

You are provided with the following solutions:-

A: containing 20.16g of the hydrated oxalic acid dissolved to make 1 litre solution.

B: containing 16g of sodium hydroxide dissolved to make 1 litre solution.

To determine the value of X proceed as follows:

- i. Fill the burette with solution **A**.
- ii. Pipette 20.00cm³/25.00cm³ of solution B and put in a conical flask.
- iii. Titrate A against B using two drops of suitable indicator among the indicator given.
- iv. Repeat the titrations to obtain three more values and record in a tabular form as follows:-

titre Burette readings	pilot	1	2	3
Final volume(cm ³)				
Initial volume(cm ³)				
Volume of acid used(cm ³)				

QUESTIONS:

- a) i) at the end point of reaction colour of the solution change from _____to_____
- ii) indicate the volume of the pipette used_____.
- iii) complete the average volume of the acid_____.
- b) Calculate molarities of base
- c) Write the balanced chemical equation for the reaction.
- d) Calculate molarities of acid.
- e) Calculate value of **X** in hydrated oxalic acid.
- f) State the four application of volumetric analysis in daily life.

2. sample **E** is a normal salt containing one cation and one anion. Carry out the experiments described in the experimental table. carefully record your observations and inferences appropriately to identify the anion and cation present in sample **E**

Experimental table

S/N	Experiment	Observation	Inference
(a)	Appearance of the sample E		
(b)	To a small portion in dry test sample in a test tube add enough amount of distilled water. Warm if insoluble.		
(c)	To a small portion of a dry sample in a test tube add concentrated H_2SO_4 acid.		
(d)	To a small portion of dry sample in a dry test tube heat gently and then strongly until no further change.		
(e)	Put a small portion of sample in a dry test tube followed by dilute HCl acid. Divide the solution into 3 portions.		
	i) To one portion add NaOH in excess.		
	ii) To a second portion add MgSO_4 solution. If no precipitate warm the contents.		
	iii) To third portion add Ammonia solution till in excess.		

QUESTIONS:

a) i) the cation in a sample E is _____ and anion is _____

ii) the name of the sample E is_____

iii) the chemical formula of sample E is _____

b) with the aid of a balanced ionic equation, explain the effect of the dilute HCl to the sample E in experiment (e).