**Experiment:1**

**\*Part A**

**Standardization of Sodium Hydroxide Solutions**

**Introduction:**

The purpose of this experiment is to determine the concentration of an unknown NaOH solution by acid-base titration.

KHC8H4O4 + NaOH KNaC8H4O4 + H2O

**Titration:**

-It is an analytical procedure used to determine the concentration of a sample by reacting it with a standard solution.

**Types of titration:**

**1)** acid –base titration.

**2)** redox titration.

**3)** complexometric titration.

-Acid-base titration is one type of titration uses a neutralization reaction, in which an acid and a base react to produce salt and water.

-The titration proceeds until the equivalence point is reached, where the number of moles of acid is equal to the number of moles of base.

-Equivalence point is marked by adding indicator.

**Standard Solution:**

It is a solution whose concentration is known accurately and used to standardize acidic and alkaline solution.

***\*Primary standard solution:* must be**

1-Inexpensive and readily available.

2-High purity and High solubility.

3-Stability (low reactivity).

4-Low hygroscopicity and efflorescence.

5-High equivalent weight.

Ex: Potassium Hydrogen Phthalate (KHP)

**\*Sodium hydroxide does not satisfy enough of the above requirements, so it cannot be used to prepare a standard alkaline solution directly. It must be standardized titrimetrically against a suitable primary standard such as KHP.**

**Indicator:**

It is any substance in solution that changes it's color as it react with either an acid or a base.

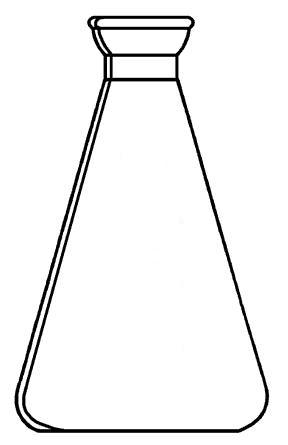
**Reagent:**

1-KHP (Potassium Hydrogen Phthalate) dried for 2 hours at 110 °c

(Standard Solution).

2-NaOH (Sodium Hydroxide Solution) 0.1M .

3-Phenolphthalein Indicator.

**Procedure:**

0.5 g KHP

100 ml H2O

2 drops indicator

***Erlenmeyer flask***

4- Titrate with NaOH to the first pink tinge that persists for at least 30 seconds.

**Calculation:**

Ex: If volume of NaOH react in standardization of NaOH = 25.3 ml

\*Molarity (M) of NaOH = moles of solute / liter of solution

\*m mole of KHP = wt. of KHP / m.wt

= 0.5 / 204.23 = 0.002448 mole = 2.448 m mole

\*M =2.448 / 25.3

= 0.097 M 0.1 M

**m.wt(KHP)=**

**k=39,H=1,C=12,P=16**

**39+1+(12\*8)+(1\*4)+(4\*16)=204,23**

**\*Part B**

**Standardization of Hydrochloric Acid Solution**

**Introduction:**

The purpose of this experiment is to determine the concentration of an unknown HCL solution by acid-base titration.

NaOH + HCL NaCL + H2O

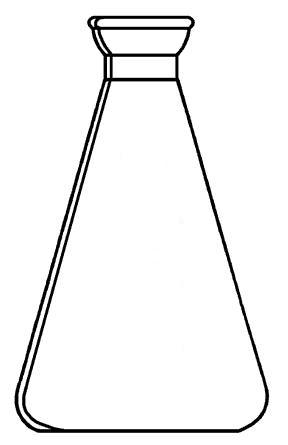
**Reagent:**

1-Phenolphthalein Indicator.

2-NaOH (Standard Solution) 0.1 M .

3-0.1 N HCL (Hydrochloric Acid).

**Procedure:**

****

10 ml HCL

10 ml H2O

. 2 drops indicator

***Erlenmeyer flask***

4- Titrate with NaOH to the first pink tinge that persist for at least 30 seconds.

**Calculation:**

Ex: If volume of NaOH react in standardization of HCL = 10.2 ml

\*M1 × V1 = M2 × V2

\*MHCL VHCL = MNaOH VNaOH

\*MHCL =( 0.097 10.2) / 10

= 0.099 M 0.1 M

**Good luck ☺**

Najla Alkhwaitim