

Mixtures of Acids and Bases

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.

Complete the following table.

Table A. Calculated and Measured pH's of Acid and Base Mixtures

Reaction #	Reagents	Calculated pH	Measured pH
1	10 mL H ₂ O		
	+ 5 mL NaOH		
	+ additional 5 mL NaOH		
	+ additional 5 mL NaOH		
2	10 mL HCl		
	+ 5 mL NaOH		
	+ additional 5 mL NaOH		
	+ additional 5 mL NaOH		
3	10 mL NH ₄ Cl		
	+ 5 mL NaOH	see below	
	+ additional 5 mL NaOH	-----	
	+ additional 5 mL NaOH	-----	
4	10 mL NaC ₂ H ₃ O ₂		
	+ 5 mL NaOH	see below	
	+ additional 5 mL NaOH	-----	
	+ additional 5 mL NaOH	-----	

Complete the reaction table for the mixture of 10.0 mL of 0.10 M NH_4Cl with 5.0 mL of 0.10 M NaOH below. (Answers should be in **millimoles**. Enter your answers to one decimal place.)

	$\text{NH}_4^+(aq)$	+ $\text{OH}^-(aq)$	$\rightleftharpoons \text{NH}_3(aq)$	+ H_2O
initial				-----
Δ				-----
final				-----

Calculate the equilibrium concentrations of each of the following in the resulting solution. (Enter your answers to two significant figures.)

Species	Final Concentration (M)
$[\text{NH}_4^+]$	
$[\text{OH}^-]$	
$[\text{NH}_3]$	
$[\text{H}_3\text{O}^+]$	

Based on your results above and using the Henderson-Hasselbalch equation, calculate the pH of this solution. (Enter your answer to two decimal places.)

For the mixture of 10.0 mL of 0.10 M $\text{NaC}_2\text{H}_3\text{O}_2$ with 5.0 mL of 0.10 M NaOH , which of the following is true? (Note: The order of these options may be different in the WebAssign question.)

- This reaction goes to completion, and $\text{NaC}_2\text{H}_3\text{O}_2$ is the limiting reagent.
- This reaction goes to completion, and NaOH is the limiting reagent.
- This reaction does not go to completion but is described by the K_b for $\text{C}_2\text{H}_3\text{O}_2^-$.
- There is no net reaction between $\text{NaC}_2\text{H}_3\text{O}_2$ and NaOH .

For the mixture of 10.0 mL of 0.10 M $\text{NaC}_2\text{H}_3\text{O}_2$ with 5.0 mL of 0.10 M NaOH , calculate the equilibrium concentrations of each of the following in the resulting solution. (Enter your answers to two significant figures.)

Species	Final Concentration (M)
$[\text{C}_2\text{H}_3\text{O}_2^-]$	
$[\text{HC}_2\text{H}_3\text{O}_2]$ (tricky)	
$[\text{OH}^-]$	
$[\text{H}_3\text{O}^+]$	

Based on your results above, calculate the pH of this solution. (Enter your answer to two decimal places.)