Quiz 10

Name__________________________
Chem 121, Section 1

\(K_a\) and \(K_b\) values are on the back side

1. (2 pts) Select the best material for constructing a buffer of pH 10.00
   a. acetic acid
   b. ammonia
   c. ethylenediamine
   d. formic acid

\[ pK_a = 4.75 \]
\[ pK_b = 4.75 \]
\[ pK_a = 3.75 \]

\[ \text{pH} = 4 \]

2. (4 pts) If you begin with 1.00 L of 0.25 M benzoic acid, and add 10 mL of 5 M NaOH, what is the pH of the resulting solution? (Pretend that your total volume is still 1.00 L.)

\[ \text{pH} = \text{pK}_a + \log \left( \frac{[A^-]}{[HA]} \right) \]

\[ (0.010 \text{ L BASE}) \left( \frac{5 \text{ mol}}{L} \right) = 0.050 \text{ mol OH}^- \]

\[ 0.25 \text{ M HA} \]

\[ 0.050 \text{ converted to A}^- \]

\[ \Rightarrow \text{0.050 M A}^- \]

\[ \text{0.050 M HA} \]

\[ \text{pH} = 4.20 + \log \left( \frac{0.05}{0.020} \right) \]

\[ \text{pH} = 3.60 \]

3. (4 pts) If you add an additional 100 mL of 5 M NaOH, do you still have a buffer? **Explain for full credit.**

\[ (0.100 \text{ L}) \left( \frac{5 \text{ mol}}{L} \right) = 0.50 \text{ mol OH}^- \]

Only 0.20 M HA LEFT, SO \[ \boxed{\text{NO}} \]

There would be no HA left... it is all in A\(^-\) form. Since you need both HA and A\(^-\) to have a buffer, we don't.