بِسۡمِ ٱللَّهِ ٱلرَّحۡمَٰنِ ٱلرَّحِيمِ

Practical of General Chemistry

Department :- Radiology Techniques

Class:1st year

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- Exp:. 6
- Name of experiment :. Determine the concentration of sodium hydroxide solution (NaOH) by titrating it with a standard solution of 0.1 M hydrochloric acid (HCl).
- Purpose of experiment: to known the concentration of of NaOH

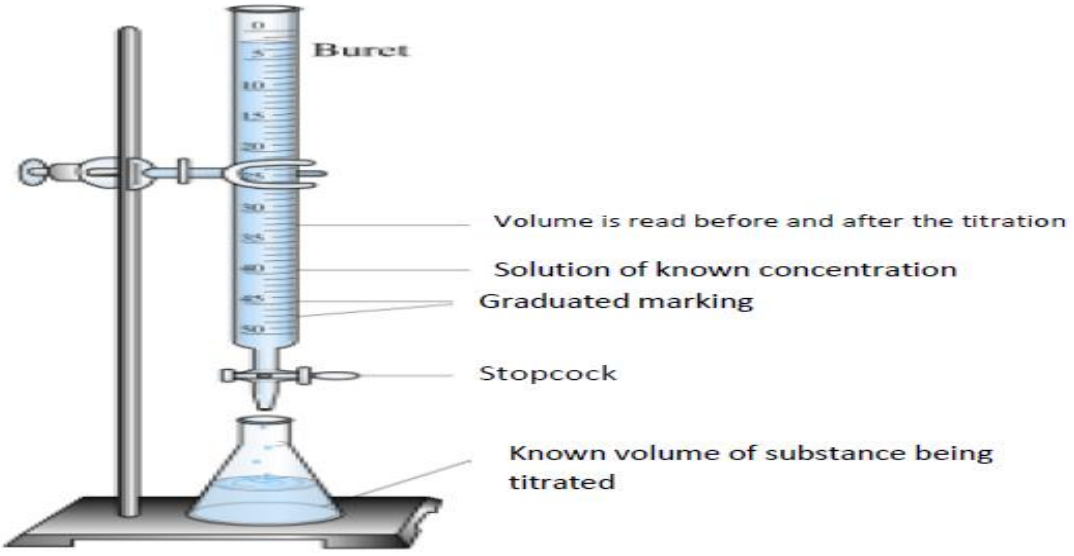


Figure (1): Titration equipment.

Introduction

The reaction of an acid and base is a neutralization reaction , the products of which are a salt and water

Acid + base (alkali) → salt + water

For example:

$HCl + NaOH \rightarrow NaCl(S) + H2O(L)$.

In an aqueous solution, virtually all of the OH^- ions present will react with all of the H^+ ions that are present:

$H^+_{(aq)} + OH_{-(aq)} \rightarrow H2O_{(l)}$

Because this reaction is essentially quantitative, it is possible to determine the concentration of an acid or base in an aqueous solution with high accuracy.

When a solution of hydrochloric acid, HCl, is exactly neutralized with a solution of sodium hydroxide, NaOH, the number of moles

of NaOH used will equal the number of moles of HCl originally present.

moles NaOH = moles HCl

(M NaOH)*(V NaOH) = (M HCl)*(V HCl)

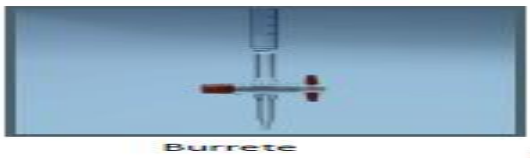
where M = concentration in molarity and V= volume.

Titration

The process by which the slow addition of a standard solution from a burette takes place to the material to be analyzed until the reaction is complete.

Tools, chemicals and devices used in this experiment:

1. Graduated Cylinder.
2. Conical flask (Erlenmeyer flask)
3. Burrete.
4. Stand.
5. burette.
5. Pipette
6. D.W and NaOH,HCL









Procedure

1) Prepare standard solution of HCl with 0.1 M and put the acid in the burette.

2) Prepare unknown solution of NaOH and put the base in the conical flask(prepare 0.1m and 20volume).

3) Put a chemical of phenolphthalein indicator in the contents of conical flask.



4) Open the burette stopcock and start the titration process until the solution changes color. Close the stopcock, indicating that the reaction has ended.

5) Use this equation to calculate the concentration of NaOH solution.

M1 * V1 = M2 * V2

Calculations

mole of NaOH = mole of HCl

(M NaOH)*(V NaOH) = (M HCl)*(V HCl)

M x V NaOH = 0.1 x (v) average

Discussion

a. What is the purpose of adding the phenolphthalein reagent?

b. What is the benefit of the titration process in this experiment?