

**Buffers Worksheet**

As you work through the steps in the lab procedure, record your experimental values and the results on this worksheet. Use the exact values you record for your data to make later calculations.

All pH measurements and calculations should be reported to two decimal places. Concentrations are from calculations involving the volume (3 significant figures) and molarity (2 significant figures). Masses are acquired on a balance that reads to the 0.001 decimal place.

**Part A - Acetate Buffer by the Direct Method**

Complete the following table.

**Table A. pH Data for Acetate Buffers (Direct Method)**

<b>Solution #</b>	<b>mL of 0.60 M HC<sub>2</sub>H<sub>3</sub>O<sub>2</sub></b>	<b>mL of 0.60 M NaC<sub>2</sub>H<sub>3</sub>O<sub>2</sub></b>	<b>pH</b>
<b>1A</b>	30.0	0.00	
<b>2A</b>	30.0	10.0	
<b>3A</b>	0.00	30.0	
<b>4A</b>	10.0	30.0	
<b>5A</b>	20.0	20.0	

Enter the calculations on your lab worksheet, if this is not already completed from the prelab.

Based on your observations in Part A, which of the following statements are true? (Select all that apply. *Note: The order of these options may be different in the WebAssign question.*)

- The pH decreases as the mL of acid added minus the mL of base added increases.
- The pH increases as the mmol of base added increases.
- The pH decreases as the mmol of acid added minus the mmol of base added increases.
- The pH increases as the mmol of base added minus the mmol of acid added increases.
- The pH decreases as the mL of acid added increases.
- The pH increases as the mL of base added increases.
- The pH decreases as the mmol of acid added increases.
- The pH increases as the mL of base added minus the mL of acid added increases.

### Part B - Acetate Buffer by the Indirect Method

How many mmol of acetic acid are present in your sample in 1B?

Enter your calculated values in Table B.

**Table B. pH Data for Acetate Buffers (Indirect Method)**

Solution #	mL of NaOH added	Total mL NaOH added	pH	Total mmol NaOH added	Buffer?
1B	0.00	0.00			
2B	4.00	4.00			
3B	5.00	9.00			
4B	6.00	15.0			
5B	10.0	25.0			

For Part B, you are asked to assess which of the mixtures are buffers. Which of the following are true about the solutions you labeled as buffers? (Select all that apply. *Note: The order of these options may be different in the WebAssign question.*)

- They all contain only acetic acid.
- They all contain both acetate ions and acetic acid.
- They all contain more acetic acid than acetate ions.
- They all contain more acetate ions than acetic acid.
- They all contain only acetate ions.
- They all contain equal amounts of acetate ions and acetic acid.

### Part C - Phosphate Buffer by the Direct Method

Enter results into Table C.

**Table C. Data for Phosphate Buffer**

<b>pH assigned</b>	
<b>actual mass of <math>\text{Na}_2\text{HPO}_4 \cdot 7 \text{H}_2\text{O}</math> used</b>	g
<b>other phosphate compound used</b>	
<b>calculated mass of other phosphate compound to use</b>	g
<b>actual mass of other phosphate compound used</b>	g
<b>initial measured pH of buffer</b>	
<b>action taken</b>	
<b>final measured pH of buffer</b>	