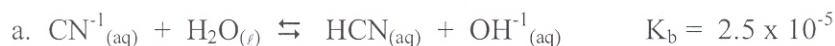


Acids, Bases and Buffers Worksheet

1. Classify each of the following as a strong acid (SA), a weak acid (WA), a strong base (SB), or a weak base (WB) in aqueous solution.

- | | |
|-----------------------------|------------------|
| a. HNO_3 | d. NaOH |
| b. H_3PO_4 | e. NH_3 |
| c. CH_3NH_2 | f. HF |

2. If you have 0.10 M solutions of the following Bronsted bases, in which solution is the hydroxide ion concentration larger? In which solution is the pH higher?



- | | |
|------------------------------------|--------------------|
| a. $[\text{OH}^{-1}]$ is larger in | b. pH is higher in |
|------------------------------------|--------------------|

3. Write the formula and give the conjugate acid or base for each of the following:

- | | |
|------------------------|---------------------------------|
| a. HNO_2 | d. Br^{-1} |
| b. SO_3^{-2} | e. NH_4^{+1} |
| c. HCO_3^{-1} | f. $\text{H}_2\text{PO}_4^{-1}$ |

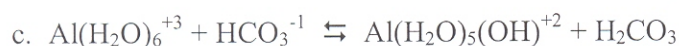
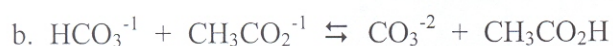
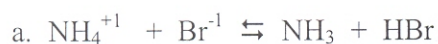
4. For each of the following reactions, identify the acid, the base, the conjugate base and the conjugate acid.



5. Write the dissociation reaction and the corresponding equilibrium expression for each of the following in water.



6. For each reaction shown here, predict whether the equilibrium lies predominantly to the left or to the right. Explain your prediction briefly.



7. Calculate the pH of the following solutions.

a. $[\text{H}_3\text{O}^{+1}] = 1.4 \times 10^{-3} \text{ M}$

b. $[\text{OH}^{-1}] = 3.5 \times 10^{-2} \text{ M}$

c. $\text{pOH} = 9.1$

8. Milk of magnesia has a pH of 10.51. What is the $[\text{H}_3\text{O}^{+1}]$? What is the $[\text{OH}^{-1}]$? Is the solution acidic or basic?

9. Write the equation for the ionization of nitric acid in aqueous solution. What is the pH of a $2.5 \times 10^{-2} \text{ M}$ solution of nitric acid?

10. Write the equation for the ionization of nitrous acid in aqueous solution. What is the pH of a $2.5 \times 10^{-2} \text{ M}$ solution of nitrous acid?

11. Write the equation for the ionization of sodium hydroxide in aqueous solution. What is the pH of a 0.034 M solution of sodium hydroxide?

12. Write the equation for the ionization of ammonia in aqueous solution. What is the pH of a 0.034 M solution of ammonia?

13. Heavy metal azides, which are salts of hydrazoic acid, HN_3 , are used as explosive detonators. A solution of 0.20 M hydrazoic acid has a pH of 3.21. What is the value of K_a for hydrazoic acid?
14. Carbonic acid can be found in a wide variety of body fluids. a) Calculate the hydronium ion concentration of a 5.45×10^{-4} M H_2CO_3 solution. b) What is the pH of this solution? c) What is the concentration of CO_3^{2-} ?
15. Trimethylamine, $(\text{CH}_3)_3\text{N}$, is a gas with a fishy, ammonia-like odor. An aqueous solution that is 0.25 M trimethylamine has a pH of 11.63. What is the value of K_b for trimethylamine?
16. Note whether aqueous solutions of each of the following salts will be acidic, basic, or neutral.
- | | |
|-------------------------------|--------------------------------------|
| a. NaHSO_3 | d. KClO_4 |
| b. $\text{Cu}(\text{NO}_3)_2$ | e. $\text{CH}_3\text{NH}_3\text{Cl}$ |
| c. CaCl_2 | f. KCN |

