

Lab sheet #4

-Preparation of Different Buffer Solutions-

A) Nature of buffers:

Method and calculations:

You are provided with: 0.2M solution of CH₃COOH and 0.2M solution of CH₃COONa.

1. Determine which the weak acid is and which is the conjugated base [its salt].

.....

2. Calculate the volume that you must take from CH₃COOH and CH₃COONa to prepare the following mixtures with final volume of the solution =20 ml:

1. 100% [HA] 2. 75% [HA] , 25% [A-] 3. 50% [HA] , 50% [A-] 4. 25% [HA] , 75% [A-]

.....

.....

.....

.....

.....

3. Mix the solutions properly and measure the pH of final solution.

4. Calculate the pH for each solution mixture and record results in the table below. [pKa= 4.76].

.....

.....

.....

.....

.....

Record your results in the following table:

Solution	HA (ml)	A- (ml)	Final volume	Calculated pH	Measured pH	2M HCl (ml)	Measured pH	The difference
100%[HA]			20 ml			0.1		
75%[HA],25%[A-]			20 ml			0.1		
50%[HA],50%[A-]			20 ml			0.1		
25%[HA],75%[A-]			20 ml			0.1		

B) Preparation of buffer:

You are provided with **0.2M acetic acid** and **solid sodium acetate**.

-Prepare 50ml of a 0.19M acetate buffer pH =4.86 if you know that (pKa=4.7).

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

➔ Now, take ml from 0.2M acetic acid and add g from solid sodium acetate and then complete the volume up to 50 ml by addition of water.

C) Testing for buffering behaviour:

1. In one beaker add 10ml of 0.19M acetate buffer that you have prepared, and in another beaker add 10ml of 0.2M KCl.

2. Follow the table.

Solution	Measured pH	2M HCl	Measured pH
0.19 M acetate buffer (prepared in step B)		0.1 ml	
0.2M KCl.		0.1 ml	

In the **discussion** after introducing your discussion

(A)

- Discuss the calculated pH and the measured pH
- Discuss the resistance, and explain the reason behind the resistance (is it the same as you expected or not and why). each solution must be discussed

(C)

- Is the measured pH of your prepared buffer the same as calculated?
- Discuss the resistance between your buffer and the KCl -explain the reason behind the resistance-

Formulas needed for this lab:

$$pH = pK_a + \log \frac{[A^-]}{[HA]}$$

$$pH = \frac{pK_a + p[HA]}{2}$$

$$pOH = \frac{pk_b + p[OH]}{2}$$

$$\text{Molarity} = \frac{\text{moles of solute (mole)}}{\text{volume of solution in (L)}}$$

$$\text{Moles} = \frac{\text{weight (g)}}{\text{Molecular weight } (\frac{g}{\text{mole}})}$$