Estimation of Copper from PCB.

Part A: Preparation of Standard thiosulphate:

Weigh the weighing bottle containing sodium thiosulphate accurately and transfer the salt onto the funnel placed on a 100 cm^3 volumetric flask. Weigh the Bottle again. The difference between the two weights will give the amount of sodium thiosulphate transferred. Dissolve the salt by adding about 20-30 cm^3 of de-ionized water. Make up the solution to the mark and shake well for uniform concentration.

Part B: Preparation of PCB Solution:

Weight out the given PCB sample in to 250 cm^3 conical flask. Add concentrated nitric acid drop by drop till it dissolves. From this prepared solution take 25 cm^3 of solution in conical flask for titration.

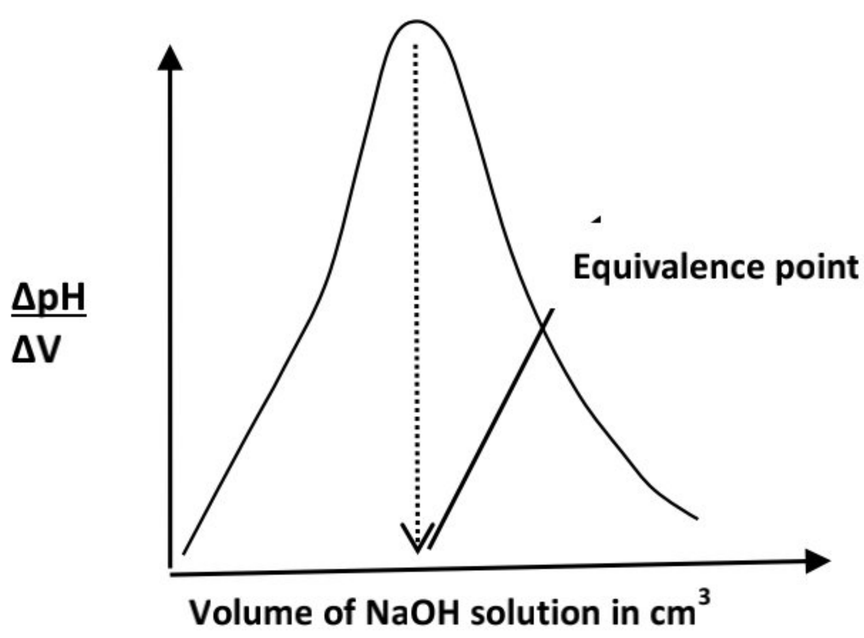
Part C: Estimation of Copper:

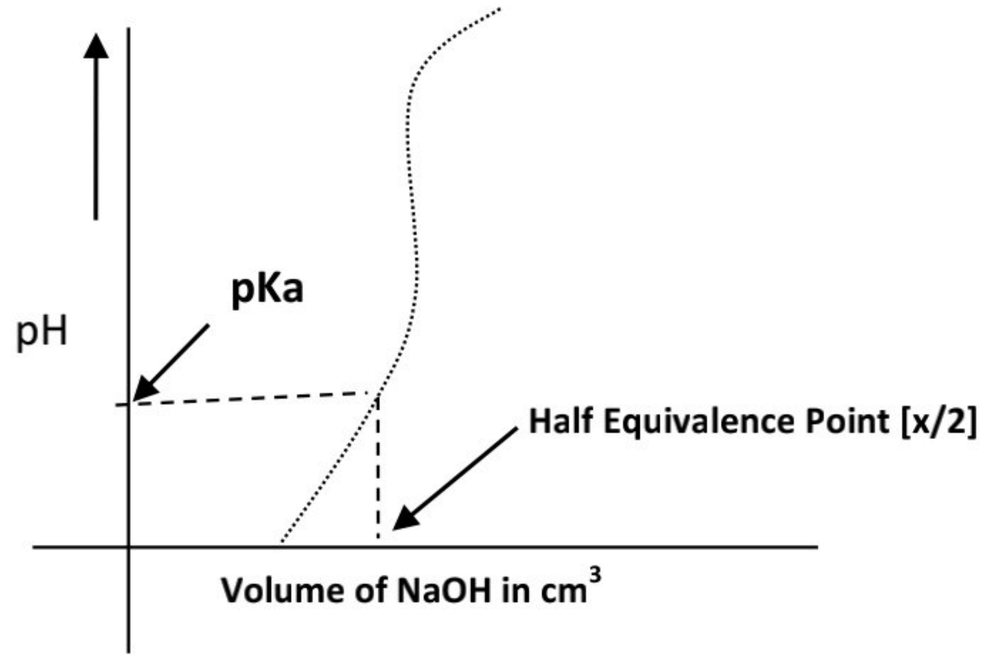
Take 25 cm^3 of PCB solution in a conical flask and add one spatula of urea and one test tube of distilled water. Boil for two minutes. Cool to room temperature. Add Ammonium hydroxide solution drop by drop till bluish white precipitate forms and add ¼ test tube of acetic acid to dissolve the precipitate. To the solution prepared add water and one test tube of 10% Potassium iodide solution. The solution starts liberating Iodine and is titrate against sodium thiosulphate till it becomes pale yellow and then add 2 droppers of Starch and continue the titration till it becomes white precipitate. Note down the reading and repeat the titration for 3 times to obtain concordant values.

	VIVA QUESTIONS
1	What are the constituents of PCB?
2	How is PCB solution prepared?
3	What is the purpose of adding urea?
4	What are iodometric titrations?
5	Why is ammonium hydroxide added to the PCB solution?
6	What is the bluish white precipitate formed after adding ammonia solution?
7	Why is the solution acidified with acetic acid after the addition of ammonium hydroxide?
8	Why is acetic acid added?
9	How is liberated iodine estimated?
10	What is the reaction that occurs between iodine and sodium thiosulphate?
11	Write the reaction between acidified PCB solution and potassium iodide.
12	Why is starch indicator added towards the end point?
13	What is the white precipitate produced at the end point?
14	Write the reactions involved in the experiment.

Determination of total acidity of the soft drinks using pH sensors.

Pipette out 50cm^3 of the given solution into a beaker. Immerse the glass electrode-calomel electrode assembly into it. Connect the electrodes to pH meter and measure the pH. Add sodium hydroxide from the burette in the increments of O.2 cm^3 and measure the pH after each addition. Plot a graph of ΔpH/ ΔV against volume of sodium hydroxide solution added and determine the equivalence point. Plot another graph of pH against volume of sodium hydroxide solution added and determine the pKa value of the solution. From the graph find out the pKa value of the weak acid. Identify the weak acid from the table. Calculate the acid content using the standard normality equation.

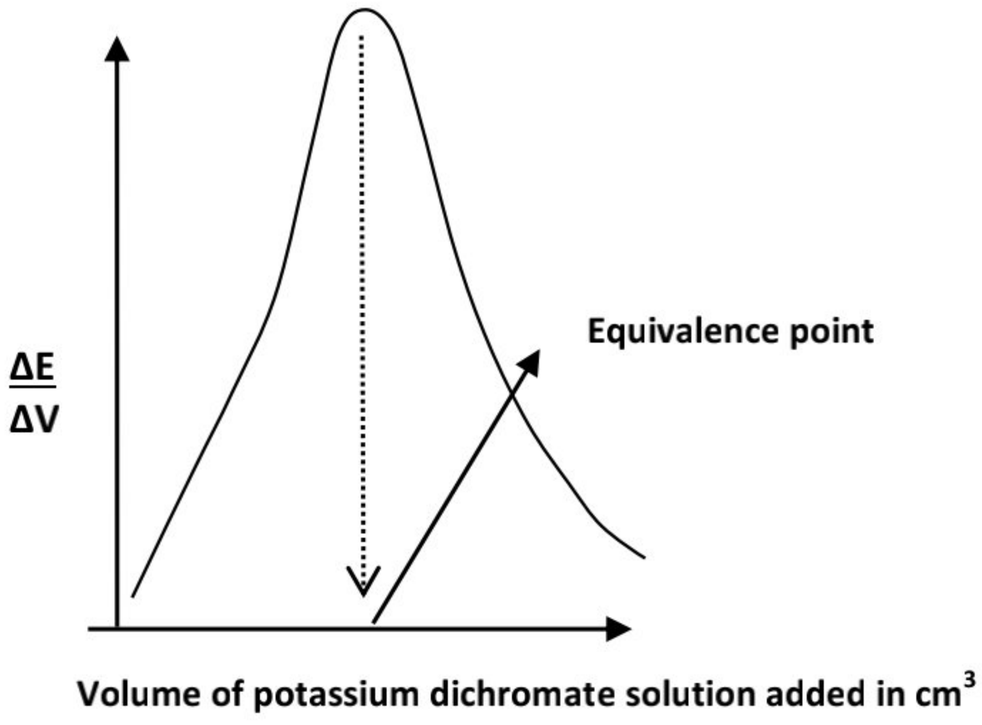




	VIVA QUESTIONS
1.	Define pKa of a weak acid.
2.	pK_a values of two acids are 2.8 and 3.2. Which one of these acids is stronger?
3.	Why should we compute the pKa values of a weak acid?
4.	Define pKa of a weak acid in terms of pH of the solution
5.	pH of the medium changes enormously at its equivalence point.
6.	At half equivalence point, pH is equal to pKa.
7.	Write down Henderson-Hasselbalch equation.
8.	What are impacts of drinking carbonated water?

Potentiometric estimation of Iron

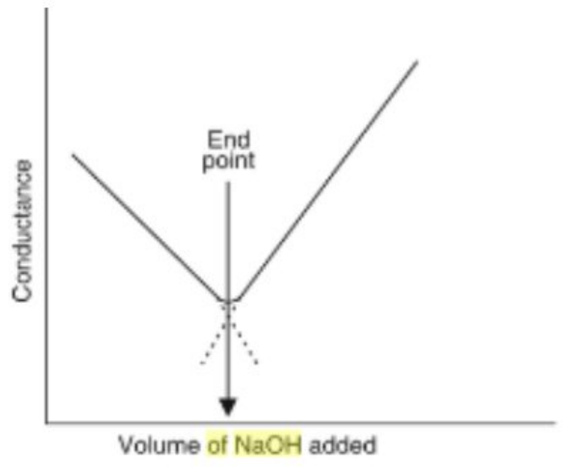
Pipette out 25cm^3 of the given ferrous ammonium sulphate solution into a beaker. Add 1 test tube of dil.H_2SO_4. Immerse the platinum electrode and calomel electrode assembly into it. Connect the electrodes to potentiometer and measure the potential. Add potassium dichromate solution from the burette in the increments of 0.2 cm^3 measure the potential after each addition. Plot a graph of ΔE/ΔV against volume of potassium dichromate solution added and determine the equivalence point. From normality of potassium dichromate evaluates the normality of given ferrous ammonium sulphate.



VIVA QUESTIONS	
1	What is a Potentiometer titration?
2	Give the principle of Potentiometer titration.
3	What are the electrodes used in Potentiometer titration?
4	What is determining factor in the oxidation-reduction reaction?
5	What is an indicator electrode?
6	What is the reaction that occurring between FAS and Potassium Dichromate?
7	What are the advantages of Potentiometric titration?

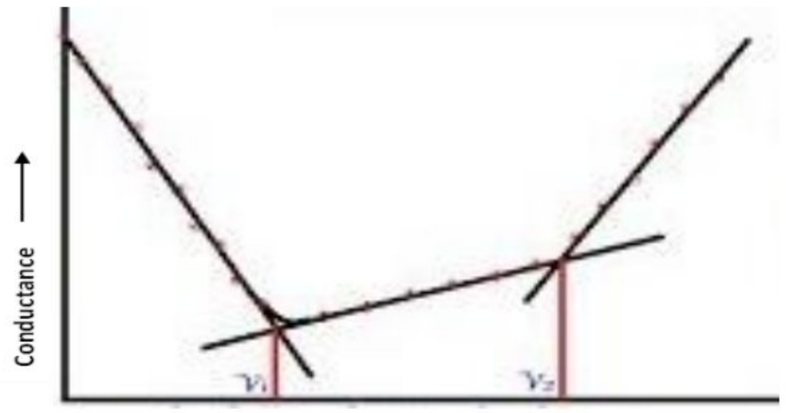
Conductometric estimation of strong acid vs strong base

Pipette out 50cm^3 of HCl (Strong acid) in to a beaker. Immerse the conductivity cell in it. Connect the cell to the conductivity bridge and measure the conductance. Add sodium hydroxide (Strong base) in the increments of 0.2cm^3 and measure the conductance after each addition. Plot a graph of conductance versus volume of sodium hydroxide added. Determine the volume of sodium hydroxide required to neutralize HCl. From the normality of sodium hydroxide, calculate the normality and amount of HCl.



Conductometric estimation of mixture of acids.

Pipette out 50cm^3 of acid mixture in to a beaker. Immerse the conductivity cell in it. Connect the cell to the conductivity bridge and measure the conductance. Add sodium hydroxide in the increments of 0.2cm^3 and measure the conductance after each addition. Plot a graph of conductance versus volume of sodium hydroxide added. Determine the volume of sodium hydroxide required to neutralize mixture of acids. From the normality of sodium hydroxide, calculate the normality and amount of HCl and acetic acid.

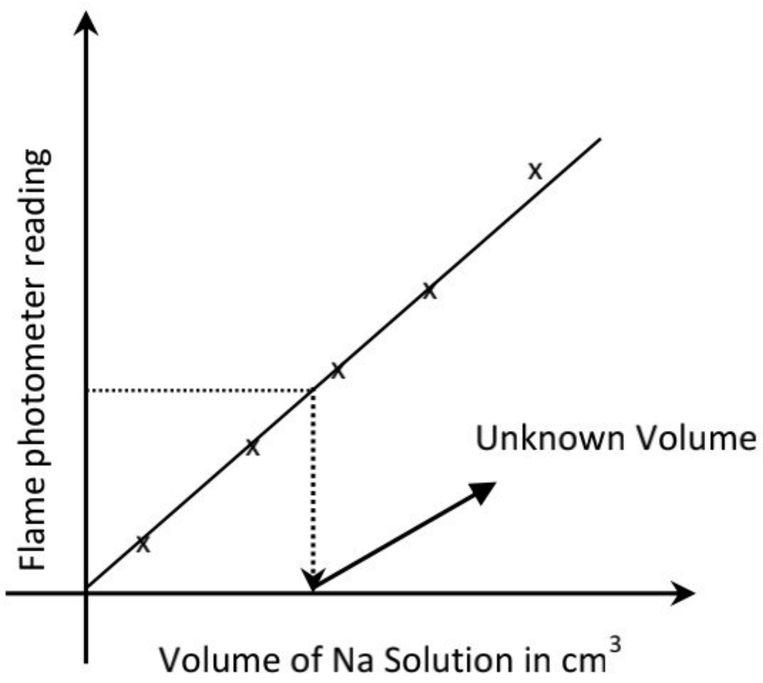


Volume of NaOH in

VIVA QUESTIONS	
1.	State Ohm's law.
2.	What is conductance and its SI unit?
3.	Mention the different types of conductivities.
4.	Which of the above conductivity measured during Conductometric titration?
5.	What is specific conductivity?
6.	What is equivalent conductivity?
7.	What is molar conductivity?
8.	What is a cell, cell constant, conductivity cell?

Flame photometric estimation of sodium

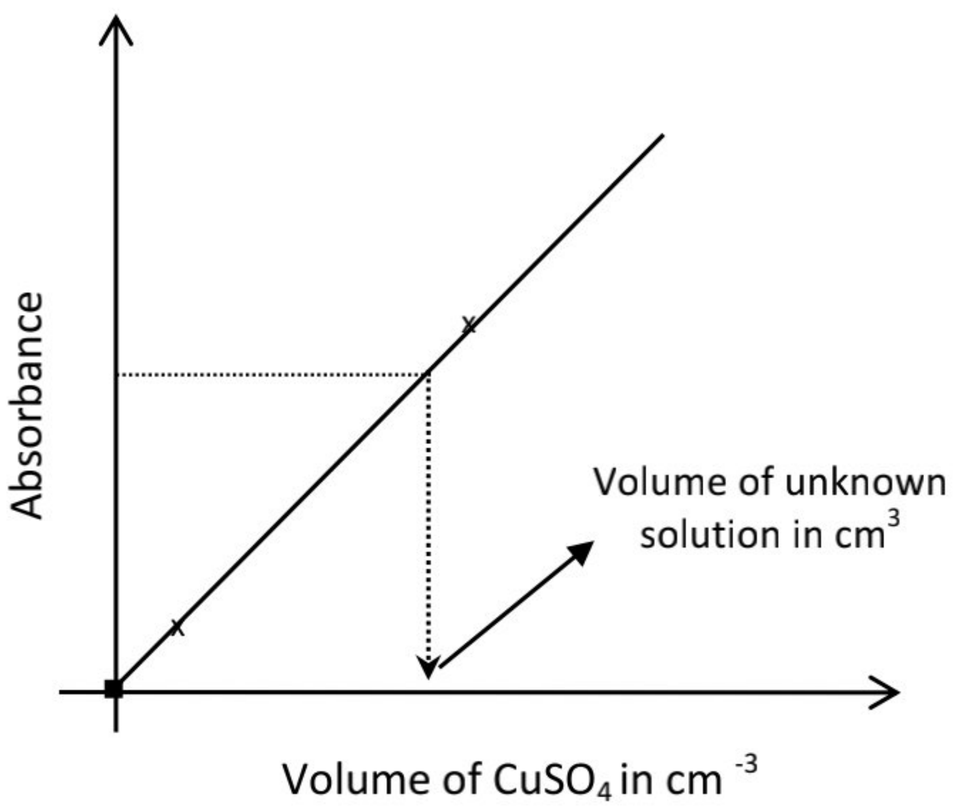
Draw 2, 4, 6, 8 and 10 cm^3 of given Sodium chloride solution into separate 25 cm^3 volumetric flasks. Dilute with water up to the mark and mix well. Similarly, prepare the test solution of unknown concentration. Note down the flame photometer readings (**λ_{max} = 589 nm**). Plot a graph of flame photometer readings against the volume of the solution get the calibration curve. Using the curve obtained find out the volume of the unknown solution containing sodium and calculate the amount of sodium in it.



VIVA QUESTIONS	
1.	What is meant by atomic emission?
2.	What is Flame Photometry?
3.	What are alkali and alkaline earth metals?
4.	What are the various events that occur when solution containing metal atom ions atomized through a flame?
5.	What are different components of a Flame Photometer?
6.	Why the analysis of Sodium is advantageous is Flame Photometry?
7.	What is the role of filter in Flame Photometry?
8.	What are the errors that occur in Flame Photometry?
9.	What are the factors that influence this experiment?
10.	Name the fuel and oxidant used in this experiment

Colorimetric estimation of copper from e-waste

Copper collected from the e-waste is made in to the copper sulphate solution. From the solution that 2,4,6,8 and 10 cm^3 of given copper solution into separate 25 cm^3 volumetric flasks. Add 2.5 cm^3 of ammonia to each of them and also into the test solution of unknown concentration. Dilute with water up to the mark and mix well. Measure the absorbance (λ_{max}**= 620 nm**) of each of these against blank solution (Only ammonia and water). Plot a graph of absorbance (OD) against volume of $CuSO_4$ and determine the concentration of copper in the test solution.



VIVA QUESTIONS	
1	What is Colorimetry?
2	What forms the basis for Colorimetric determination?
3	What is photoelectric Colorimeter?
4	What are filters? Why are they used?
5	What is wave length and frequency?
6	Why is estimation of Copper done at 620 nm wave length?
7	What is wave number?
8	State Beer's law and Lambert's law.
9	What is calibration curve?
10	What is meant by transmittance?
11	Why a filter of 620 nm is used in the estimation of Copper?
12	Mention a few important criteria for satisfactory Colorimetric analysis.
13	Mention a few advantages of Photoelectric Colorimetric determination.
14	What is Blank solution?
15	What is the basic requirement of a compound for its estimation by Colorimetric method?

Determination of viscosity coefficient of a given liquid using Ostwald's viscometer

Pipette out 10 cm^3 of the given liquid into the wide limb of the dry viscometer kept in a water bath. Suck the liquid through the other limb. Determine the time of flow between the two fixed points, one above and one below the bulb in the narrow limb of viscometer. Repeat and calculate the average time of flow. Pour out the liquid and wash the viscometer with acetone and dry it. Pipette out 10 cm^3 of distilled water into the wide limb, repeat the experiment and determine the average time of flow. From the densities of liquid and water, viscosity coefficient of water, determine the viscosity coefficient of the liquid.

$$\eta_l = \frac{t_l d_l}{t_w d_w} \eta_w$$

Where, d_l = density of liquid; d_w = density of water; t_l = time of flow of liquid; t_w = time of flow of water; η_w = viscosity of water

VIVA QUESTIONS	
1	What is Viscosity Coefficient of a liquid?
2	What is density of a liquid?
3	What is specific gravity?
4	How are specific gravity and density related?
5	What is SI unit of Viscosity Coefficient?
6	What are the factors that affect the viscosity of a liquid?
7	How does the viscosity vary with temperature?
8	Why is acetone used for cleaning viscometer?
9	Why do you require laboratory temperature for viscosity determination?
10	How is the viscosity of liquid related to its mobility?
11	What is fluidity of a liquid?