Republic of Iraq

Ministry of Higher Education and Scientific Research

University of Babylon

College of Pharmacy

Department of Pharmaceutical Chemistry

Practical Analytical Chemistry

For

1st Year Pharmacy Students/ Semester I-

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By

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Experiment No. 4 /Determination percentage of

Acetic acid in commercial vinegar sample

Theory:

Determination of acetic acid concentration in commercially available white vinegar is one of the simplest and easiest titrations. It is also possible to determine concentration of acetic acid in other types of vinegar.

The only problem is that the color of the vinegar can make it difficult to spot the end point. However, in most cases even vinegars made of red wine after being diluted for titration - are pale enough so that the phenolphthalein color at the end point can be easily spotted.

Vinegar can have different strengths. Most popular are concentrations between 4% and 15% In case of such concentrated solutions it may be impossible to simply take a single sample for titration. We won't be able to measure such a volume of liquid with reasonable accuracy, thus we are forced to dilute the original acid.

Purpose of this experiment

Determination percentage of Acetic acid in commercial vinegar sample

❖ Determination of acetic acid concentration in commercially available white vinegar is one of the simplest and easiest titrations

❖ The active component in vinegar is acetic acid in which the concentration ranges from 4-6%

❖ acetic acid is classified as weak monobasic the titration will be occur with standard solution of NaOH

❖ Phenolphthalein will be appropriate indicator for this titration

❖ Any vinegar sample may be used but colorless vinegar is preferred because its give less interferances with the observation of indicator end point color change

❖

$CH_3COOH + NaOH \rightarrow CH_3COONa + H_2O$
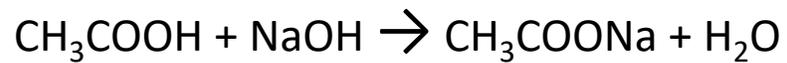
Colorless   Red

Acetic acid reacts with NaOH on the 1:1 basis

Preparation standard solution of NaOH

Example : Prepare 0.1 M of NaOH in 250 ml of D.Water

Wt= M x M.wt. x V(ml) / 1000

= 0.1 x 250 x 40/ 1000   = 1g of NaOH will dissolve in 250 ml of D.W

Procedure:-

1. Weigh accurately 5 ml volume of the Vinegar solution

2. Transfer to conical flask and add 50 ml water .

3. Add one or two drops of ph. ph. indicator to this solution.

4. Add 0.05 N NaOH from the burette gradually with continuous swirling of the solution in the conical flask and near the end point, NaOH is added drop by drop. Continue the addition of NaOH until the color of the solution passes from Colorless to faint red /pink.

5. Repeat the experiment three times and tabulate your results then take the mean of the three readings

Calculations:-

$$M \times V_{(acetic\ acid)} = M \times V_{(NaOH)}$$

$$M = \ldots\ldots\ldots g.mole/L$$

$$Wt_{acetic} = \frac{A_{cetic} \times V \times Mwt}{1000}$$

%Acetic = Wt of acetic / Wt of vinegar

From previous calculation

Wt of vinger = d X v
= 1.05 X 1
=1.05

Discussion:-

1. A word equation summarizing the souring of wine is:

Grain alcohol (C_2H_5OH) + oxygen → acetic acid + water. Please convert this word equation to a balanced chemical equation.

 2. Different vinegars may have different percentages of acetic acid. Is vinegar a mixture, compound, or an element?

3. There are two kinds of vinegars, what the different between them?