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Institute of Science and Technology

Department of Mechanical and Electromechanical Engineering Process Engineering 2nd year

**Solution Chemistry practical’s Works**



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**Experiment 1 :BUFFER SOLUTIONS**

 We will know the definition of a buffer solution and its properties

# Introduction

 A buffer solution is a mixture of an acid and a base of the same couple, in equal quantities (equimolar mixture), or in similar

$$pH=Pka+log\frac{\left[Base\right]}{\left[Acid\right]}$$

# reagents:

* hydrochloric acid (37%)
* sodium hydrochloric acid
* ethanoic acid or Acetic acid (99%)
* sodium ethanoate

**In the repport you have to calculate the volume or the mass necessary to prepare 50ml of 0,1M of each solution**

# Procedure:

**Part 1: Preparation of the buffer solution**

 We want to prepare an equimolar mixture of ethanoic acid CH3COOH(0,1M) and ethanoate CH3COO- (0,1M). The pKa of this Caple is 4.75.

1. Pour 50 mL of 0.10 mol. L-1ethanoic acid solution into a 250 mL beaker., and 50 mL of 0.10 mol. L-1 sodium ethanoate solution and homogenize it.
2. Distribute approximately evenly the solution obtained in 3 beakers of 100 mL.
3. **What should be the pH of such a solution? (calculate it in your repport)**
4. Experimentally check the pH.

**Part 2:** **Study of the properties of the buffer solution**

1. **Moderate addition of acid to the solution**

• In a beaker, pour 20 mL of buffer solution

 • Measure the pH of the buffer solution, then the pH after successive additions of 2.00 mL of hydrochloric acid (0,1M).

 • Do the same by replacing the buffer solution with distilled water.

• Record the measurements in a table.

1. **Moderate basic addition to the solution**

• In a beaker, pour 20 mL of buffer solution.

• Measure the pH of the buffer solution, then the pH after successive additions of 2.00 mL of sodium hydroxide (0,1M).

• Do the same by replacing the buffer solution with distilled water.

 • Note the measurements in a table.

1. **Influence of dilution**

• Record in the table the pH of the buffer solution

• Dilute 1/10 of the solution

• Measure the pH of the solution obtained Comparison with ethanoic acid solution (stock solution)

• Measure the pH of the ethanoic acid solution

 • Dilute this solution 1/10

 • Measure pH of the solution obtained Comparison with ethanoic acid solution (stock solution).

# QUESTIONS :

1. Give the principle of this experiment
2. give the pictograms of the products used
3. calculate the pH of each measurement and compare it with pH value obtained with pHmeter.