

Problem Set #4

Due 3/17/11

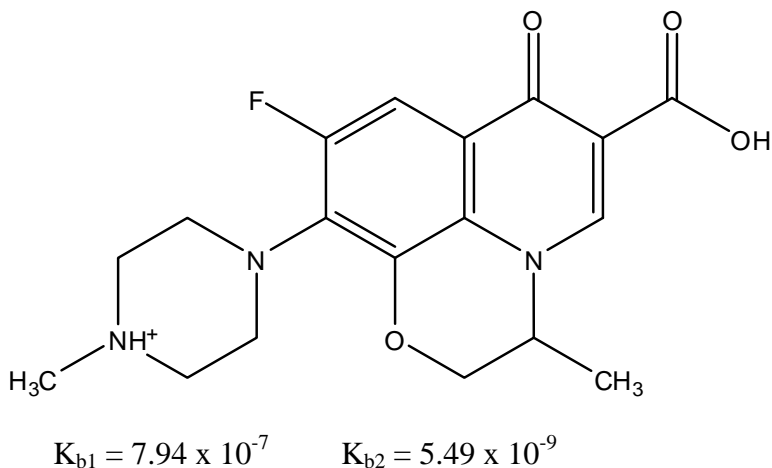
1. A TRIS buffer was made using the following table and diluted to 2.50 L.

<u>Name</u>	<u>Formula</u>	<u>Amount used</u>
TRIS hydrochloride	(HOCH ₂) ₃ CNH ₃ ⁺ Cl ⁻	0.038 moles
TRIS	(HOCH ₂) ₃ CNH ₂	0.072 moles

What is the resulting pH of this buffer? $K_a = 8.32 \times 10^{-9}$.

2. Working in a hospital, you are asked to make a 1.00-liter phosphate solution buffered to physiological pH (pH 7.40). You have available a 1.25 M solution of NaH₂PO₄ and a 2.05 M solution of Na₂HPO₄. Calculate the amount of each solution needed to provide the required solution. $K_{a1} = 7.11 \times 10^{-3}$, $K_{a2} = 6.32 \times 10^{-8}$, and $K_{a3} = 7.1 \times 10^{-13}$ for H₃PO₄.

3. For a 8.25×10^{-3} M solution of Ofloxacin



- Calculate the pH
- Calculate the percent that is completely protonated
- Calculate the percent that is completely deprotonated

4. A. If 8.24 g of disodium phosphate (Na_2HPO_4) is dissolved in 350.0 mL water, what will the pH of the solution be?

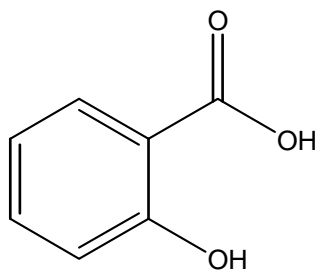
B. What would be the pH of a buffer made by dissolving 7.29 g disodium phosphate (Na_2HPO_4) and 5.37 g trisodium phosphate (Na_3PO_4) and diluting to 0.750 L?

5. Find the pH of each of the four following solutions: 0.27 M $\text{H}_3\text{His}^{+2}$ (fully protonated histidine), 0.27 M $\text{H}_2\text{His}^{+1}$, 0.27 M H His , and 0.27 M His^{-1} (fully deprotonated histidine).

6. Salicylic acid (H_2S), a diprotic species has

$$K_{a1} = 1.07 \times 10^{-3} \text{ (CO}_2\text{H)}$$

$$K_{a2} = 1.82 \times 10^{-14} \text{ (OH)}$$



- What is the principle species at pH 2.50?
- What is the principle species at pH 7.40?

7. Harris Chapter 9, Problem 29

Suggested/Review Problems:

- Harris Chapter 8, Problem 32
- Harris Chapter 8, Problem 34
- Harris Chapter 8, Problem 37
- Harris Chapter 8, Problem 41
- Harris Chapter 9, Problem 4
- Harris Chapter 9, Problem 21
- Harris Chapter 9, Problem 24
- Harris Chapter 9, Problem 25
- Harris Chapter 9, Problem 28
- Harris Chapter 9, Problem 33

6. Harris Chapter 9, Problem 5
7. Harris Chapter 9, Problem 13
8. Harris Chapter 9, Problem 18

14. Harris Chapter 9, Problem 40