

Experiment II

Secret Behind the Delicious Juices

I. Introduction

Acidity is a property of substances that can be taste. Foods have certain acidity to make them delicious and safe to eat. Too much acid or too little acid make foods harmful to eat. This is usually the case in expired foods. *Be aware with food of expire date.*

A very simple way to determine acidity of substances is using a litmus paper. Simple litmus papers produced in two colors appearance, i.e., red and blue. If a red litmus paper is immersed in an acidic substance, the color does not change, but when immersed in a non-acidic substance the color changes to blue (non-acidic substances also known as base substances). If a blue litmus paper is immersed in a base substance, the color does not change, but when immersed in an acid substance the color changes to red.

	Acid	Base (non-acidic)
Red Litmus	Remains red	Changes to blue
Blue Litmus	Changes to red	Remains blue

Acid or base substances can also be used to make chemical cell, like battery. By immersing a pair of different kinds of metals (a pair of electrodes) in the substance, we can measure an electric potential (voltage) produced by the pair of the electrodes.

II. Objectives

The main objectives of the present exploration are as follows.

- [1] Classifying various substances, either acid or base, using litmus papers
- [2] Identifying the voltage generated by batteries made of various substances and different pairs of electrodes.

III. Equipments

- [1] Four different juices: Strawberry, pineapple, orange, sour-sop.
- [2] Limewater.
- [3] Soap water
- [4] Four different electrodes: iron, zinc, copper, and stainless steel.
- [5] Pure water
- [6] Plastic cups
- [7] Connector cables
- [8] Blue and red litmus papers
- [9] Voltmeter
- [10] Spoon

IV. Procedure

IV. A. Identifying a substance, either an acid or a base

- [1] Put one spoon of strawberry juice in a plastic cup
- [2] Use litmus paper by immersing for 1 minute to test the acidity.
- [3] Conclude either the substance is an acid or a base
- [4] Write your observation results on the answer sheet
- [5] Repeat steps [1] – [4] for different juices and for limewater and soap water.
- [6] Classify which substances are acids and which substances are bases.

IV.B Changing the Acidity

Mix one spoon of orange juice and one spoon of limewater (measured using spoon).

- [1] Observe the color of red litmus paper when immersed in the mixture.
- [2] If the color of litmus paper in [1] does not change, add the limewater into the mixture. Determine the volume of limewater (number of spoonful) at which the color of red litmus paper suddenly changes into blue.
- [3] If the color of litmus paper in [1] changes to blue, add the orange juice into the mixture. Determine the volume of the orange juice (number of spoonful) at which the color of red litmus paper does not change.

IV. C Making Batteries

- [1] Pour strawberry juice into a clean cup to fill about three fourth of the cup volume.
- [2] Immerse a pair of electrodes into the strawberry juice and measure the voltage generated by these pairs.
- [3] Repeat step [2] for all combinations of electrode pairs. Write down your observations in the answer sheet of paper and determine the best combination or the highest voltage.
- [4] Replace the strawberry juice with other juices using a pair of electrode, which produce the highest voltage to determine the best juice.
- [5] Using a certain pair of electrode, measure the voltage generated by the electrode pairs immersed in a certain juice for different juice volumes. Does the potential depend on the juice volume?
- [6] When one spoon juice is diluted with 5 spoons of water, 10 spoons of water, 15 spoons of water, does the potential generated by a pair of electrodes change?

V. Conclusion

Write down the general conclusion you obtained from this exploration.