1. **You are provided with**:

i) Solution A: a solution containing 6.5g of H2A.xH2O in 1000cm3 of solution.

ii) Solution B: 0.1M Sodium hydroxide.

iii) Phenolphthalein indicator.

You are required to determine the value of x in the formular. $H_2A.XH_2O$

PROCEDURE:-

Pipette 25.0cm3 of solution A using a pipette filler into a $250cm^3$ conical flask.

Add 3 drops of phenolphthalein indicator. Fill the burette with solution B.

Titrate solution A with solution B.

Record your readings in table 1 below and repeat the titration two more times and complete table 1.

	I	II	III
Final burette reading			
Initial burette reading			
Volume of solution B used (cm^3)			

Calculate the: a) Average volume of solution B used.

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b) Number of moles of solution B used.

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c) Number of moles of solution A in 25cm3 of solution A given that 1 mole of solution A completely reacts with 2moles of solution B.
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d) Relative formula mass of A.

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e) The formula of A has the form $H_2A.\ XH_2O$. Determine the value of X in the formula given that the relative formula mass of A is 88.0 and the atomic masses of oxygen and hydrogen are 16.0 and 1.0 respectively.

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2. **You are provided with:**

i) 1.0M Iron (III) chloride, solution C.

ii) 3M sodium hydroxide, solution D.

You are required to determine the volume of Iron (III) chloride needed to react exactly with a certain volume of 3M sodium hydroxide.

PROCEDURE:

a) Put seven boiling tubes side by side and label them as 1, 2,3,4,6 and 7 respectively.

b) In each boiling tube place 5.0cm_3 of 3M NaOH.

c) In the boiling tube labelled 1 put 1.0cm_3 of 1.0M Iron (III) Chloride, shake the contents of the boiling tube, add 18cm_3 of water to make the total volume 24cm_3.

d) Measure the height of the precipitate obtained in millimetres.

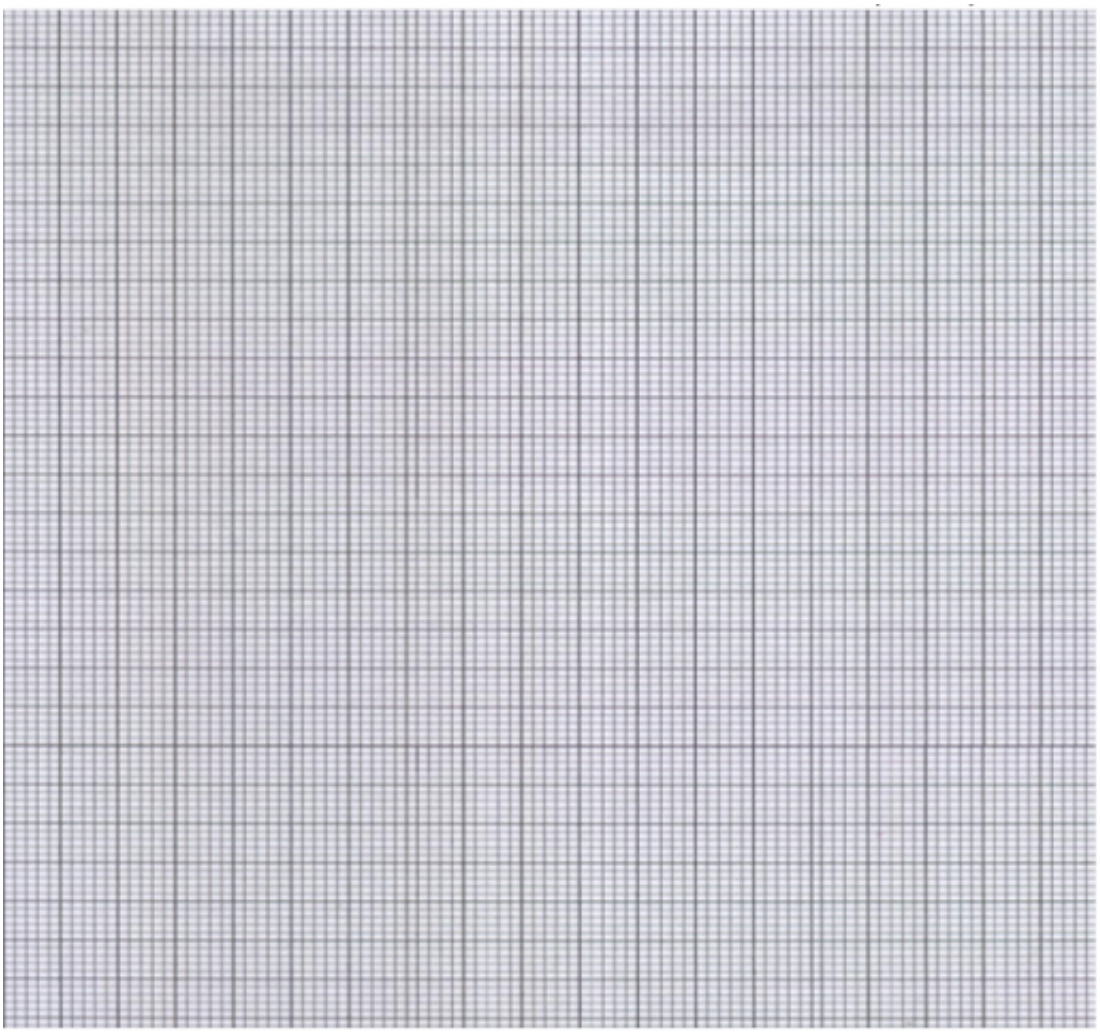
e) Repeat steps c and d using the contents of the boiling tubes labelled 2, 3, 4, 5, 6 and 7.

f) **Complete table 2.**

Table 1

	I	II	III
Final burette reading			
Initial burette reading			
Volume of solution B used (cm^3)			

a) Plot a graph of height of the precipitate (y-axis) against volume of Iron (III) Chloride.



b) Obtain from the graph the volume of Iron (III) Chloride needed to exactly react with 5.0cm^3 of 3M sodium hydroxide.

3. a) **You are provided with E.**

Carry out the tests below and record your observations and inferences in the spaces provided.

i) Place about one-half of solid E in a dry test tube. Heat it strongly and test any gas produced using Hydrochloric acid on a glass rod.

Observations	Inferences
(2marks)	(1mark)

b) You are provided with solid F carry out the tests below and write your observation and inferences in the spaces provided.

I) Place about one third of solid F on a metallic spatula and burn it in a Bunsen burner flame.

II) Dissolve the remaining solid F in about 10cm3 of distilled water in a boiling tube. Use the solution for the tests below. i) Place 2cm3 of the solution into a test tube and add 3 drops of bromine water and warm.

ii) To $2cm^3$ of solution add 2 drops of acidified potassium manganate (VII) and warm.

iii) To 2cm3 of the solution add all sodium hydrogen carbonate provided.

iv) Determine the pH of the solution

ii) Place the rest of solid E in a boiling tube. Add about 10cm3 of distilled water. Shake well and use 2cm3 portions for each of the tests below. I) To one portion, add aqueous ammonia dropwise until in excess.

Observations	Inferences
(2marks)	(1mark)

To the second portion, add about 1cm3 of hydrochloric acid.

Observations	Inferences
(2marks)	(1mark)

To the third portion, add to drops of lead (II) nitrate and heat the mixture to boiling.

Observations	Inferences
(2marks)	(1mark)

b) You are provided with solid F carry out the tests below and write your observation and inferences in the spaces provided.

Observation	Inferences
(1mark)	(1mark)

II) Dissolve the remaining solid F in about 10cm3 of distilled water in a boiling tube. Use the solution for the tests below. i) Place 2cm3 of the solution into a test tube and add 3 drops of bromine water and warm.

Observation	Inferences
(1mark)	(1mark)

i) To 2cm3 of solution add 2 drops of acidified potassium manganate (VII) and warm.

Observation	Inferences
(1mark)	(1mark)

iii) To 2cm3 of the solution add all sodium hydrogen carbonate provided.

Observation	Inferences
(1mark)	(1mark)

iv) Determine the pH of the solution

State the procedure used	Inferences
(2marks)	(1mark)