation:

Let Volume of Na₂S₂O₃ = x cm³Normality
volume of Na₂S₂O₃ = y cm³1000 cm³ of 1N sodium thiosulphate (Na₂S₂O₃) = 63.54 g of CuTo x cm³ of yN sodium thiosulphate (Na₂S₂O₃) = $\frac{x \times y \times 63.54}{1000}$ g of Cu.

✱

Amount of Cu in 25 cm³ of sample solution = N g of CuAmount of Cu in 25 cm³ (given) of sample solution

= 10 'N' g of copper

Observation and Calculation:

Part-A: Preparation of Copper solution

Sample Details	Sample
Weight of $\text{Na}_2\text{S}_2\text{O}_3$ + Weighing Bottle	4.9807 4.9858 45 g
Weight of empty Weighing Bottle	3.7645 g
Weight of the $\text{Na}_2\text{S}_2\text{O}_3$ taken	1.2150 g

Normality of $\text{Na}_2\text{S}_2\text{O}_3$ = $\frac{\text{Mass of } \text{Na}_2\text{S}_2\text{O}_3}{\text{Gram Equivalent weight of } \text{Na}_2\text{S}_2\text{O}_3 (248.17)}$

$$N = \frac{1.2150}{248.17} = 0.00489$$

Part-B: Estimation of Copper in Sample solution

Burette readings (in cm^3)	Trial-I	Trial-II	Trial-III	Expected Value
Final	10.6	8.4 8.8	8.6	8.7
Initial	0	0	0	
Volume of $\text{Na}_2\text{S}_2\text{O}_3$ run down	10.6	8.4 8.8	8.6	

Part-C: Calculation

$$\text{Normality of } \text{Na}_2\text{S}_2\text{O}_3 = \frac{1.2150}{248.17} = 0.004895 \approx 0.0049$$

$$\text{Volume of } \text{Na}_2\text{S}_2\text{O}_3 = 8.8 \text{ ml}$$

$$1000 \text{ ml of } 1 \text{ N } \text{Na}_2\text{S}_2\text{O}_3 \rightarrow 63.54 \text{ g of Cu}$$

$$8.8 \text{ ml of } 0.0049 \text{ N } \text{Na}_2\text{S}_2\text{O}_3 \rightarrow \text{? g of Cu}$$

$$\frac{63.54 \times 8.8 \times 0.0049}{1000} = 0.00273 \text{ g}$$

$$\text{Amount of Cu in 25 ml sol} = 0.0027 \text{ g}$$

$$\text{Amount of Cu in 250 ml solution} = 0.027 \text{ g}$$

$$\therefore \text{Amount of Cu in given PCB solution} = 0.027 \text{ g}$$

Inference:

The amount of Cu extracted from 250ml of PCB solution is approximately 0.027g

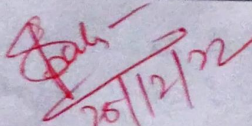
- What we can infer from the final solution of our experiment is that a lot of copper is wasted by disposing many PCB. We can extract profitably a good amount of Cu from these PCB by our experiment.

Relevance to Society & Environment:

- Using this method we can extract all the copper from the disposed PCB
- Since Cu is a non-renewable resource, ~~extracting~~ extracting it back from PCB & using it again ~~reduces stress~~ improves the environment which is destroyed by mining
- We can also reduce e-waste which reduces waste by a great amount

Report:

Amount of copper in given PCB sample is = 0.027g

Evaluation of Experiment - 1		
Components	Marks	
	Max	Obtained
Model Procedure & Calculation	7+5	10
Burette Reading & Execution	20+4	24
Inference & Societal Relevance	02+02	02
Total	40	36
Signature of Teacher		
 26/12/22		