Chemistry **Chapter 12-13 Review**

Name: _____

1. (1 pt) Label the Acid and Base reactants in the following equation and draw a line to each conjugate:

$$HCO_3{}^-{}_{(aq)} + H_2O_{(l)} \rightleftharpoons H_2CO_{3(aq)} + OH^-_{(aq)}$$

2. (1 pt) Find the $[OH^-]$ and pH of a 0.100 M LiOH solution.

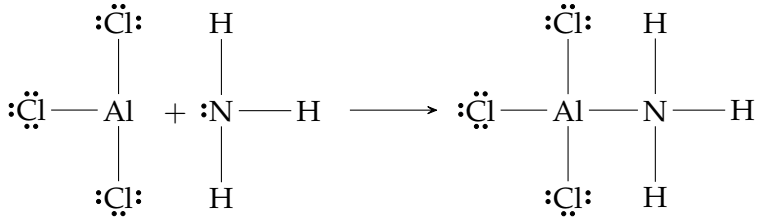
3. (1 pt) What is the $[OH^-]$ and pH of a 0.225 M $Sr(OH)_2$ solution?

4. (1 pt) Find the $[OH^-]$ and pH of a 0.010 M $Ba(OH)_2$ solution.

5. (1 pt) Label the Brønsted-Lowry base and its conjugate acid in the following reaction:

$$NH_{3(aq)} + H_2O_{(l)} \rightleftharpoons NH_4{}^+{}_{(aq)} + OH^-_{(aq)}$$

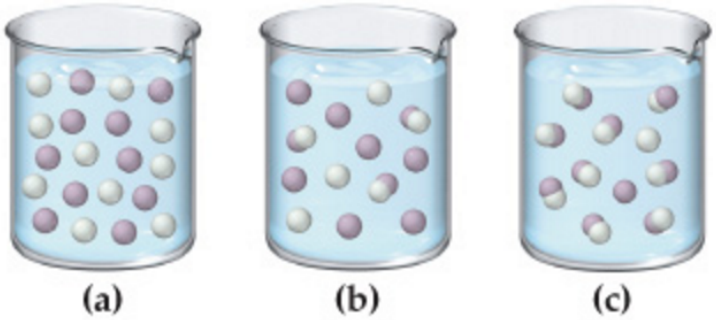
6. (1 pt) Draw the movement of electrons in the following Structural Equation and label the Lewis acid and Lewis base.



7. (4 pts) Identify each substance as an acid or a base and write a chemical equation showing how it is an acid or a base according to the Arrhenius definition.
   (a) $HNO_{3(aq)}$
   (b) $NH_4^{+}{}_{(aq)}$
   (c) $KOH_{(aq)}$
   (d) $HC_2H_3O_{2(aq)}$

8. (4 pts) Write the formula for the conjugate base of each acid.
   (a) HCl
   (b) H_2SO_3
   (c) $HCHO_2$
   (d) HF

9. (1 pt) These three diagrams represent three different solutions of the binary acid HA. Water molecules have been omitted for clarity and hydronium ions (H_3O^+) are represented by hydrogen ions (H^+). Rank the acids in order of decreasing acid strength.



10. (1 pt) Calculate $[OH^-]$ in a solution where the $[H_3O^+] = 9.7 \times 10^{-9}$ M.

11. (1 pt) Calculate the pH and pOH of a solution where $[H_3O^+] = 2.2 \times 10^{-6}$ M.

12. (3 pts) Calculate the $[H_3O^+]$ and $[OH^-]$ for each solution.
    (a) pH = 8.55
    (b) pH = 11.23
    (c) pOH = 11.13

13. (1 pt) What mass of HI should be present in 0.250 L of solution to obtain a solution with pH = 1.25?

14. (2 pts) Determine the $[H_3O^+]$ and pH of a 0.200 M solution of Lithium Hydroxide (Assume you have 1.00 L of solution).

15. (1 pt) Identify the Lewis acid and Lewis base from among the reactants in the following equation:

$$Zn^{2+}_{(aq)} + 4\,NH_{3(aq)} \rightleftharpoons Zn(NH_3)_4{}^{2+}{}_{(aq)}$$

16. (1 pt) Identify the Lewis acid and Lewis base from among the reactants in the following reaction:

$$F^-_{(aq)} + BF_{3(aq)} \rightleftharpoons BF_4{}^-{}_{(aq)}$$

17. (1 pt) Determine the pH of 0.045 M $Sr(OH)_2$.

18. (1 pt) Write the molecular equation that takes place when aqueous solutions of ammonium chloride and sodium hydroxide are mixed and label the Brønsted-Lowry acid and base.

19. (1 pt) Lactic acid is a weak acid found in milk. Its calcium salt is a source of calcium for growing animals. A saturated solution of this salt, which we can represent as $Ca(Lact)_2$ has a $[Ca^{2+}] = 0.26$ M. Assuming the salt is completely dissociated (pretend its actually a strong acid), find its pH.

20. (1 pt) A solution of 0.23 mol of the chloride salt of protonated quinine (QH^+), a weak organic base, in 1.0 L of solution has pH = 4.58. Find the concentration of quinine.

21. (1 pt) Draw the movement of electrons in the following Structural Equation and label the Lewis acid and Lewis base.