Che 111: Chapter 5 Practice Problems

1. Classify each of the following acids as **monoprotic**, **diprotic**, or **triprotic**.
    a. HCl(*aq*) (used in food processing)
    b. H_2SO_4 (used in petroleum refining)
    c. $HC_2H_3O_2$ (solvent in the production of polyesters)
    d. H_3PO_4 (catalyst for the production of ethanol)

2. Write the formulas and names of the acids that are derived from adding enough H+ ions to the following ions to neutralize their charge.
    a. SO_4^{2-}
    b. NO_3^-

3. Classify each of the following compounds as either
    (1) a binary ionic compound,
    (2) an ionic compound with polyatomic ion(s),
    (3) a binary covalent compound,
    (4) a binary acid, or
    (5) an oxyacid.
    Write the chemical formula that corresponds to each name:
    a. potassium sulfide
    b. copper(I) sulfate
    c. sulfuric acid
    d. hydrofluoric acid
    e. ammonium nitrate
    f. sodium hydrogen carbonate
    g. iodine pentafluoride

4. Classify each of the substances as a **weak acid**, **strong acid**, **weak base**, or **strong base** in the Arrhenius acid‐base sense.
    a. HNO_3
    b. H_2SO_4
    c. Ammonia
    d. nitric acid
    e. LiOH
    f. $NaHCO_3$
    g. phosphoric acid

5. Classify each of the following solutions as **acidic**, **basic**, or **neutral**.
    a. Saliva with a pH of 7.0
    b. Beer with a pH of 4.712
    c. A solution of a drain cleaner with a pH of 14.0

6. Write the complete equation for the neutralization reactions that take place when the following water solutions are mixed. (If an acid has more than one acidic hydrogen, assume that there is enough base to remove all of them. Assume that there is enough acid to neutralize all of the basic hydroxide ions.)
    a. ___ $LiOH(aq)$ + ___ $HNO_3(aq)$

    b. ___ $Co(OH)_2(s)$ + ___ $HNO_3(aq)$

    c. ___ $H_3PO_4(aq)$ + ___ $KOH(aq)$

7. For each of the following equations, identify the Bronsted-Lowry acid and base for the forward reaction.
    a. $3NaOH(aq) + H_3PO_4(aq) \rightarrow 3H_2O(l) + Na_3PO_4(aq)$

    b. $HS^-(aq) + HIO_3(aq) \rightarrow H_2S(aq) + IO^{3-}(aq)$

    c. $HS^-(aq) + OH^-(aq) \rightarrow S^{2-}(aq) + H_2O(l)$