Acid/Base II Review

Name:_____   Block:_____

1a) Write the net ionic equation for the hydrolysis reaction between NH_4Cl and water.

b) Will $NaHSO_3$ produce an acidic or basic solution when dissolved in water? Support your conclusions with appropriate reactions and calculations.

2. Calculate the pH of 0.40M CH_3COOH.

3. Calculate the pH of 2.00M $C_6H_5O^-$.

4. A 1.0L solution contains 1.00 mol of H_3PO_4 in equilbrium with 1.00 mol NaH_2PO_4
    a) What is this type of solution called? Write an equation to represent this equilbrium.
    b) What is the pH of this solution?
    c) Explain why the pH of this solution does not change significantly when 10.0mL of 1.0M KOH is added.

5. A weak acid $H_2C_6H_6O_6$ is dissolved in water. Write a chemical equation to represent this system.

6a). Write a chemical equation representing the hydrolysis of sodium acetate.

 b). Calculate the K_b value for the hydrolysis in part a) above.

7. An acid is known to be either iodic, acetic, or benzoic. A 0.200M solution of this acid is found to have a pH of 2.44. Find the K_a of the solution and identify the acid.

8. In a titration, 25.00mL of 0.10M HCl was neutralized by slowly adding 50.00mL of 0.10M NaOH
    a) Sketch the titration curve for the reaction and label:
        - the initial pH of the HCl
        - the volume of NaOH required to neutralize the HCl
        - the pH of the equivalence point
    b) Select a suitable indicator for this titration.

9. For a titration of NH_3 with 0.50M HCl, give two characteristics of the titration curve and select a suitable indicator.

10. Hydrazine, N_2H_4, is a weak base with $K_b = 8.5 \times 10^{-6}$.
    a) Write the equilibrium formed when hydrazine dissolves in water.
    b) Identify the conjugate acid of hydrazine and calculate its K_a.

11. A student predicts that MgO will form an acidic solution in water. Evaluate this prediction, including any appropriate equations.

12. The indicator bromcresol green may be represented as HInd. The acid-base equation is
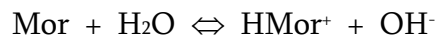$$HInd + H_2O \Leftrightarrow H_3O^+ + Ind^-$$
   a) What colour is this indicator in distilled water. Explain.
   b) When this indicator is added to a solution of acetic acid, the indicator's colour   turns
   from blue to yellow. Explain the colour change.
13. Consider the following equilibrium: $HInd + H_2O \Leftrightarrow H_3O^+ + Ind^-$
   Explain why the $[H_3O^+] = K_a$ at the transition point of an indicator.

14. The pain killer morphine (Mor) acts as a weak base.
$$Mor + H_2O \Leftrightarrow HMor^+ + OH^-$$
   Given that a 0.010M morphine solution has a pH of 10.10, calculate the K_b of
   morphine.

15. Write the equations for the hydrolysis reactions of the salt ammonium oxalate. Will the
   resulting solution be acidic or basic?
16. A 10.00mL sample of 1.0M CH_3COOH was placed in a flask and titrated with 0.50M
   NaOH. Explain why the pH is not 7 at the equivalence point for this reaction. Be more
   specific than just stating that it is *because it is a weak acid - strong base titration.*
17. A solution of the salt 1.0M $NaNO_2$ is slightly basic and a solution of 1.0M CH_3COOH is
   acidic. Which solution would have the greater electrical conductivity? Explain.
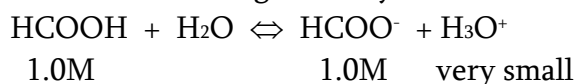18. Write an equation representing the formation of acid rain from an oxide.

19. List two reactants that when combined would produce a buffer solution. Write an
   equation to represent this buffer. What happens to the pH of this buffer when a small
   amount of HCl is added? Explain why.

20. What concentration of HCOOH is required to produce a solution with a pH of   3.245?
21. What concentration of the base CN^- is required to produce a solution with a pH of 12.23?
22. Using equations and explanations, show that a 1.0M HNO_3 solution will conduct better
   than a 1.0M HIO_3 solution.

23. Consider the following buffer system:
$$HCOOH + H_2O \Leftrightarrow HCOO^- + H_3O^+$$
      1.0M   1.0M   very small
   a) What is the pH of the buffer?
   b) Explain (use equations to help) how the buffer works if a small amount of OH^- is
      added to the solution and how the pH will change.

24. You find an unknown acid in the laboratory and want to find the pH. Describe two ways
      you could find the pH.