# Topic 8.8, 8.10 Worksheet

1. What types of substances make up a buffer?

2. What does the conjugate acid react with in a buffer?

3. What does the conjugate base react with in a buffer?

4. How is a buffer able to resist a change in pH?

5. When is a buffer formed in a titration?

6. Consider a buffer made from acetic acid and sodium acetate.
   a. Explain how to make a buffer using acetic acid, $HC_2H_3O_2$, and sodium acetate, $NaC_2H_3O_2$ .

   b. Does the acetic acid react with an acid or a base? Give the reaction of acetic acid reacting with the acid/base. In the case of an acid use HCl and in the case of a base use NaOH.

   c. Does the sodium acetate react with an acid or a base? Give the reaction of acetic acid reacting with the acid/base. In the case of an acid use HCl and in the case of a base use NaOH.

7. Which of the following solutions would be considered a buffer?

| Substances | Buffer (Yes or No) |
|---|---|
| 0.10 M HCl + 0.10 M NaCl | |
| 0.10 M HF + 0.10 M NaF | |

| | |
|---|---|
| 0.10 M HBr + 0.10 M NaBr | |
| 0.10 M $C_6H_5COOH$ + 0.10 M $KC_6H_5COO$ | |

8. For the buffers in the question above, is the pH greater than, less than, or equal to the pKa? Explain your reasoning by referring to the Henderson-Hasselbach equation.

9. Of the buffers created below, which has the greatest buffering capacity?

| | |
|---|---|
| 0.1 M $NaH_2PO_4$ + 0.1 M $Na_2HPO_4$ | |
| 0.01 M $NaH_2PO_4$ + 0.01 M $Na_2HPO_4$ | |
| 1.0 M $NaH_2PO_4$ + 1.0 M $Na_2HPO_4$ | |

10. For the buffers created in the question above, how does the pH change with the change in molarity?