

## Data Tables

### Part A. pH of Acetic Acid–Sodium Acetate Buffer

mL of 0.2 M HCl added	pH		mL of 0.2 M NaOH added	pH	
	Actual	Calc.		Actual	Calc.
0			0		
1.0			1.0		
2.0			2.0		
3.0			3.0		
4.0			4.0		
5.0			5.0		
6.0			6.0		
7.0			7.0		
8.0			8.0		
9.0			9.0		
10.0			10.0		

### Part B. pH of Ammonia–Ammonium Chloride Buffer

mL of 0.2 M HCl added	pH		mL of 0.2 M NaOH added	pH	
	Actual	Calc.		Actual	Calc.
0			0		
1.0			1.0		
2.0			2.0		
3.0			3.0		
4.0			4.0		
5.0			5.0		
6.0			6.0		
7.0			7.0		
8.0			8.0		
9.0			9.0		
10.0			10.0		

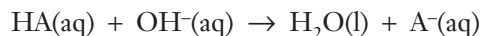
### Part C.

mL of 0.1 M CH<sub>3</sub>COOH \_\_\_\_\_ mL      pH \_\_\_\_\_ (calc.)

mL of 0.1 M NaCH<sub>3</sub>COO \_\_\_\_\_ mL      pH \_\_\_\_\_ (actual)

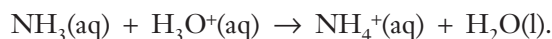
## Calculations

1. Using Equation 4 on page 1, calculate the pH of the Part A acetic acid–sodium acetate buffer solution before and after 1.0 mL of 0.2 M HCl solution is added to the buffer.  $K_a$  of acetic acid equals  $1.8 \times 10^{-5}$ . Enter these in the Part A Data Table.
2. Repeat the pH calculation for each successive 1.0 mL increment of 0.2 M HCl added to the buffer. Enter these values in the Part A Data Table.
3. When strong base is added to a buffer of a weak acid–conjugate base, the acid reacts with the base to form water and its conjugate base.



Calculate the pH of the Part A acetic acid–sodium acetate buffer solution after 1.0 mL of the 0.2 M NaOH solution is added to the buffer. Enter this value in the Part A Data Table.

4. Repeat the pH calculation for each successive 1.0 mL increment of 0.2 M NaOH added to the buffer. Enter these values in the Part A Data Table.
5. The ammonia–ammonium chloride buffer solution is a weak base–conjugate acid buffer solution.  $K_b$  for  $\text{NH}_3 = 1.8 \times 10^{-5}$ . Using Equation 4 on page 1 and the relationship,  $\text{pH} = 14.0 - \text{pOH}$ , calculate the pH of the ammonia–ammonium chloride buffer solution after 1.0 mL of 0.2 M HCl is added to the buffer solution. The initial moles of both  $\text{NH}_3$  and  $\text{NH}_4\text{Cl}$  in 50 mL of the buffer solution are 0.0025 moles. Record the pH value in the Part B Data Table.



6. Repeat the pH calculation for each successive 1.0 mL increment of 0.2 M HCl added to the buffer. Enter these values in the Part B Data Table.
7. Repeat the pH calculations for each 1.0 mL increment of 0.2 M NaOH added to the ammonia–ammonium chloride buffer solution. Enter these values in the Part B Data Table.

