



MACHAKOS UNIVERSITY

DEPARTMENT OF PHYSICAL SCIENCES
(CHEMISTRY)

Data Sheet

SCH 100: FUNDAMENTALS OF INORGANIC CHEMISTRY

No: Chem. Lab:.....

EXPERIMENT TITLE:.....

Reg. / No:..... Student's Name:.....

Date:.....

Technologist's Name:..... Signature:.....

Date:.....

RESULTS AND CALCULATIONS:

Note: -The results and calculations should be written on this sheet and signed by the technologist in charge at the end of the experiment.

EXPERIMENT 1: TITRATION OF A WEAK ACID WITH A STRONG BASE

Introduction

This experiment involves the titration of a weak acid, CH_3COOH , with a strong base, NaOH , and the selection of a suitable indicator for the titration. Acid – base titrations form one branch of volumetric analysis. Other branches such as redox precipitation and complexometric titrations will be studied later.

1.0 Theory of acid- base titrations

The purpose of titrating say an alkaline solution with standard solution of an acid is the determining of the exact amount of acid which is chemically equivalent to the amount of base present. The point at which chemically equivalent amounts of acid and base are present is known as either the equivalent point or the end point. The pH of a solution at the equivalence point depends upon the nature of the acid and the base being titrated. If both are strong electrolytes, the solution will be neutral i.e. $[\text{H}^-]=[\text{OH}^-]$ and will have a pH of 7. If we titrate a weak acid with a strong base, there will be hydrolysis of the anion of the acid.



And the solution will be basic ($\text{pH}>7$). Similarly, for titration of a strong acid with a weak base, hydrolysis occurs and the solution will have a pH less than 7.

Choice of Indicators

The most important method of detecting the end point of an acid-base titration involves the use of pH indicators. These are substances, weak organic bases or acids which possess different colours according to the pH of a solution. The general rule of indicators can be summarized as follows:

- Strong acid titrated with a strong base-any indicator
- Strong acid titrated with a weak base- methyl orange
- Weak acid and a weak base- not titrated

Titration of ethanoic acid with NaOH using different indicators

Apparatus: Burettes, 25ml pipette, 250ml beaker, conical flask, retort stand

Reagents: 0.1M NaOH , ethanoic acid, bromothymol blue indicator, phenolphthalein indicator

Titration using bromothymol blue indicator

- I. Pipette 25ml ethanoic acid provided into a 250ml conical flask. Add three drops of **bromothymol blue indicator**. Titrate the solution with the 0.1M NaOH solution to a blue end point.

Titration using phenolphthalein indicator

- I. Pipette 25ml ethanoic acid provided into a 250ml conical flask. Add three drops of **phenolphthalein indicator**. Titrate the solution with the 0.1M NaOH solution to a pink end point.
- II. Repeat the titration two more times to obtain concordant results

Record your data on a titration table on the datasheet

EXERCISES

1. Write the equation for the reaction of ethanoic acid with NaOH.
2. From the number of moles of base used in each experiment, calculate the number of moles of acid present in each case.
3. From the number of moles calculated, calculate the molarity of ethanoic acid
4. Discuss the reasons why titrations of weak acids with weak bases are not done.