

GOVT.DEGREE COLLEGE FOR MEN, SRIKAKULAM

DEPARTMENT OF CHEMICAL SCIENCES

ACTIVITY: EXPERIENTIAL LEARNING

TITRATION: Titration is a common laboratory method of quantitative chemical analysis to determine the concentration of an identified analyte. Titration is an important technique in the field of analytical chemistry.

TYPES OF TITRATIONS:

1.Volumetric titrations: Volumetric analysis is a method of quantitative analysis where the amount of a substance is determined by measuring the volume that it occupies. This method can be used for solids, liquids and gases. To carry out volumetric analysis a standard solution must first be prepared.

2.Conductometric titrations: It is a laboratory method of qualitative analysis in which concentration of sample is determined which is done by adding a reagent (titrant)of known concentration in measured volumes to the sample(analyte).

OBJECTIVES:

- To determine the concentration of an unknown solution by reacting with the known reactant.
- To find the equivalence point of Acid-Base reaction by titration and to find unknown concentration of Acid.

METHODOLOGY FOR VOLUMETRIC ANALYSIS:

In volumetric analysis the reagent of a known concentration (titrant)is mixed with the unknown solution (analyte) until the reaction between them is just complete. The point at which the reaction is complete is called the endpoint. The volume of titrant required to reach the endpoint is a measure of the analyte's concentration.

There are three main methods of volumetric analysis 1. Acid-base 2. Redox 3. Complexometric titrations.

1.Acid-Base Titrations: Here base is titrant and analyte is an acid. The endpoint of the titration is reached when the acid and base react to form water.

2.Red-Ox Titration: In redox titration, the titrant is a reagent that can be oxidised or reduced and the analyte is a reagent that can be oxidised or reduced.

3.Complexometric titrations: In this method, the analyte is a metal ion and the titrant is a ligand. The Metal ligand complex has a different colour than the metal ion which is the end point.

METHODOLOGY FOR CONDUCTOMETRIC ANALYSIS (Acid-Base)

Conductometric titrations which includes strong acid Vs strong base, strong base Vs weak acid, Strong acid Vs weak base and weak acid Vs weak base Acid diluted with distilled water is taken in a beaker and burette is filled with a base. A conductivity cell is introduced into the diluted acid solution and the

conductivity cell is connected to a digital conductometer in order to obtain an initial reading. The base must now be added dropwise into the acid solution. A sharp change or increase implies that the end point has reached. These observed values must now be plotted graphically. The equivalence point can be obtained from the point of intersection between the two lines.

PRINCIPLE: Conductometry is based on the principle of determination of change in conductivity. Change in conductance is due to replacement of ions with each other. Ionic conductivity is different for different ions which impacts the overall electrolytic conductivity of the solution.

COURSE OUTCOMES: By the end of the course the students are expected to be able to

- Carry out titrations and the associated calculations.
- Identify the end point in titrations.
- Analyse a titration curve to determine the strength of an acid/base
- Calculate the concentration of an unknown acid or base using titration.
- Skills in laboratory techniques and experience in instrumental handling.
- Understand the concept of titration, end point and equivalence point and how they relate to neutralisation reaction.

REPORT ON VOLUMETRIC AND CONDUCTOMETRIC TITRATIONS

LIST OF EXPERIMENTS

I WATER ANALYSIS

- a) Hardness of Water: Temporary, permanent and Total hardness of water.
 - b) Determination of Carbonate and bi-carbonate present in the water sample.
 - c) Determination of Chloride in water sample by Mohr's method
2. Estimation of Iron(II) with Potassium permanganate using oxalic acid as a primary standard
 3. Copper(II) with Hypo using Potassium dichromate as standard solution.

II ACID HYDROLYSIS OF ESTER: Prove that acid hydrolysis of ester follows first order kinetics

III. CONDUCTOMETRIC TITRATIONS

1. Determine the concentration of given HCl solution using Standard NaOH solution.
2. Determine the concentration of CH_3COOH solution using standard NaOH solution.

ABSTRACT

S.No	Academic year	No of Experiments conducted	No of students involved
1	2018-19	06	178
2	2019-20	06	155
3	2020-21	05	230
4	2021-22	06	259
5	2022-23	08	155

FEEDBACK ON EXPERIENTIAL LEARNING ON TITRATIONS

<https://drive.google.com/file/d/1dMb1v349D44pAlG-sdLQtEukYSomaY-/view?usp=drivesdk>

PHOTO – GALLERY

VOLUMETRIC ANALYSIS







CONDUCTOMETRIC TITRATIONS



