**Lab (7) Determination of Acidity and Organic acids**

**Why Acidity is important... ACIDITY** is an important parameter in food.

1. Determination of acidity can determine the degree of maturity of fruits and vegetables such as: If the determination of organic acids contained in the grape than in the malic acid tartaric acid, the description is not yet ripe grapes, ripe grapes because a lot of tartaric acid **.** Different types of fruits and vegetables, due to acid maturity, growing conditions vary, generally the higher the maturity, the lower the acid content.
2. To determine the freshness of foods such as: fresh milk, the lactic acid levels in the high, that milk is rotten; fruits of free product in galacturonic acids, that are rotten fruits of the contamination.
3. Acidity also influences the growth ability of microorganisms, such as bacteria and fungi. Commonly, the higher the acidity of a food item, the less likely are the chances that it is spoilt by microorganisms. To give an example: The most dangerous and most probably best known microorganism in food is *Clostridium botulinum*, a bacterium that produces several toxins and has caused innumerous deaths in humans.
4. Acidity indicators reflect the quality of food the amount of organic acids in food directly affects the food flavor, color, stability, and the level of quality. Determination of acid on the microbial fermentation process has a certain significance. Such as: pickling. Pickling is the process of preserving food by anaerobic fermentation in brine to produce lactic acid, or storing it in acidic solutions, such as vinegar, wine, beer and soy sauce, and other acids is also an important indicator of quality.

**pH measurement**

pH measurement is one of the most important parameters in the quality control of foodstuffs. pH provides in formation on the quality of natural products such as citrus fruits, juices or dairy products for example.

Furthermore, pH is an important parameter in the use of acidity regulators as preservatives.

The requirements of the pH electrode that is used for measurement are just as varied as the many foods to be analyzed. The selection of a diaphragm that is appropriate for the sample is especially important since otherwise the electrolyte bridge can quickly become blocked by the

sample, which leads to erroneous measurements.



**Figure 1: The pH scale and pH values of various foodstuffs .**

**pH Testing Procedure**  
  
1. Rinse each test tube with the water sample. Gloves should be worn to avoid skin contact with the water.  
2. Fill the tube to the 5mL line with sample water.  
3. While holding a dropper bottle vertically, add 10 drops of Wide Range Indicator Solution.  
4. Cap and invert several times to mix.  
5. Insert the tube into the Wide Range pH Comparator. Hold the comparator up to a light source. Match the sample color to a color standard.  
6. Record the pH value.  
7. Wash your hands

**Experiment. Determining acidity (citric acid content)**

Citric acid, and small amounts of malic and tartaric acid, give citrus its tartness and unique taste. The levels of acid are at the highest concentrations early in the season and they decrease as the fruit mature.

The amount of acid present in the juice is reported as percent citric acid. To calculate this value we use a titration with sodium hydroxide.

**Equipment**

- 50 mL burette - Burette stand and clamp - 10 mL pipette and pump

- 1 L volumetric flask - 0.1 M sodium hydroxide (NaOH)

- 1% Phenolphthalein indicator - 100 mL conical flask - Pipette

- Distilled water - Fresh Juice - Gloves, safety glasses and lab coat (ensure all students are wearing)

**PRINCIPLE**

Acidity of the sample is determined by titration of a diluted sample with sodium hydroxide to a specified pH value. Since more than one acid may contribute to acidity of the sample, the value is reported as millie quivalents of acid per unit sample weight.

**Procedure Titration**

1. Pipette 10 mL of juice into a clean conical flask .

2. Clean pipette immediately .

3. Pipette 10 mL of distilled water into the conical flask containing the juice .

4. Add six drops of phenolphthalein indicator to flask .

5. Carefully swish mixture .

6. Fill the burette with 0.1 M sodium hydroxide solution .

7. Open burette tap and allow a trickle of sodium hydroxide NaOH to run into a beaker. This is to ensure no air is in the burette prior to titration .

8. Refill the burette, making sure that it reads zero at the top of the scale.

9. Hold the conical flask containing the juice mix under the burette and while swirling, slowly add the sodium hydroxide to the juice.

10. Keep adding sodium hydroxide to the flask while swirling until the solution just starts to change colour to pink/purple. This is the end point and you should now record how much sodium hydroxide you have added to the flask.

11. Multiply the volume of sodium hydroxide added by 0.064 to get the value of the acid (in grams per 100ml).

**Note** the end point of the titration may be very difficult to tell at the start until you get used to the procedure. If you look closely you will see the juice mix slowly lighten in colour and then change to a green colour. This is the point just before the end of the titration and a few extra drops will see the solution change colour to pink. If you go past this point, and the solution becomes a deep purple/orange, you have gone too far.

**Example Calculation of acid content.**

Amount of 0.1 M sodium hydroxide added = 24.2 mL

Millilitres of 0.1M sodium hydroxide x 0.064 = citric acid concentration (g per 100 mL)

e.g. 24.2 x 0.064 = 1.55 g per 100 mL citric acid.

0.064 = Equivalent weight for Citric acid