

Chapter 17 Worksheet 2 (Buffers, part 2)

Name:

UGA ID:

Instructions:

- Please enter your first and last name as it appears on the eLC roster (do not use a nickname).
- Your UGA myID is a combination of letters and numbers (example: mine is wpe28548). **Do not use your 81x number.**
- If you do not have a printer, type your answers in the then upload the worksheet template to Gradescope by Monday, April 5 at 11:59 pm. Write your work on separate sheets of paper, convert to a PDF and upload to eLC.
- If you have a printer download the worksheet, convert it to a PDF and upload to Gradescope by Monday, April 5 at 11:59 pm. You do not need to upload anything to eLC.

1. You need 1.00 liter of a buffer solution of pH 5.20 for use in the lab. What mass of the sodium salt of the conjugate base will be needed if 45.0 grams of the acid (chosen from the table) is used to prepare the solution?

Acid	pKa
$\text{CH}_3\text{CO}_2\text{H}$	4.74
H_2CO_3	6.38
HClO	7.46
HCN	9.40

2. The acid dissociation constant for hexanoic acid is 1.41×10^{-5} . A buffer solution is prepared by mixing hexanoic acid and sodium hexanoate and is found to have a pH of 4.9. What is the ratio of the salt to acid concentration in this buffer solution?

- A. 0
- B. 0.5
- C. 0.8
- D. 1.0
- E. 2.5



3. Both NH_3 ($K_b = 1.8 \times 10^{-5}$) and $\text{C}_6\text{H}_5\text{NH}_2$ ($K_b = 4.3 \times 10^{-10}$) are weak bases. Which of the following is correct at equilibrium for a solution that is initially 0.10 M in NH_3 and 0.10 M in $\text{C}_6\text{H}_5\text{NH}_2$?

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- A. $[\text{OH}^-] = [\text{NH}_4^+]$
- B. $[\text{NH}_4^+] = [\text{C}_6\text{H}_5\text{NH}_3^+]$
- C. $[\text{OH}^-] = [\text{C}_6\text{H}_5\text{NH}_3^+]$
- D. $[\text{NH}_3] = [\text{C}_6\text{H}_5\text{NH}_2]$
- E. both a and b are correct

4. You need to prepare 5.00 liters of a buffer solution of pH 4.90 using a 1.00 M solution of acetic acid and a 1.00 M solution of sodium hydroxide. What volume of the acetic acid solution will you need to use? pK_a of acetic acid is 4.74.

5. A buffer solution is prepared such that the concentration of acetic acid is 1.00 M and the concentration of sodium acetate is 0.75 M. What is the pH of the buffer solution? The pK_a of acetic acid is 4.74.

6. If the pK_a of $HCHO_2$ is 3.74 and the pH of an $HCHO_2/NaCHO_2$ solution is 3.11, which of these is **TRUE**?

A. $[HCHO_2] < [NaCHO_2]$

B. $[HCHO_2] = [NaCHO_2]$

C. $[HCHO_2] \ll [NaCHO_2]$

D. $[HCHO_2] > [NaCHO_2]$

E. It is not possible to make a buffer of this pH from $HCHO_2$ and $NaCHO_2$.

7. Calculate the pH of a solution formed by mixing 250.0 mL of 0.900 M NH_4Cl with 250.0 mL of 1.60 M NH_3 . The K_b for NH_3 is 1.8×10^{-5} .

8. A 1.00 L buffer solution is 0.150 M in $HC_7H_5O_2$ and 0.250 M in $LiC_7H_5O_2$. Calculate the pH of the solution after the addition of 100.0 mL of 1.00 M HCl. The K_a for $HC_7H_5O_2$ is 6.5×10^{-5} .