

WORKSHEET: AQUEOUS SOLUTION EQUILIBRIUM – part 1

When solving the problems:

- ❖ Write the net ionic equations for all reactions that occur.
- ❖ Write the equilibrium constant expression for each equilibrium reaction.
- ❖ Give the value of each equilibrium constant. (Look up K_a s and K_b s)

1. How many moles of HNO_2 must be added to a 1.00 liter of 0.370 M NaNO_2 to give a (buffer) solution of pH 4.20? (Assume there is no change in volume when the HNO_2 is added.) Answer: 0.052 mole
2. How many moles of NaOH must be added to a 1.00 liter of 0.230 M benzoic acid, $\text{HC}_7\text{H}_5\text{O}_2$, to produce a solution with a pH of 4.50? (Assume there is no change in volume when the NaOH is added.) Answer: 0.15 mole
3. What is the pH of a solution made by adding 35.00 mL of 0.660 M $\text{C}_6\text{H}_5\text{NH}_2$ to 40.00 mL of 0.420 M HCl ? (Assume volumes are additive.) Answer: 4.17
4. How many moles of HCHO_2 must be added to 1.00 L of 0.400 M NaCHO_2 to give a (buffer) solution that has a pH of 3.60. (Assume there is no volume change upon addition of the HCHO_2 to the NaCHO_2 solution.) Answer: 0.55 mole
5. Is a 0.1 M aqueous solution of Na_2HPO_4 a buffer? Answer: yes
6. How many mole of NaOH should be added to 1.00 L of 0.190 M HNO_2 to give a solution of pH 4.80? (Assume there is no volume change upon addition of the NaOH to the solution). Answer: 0.18 mole
7. What is the pH of a solution made by mixing 25.0 mL of 0.0650 M benzylamine, $\text{C}_7\text{H}_7\text{NH}_2$, and 13.9 mL of 0.0500 M HCl . (Assume volumes are additive.) (K_b for benzylamine: 4.7×10^{-10}) Answer: 4.80