Medical Chemistry Laboratory

EXPERIMENT 5

QUANTITATIVE ANALYSIS OF A MIXTURE (SODIUM HYDROXIDE + SODIUM CARBONATE)

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INTRODUCTION

- The analysis of such mixtures requires two titrations: one with an alkaline-range indicator, such as phenolphthalein with a transition range at a pH of about (9), and the other with an acid-range indicator, such as methyl orange.

PROCEDURE

1. Clean the burette and Homogenized with HCl solution.
2. Fill the burette with (0.1 N) HCl.
3. Transfer (10ml) unknown of a mixture solution into conical flask.
4. Add 1-2 drops of phenolphthalein indicator (solution become pink).
5. Titrate with standard (0.1 N) HCl from burette until the pink color disappears (change to colorless).

- At this grade: all the hydroxide and half of the carbonate have been neutralized. Let us assume that the volume of acid by “P” ml.

PROCEDURE

6. Now add 2-3 drops methyl orange indicator in to the mixture solution (become yellow).
7. Titration until the solution just beings to change from yellow to red (Onion).

- At this grade: all the hydroxide and all of the carbon have been neutralized. Let us assume that the volume of acid by "M" ml.

The equation of reaction :

$$Na_2CO_3 + NaOH + HCl \xrightarrow{\text{Ph.Ph}} NaHCO_3 + NaCl + H_2O \xrightarrow[\text{HCl}]{\text{M.O}} NaCl + H_2CO_3$$

CALCULATION

- ✓ P (ml) = Volume of HCl which equivalent to all OH^- and ½ $CO_3^=$.
- ✓ M (ml) = Volume of HCl which equivalent to all OH^- and all $CO_3^=$.
- ✓ M-P = Volume of HCl which equivalent to ½ $CO_3^=$.
- ✓ 2(M-P) = Volume of HCl which equivalent to all $CO_3^=$.
- ✓ M-2(M-P) = Volume of HCl which equivalent to all OH^-.

CALCULATION

- ***calculate the normality of hydroxide:***
  - N_{acid} x V_{acid}[M-2(M-m)] = N_{base} X V_{base}
- ***To calculate the normality of carbonate:***
  - N_{acid} x V_{acid}[2(M-m)] = N_{base} X V_{base}
- ***Weight in grams per liter (no. of grams)*** = Normality x GEW
  - GEW for NaOH = 40 g/mol ***and*** GEW for Na_2CO_3 = 53 g/mol
    - $NaOH\ \%\ \frac{W}{V} = no.of\ grams\ x\ \frac{100}{1000}$
    - $Na_2CO_3\ \%\ \frac{W}{V} = no.of\ grams\ x\ \frac{100}{1000}$