Practice Questions for Chem 60 Test 3

Not necessarily comprehensive—study your lecture notes, labs, etc. as well!

1. Sodium chloride forms by the following (unbalanced) reaction:

 $\underline{\hspace{1cm}}$ Na (s) + $\underline{\hspace{1cm}}$ Cl₂ (g) \rightarrow $\underline{\hspace{1cm}}$ NaCl (s)

Balance the reaction above.

- a) How many moles of NaCl result from the complete reaction of 3.4 mol of Cl₂?
- b) How many moles of NaCl result from the complete reaction of 98.0 g of Cl₂?
- c) How many grams of NaCl results from the complete reaction of 2.5 moles of Na?

d) How many grams of NaCl results from the complete reaction of 125 g of Na?

2. Balance the following reaction:

 $_$ Al (s) + $_$ Fe₂O₃ (s) \rightarrow $_$ Al₂O₃ (s) + $_$ Fe (l)

- a) How many grams of Al are needed to produce 45.5 g of Al₂O₃?
- b) How many grams of Fe are produced from 4.7 g of Al?

3. Identify the acid and base in each forward reaction.

a.
$$CH_3OH$$
 (aq) + HI (aq) \longrightarrow $CH_3OH_2^+$ (aq) + I^- (aq)

b.
$$HSO_4^-(aq) + HCO_3^-(aq) \implies H_2CO_3(aq) + SO_4^{2-}(aq)$$

c.
$$HSO_4^-(aq) + HCO_3^-(aq) \iff CO_3^{2-}(aq) + H_2SO_4(aq)$$

d.
$$2 \text{ CH}_3 \text{COO}^-(\text{aq}) + \text{H}_3 \text{PO}_4(\text{aq}) \implies 2 \text{ CH}_3 \text{COOH}(\text{aq}) + \text{HPO}_4^{-2}$$

4. (2 pts) Fill in the blanks (remember, conjugates differ by the presence of H⁺).

Acid	CH ₃ OH ₂ ⁺	,	H ₂ CO ₃	
(Conjugate) Base		SO ₄ ²⁻		HSO ₄ ⁻

5. Predict the products of the following acid-base reactions. The acid and base are marked for you.

a.
$$CH_3COOH(aq) + NH_3(aq)$$

b.
$$HNO_3$$
 (aq) + F^- (aq)

c.
$$CH_3COO^-(aq) + HCl(aq)$$

d.
$$HCO_3^-(aq) + HSO_4^-(aq)$$

6. For the equilibrium below, predict how the concentrations of the different species would change under the given circumstances:

a. $[H_3O^+]$ is increased.

Eqilibrium shifts left right [propanoic acid] increases decreases [propanoate] increases

b. [propanoic acid] is increased.

Equilibrium shifts left right [propanoate] increases decreases [H₃O⁺] increases decreases

7. Name the following organic molecules:

$$\begin{array}{c} \mathsf{F} \\ \mathsf{H}_3\mathsf{C}-\mathsf{CH}-\mathsf{CH}_2-\mathsf{CH}-\mathsf{CH}_3 \\ \mathsf{F} \end{array}$$

$$CH_3$$
 CH_3 CH_3

$$H_3C$$
— C — CH_2 — CH_2 — CH_2 — CH_2 — CH_2 — CH_2

- 8. Draw the following organic molecules:
 - 2,5-dichloro-3-methylheptane
 - 1,3-dimethylcyclohexane
 - 4-isopropyloctane
 - 1,2-diethylcycloheptene