Name: Date: Period:

Understanding, Making, and Using Buffers:
Part I. Investigating Buffers Virtual Lab

Question 1: How does the concentration of buffer components in a solution affect the change in pH when a strong acid or strong base is added?

1. Identify the variables based on the scientific question above.

Independent (Manipulated) Variable	
Dependent (Responding) Variable	

2. Fill in the pH values from question 1 in the independent variable (IV) column.
3. To collect each data point, watch the corresponding video on the Part I: Investigating Buffers webpage.
4. Calculate the change in pH (ΔpH) by subtracting the original pH (IV column) from the final measured pH for each row in the DV section of the data table.

$$\Delta pH = final\ pH - initial\ pH$$

Data Table 1 - Investigating changes in pH based on concentrations of buffer components.

Buffer Components	**IV- Concentration of buffer components**	**DV- Change in pH when a strong acid or base is added**			
		With 0.001 mol HCl		**With 0.001 mol NaOH**	
		pH	**ΔpH**	**pH**	**ΔpH**
HNO_3 + $NaNO_3$	0.1 M pH =				
	1.0 M pH =				
$HC_2H_3O_2$ + $NaC_2H_3O_2$	0.1 M pH =				
	1.0 M pH =				
NH_4Cl + NH_3	0.1 M pH =				
	1.0 M pH =				

Analysis 1: Describe the relationship between the concentration of the buffer components and the change in pH when an acid or base is added.

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Question 2: How does the amount of the strong acid or strong base being added affect the change in pH of a buffer solution?

5. Identify the variables based on the scientific question above.

Independent (Manipulated) Variable	
Dependent (Responding) Variable	

6. Fill in the pH values for the 0.1 M solutions in the first column under “Buffer Components” (See Data Table 1).
7. To collect each data point, watch the corresponding video on the Part I: Investigating Buffers webpage.
8. Calculate the change in pH (ΔpH) by subtracting the original pH of the Buffer Components from the final measured pH for each row in the data table.

$$\Delta pH = final\ pH - initial\ pH$$

Data Table 2: Investigating changes in pH based on amount of added acid/base.

Buffer Components	**IV- Amount of strong acid or strong base being added to buffer**	**DV- Change in pH of the buffer solution**			
		HCl		**NaOH**	
		pH	**ΔpH**	**pH**	**ΔpH**
0.1 M HNO_3 + 0.1 M $NaNO_3$	0.001 mol				
pH =	0.010 mol				
0.1 M $HC_2H_3O_2$ + 0.1 M $NaC_2H_3O_2$	0.001 mol				
pH =	0.010 mol				
0.1 M NH_4Cl + 0.1 M NH_3	0.001 mol				
pH =	0.010 mol				

Analysis 2: Describe what happened to the change in pH when different amounts of strong acid or strong base were added to the solutions.