

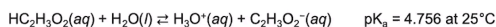
# AP Chemistry Daily Videos

## 8.10 Buffer Capacity

### Video #1

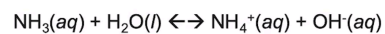
1. Does diluting a buffer solution change the pH? Why or why not?
2. What is buffer capacity and what determines its capacity?
3. According to the Henderson-Hasselbalch Equation, what would you need to change in order to change the pH of the buffer solution?

#### 4. Evaluate your work.



The acid ionization equilibrium for the weak acid  $\text{HC}_2\text{H}_3\text{O}_2$  is represented by the equation above. To prepare a buffer with a  $\text{pH} = 5.70$ , a student needs to mix 250 mL of 0.100 M  $\text{HC}_2\text{H}_3\text{O}_2$  and 500 mL of 0.440 M  $\text{NaC}_2\text{H}_3\text{O}_2$ . If the student mistakenly mixes 250 mL of 0.0500 M  $\text{HC}_2\text{H}_3\text{O}_2$  and 250 mL of 0.440 M  $\text{NaC}_2\text{H}_3\text{O}_2$ , which of the following is the result of this error?

- (A) The buffer will have a lower capacity because of the smaller numbers of moles of  $\text{HC}_2\text{H}_3\text{O}_2$  and  $\text{C}_2\text{H}_3\text{O}_2^-$  available to react if an acid or a base is added.
- (B) The buffer will have a lower capacity, because the smaller amounts of  $\text{HC}_2\text{H}_3\text{O}_2$  and  $\text{C}_2\text{H}_3\text{O}_2^-$  will lower the pH of the buffer.
- (C) The buffer will have a higher capacity, because a larger proportion of  $\text{HC}_2\text{H}_3\text{O}_2$  and  $\text{C}_2\text{H}_3\text{O}_2^-$  will ionize at lower concentrations.
- (D) The buffer will have the same capacity, because the large volume dilutes the components.



- 5. To begin this problem, identify your weak base and its conjugate acid in the reaction.**

The equation above represents the base ionization equilibrium for ammonia,  $\text{NH}_3$ . To prepare a buffer with  $\text{pH} \approx 8.20$ , 3.50 g of  $\text{NH}_4\text{Cl}(\text{s})$  should be added to 500 mL of 0.01 M  $\text{NH}_3(\text{aq})$ . The buffer is accidentally prepared using 85% pure  $\text{NH}_4\text{Cl}(\text{s})$  instead of 99% pure. Assuming impurities in this solid are unreactive, explain how this error affects the pH and capacity of the buffer.

- 6. Write down the three key points from this video in your own words.**