Matter and Motion Fall 2015

Chemistry Workshop 7

The workshop is intended to be a low-pressure setting where we get to practice problems, ask any questions, and discuss concepts and problem solving methods. Have fun! Work together on whiteboards or scratch paper and then neatly write your solutions in the notebook where you keep chemistry class notes. Your workshop solutions will be included in your portfolio.

1. Balance the following equations:

a. ____ $PbO\ (s)$ + ____ $NH_3\ (g)$ → ____ $Pb\ (s)$ + ____ $N_2\ (g)$ + ____ $H_2O\ (g)$

b. _____ $C_4H_{10}\ (g)$ + _____ $O_2\ (g)$ → _____ $CO_2\ (g)$ + _____ $H_2O\ (g)$

c. _____ $FeCl_2$ + _____ Na_3PO_4 → _____ $Fe_3(PO_4)_2$ + _____ $NaCl$

d. _____ $K_4Fe(CN)_6$ + _____ H_2SO_4 + _____ H_2O → _____ K_2SO_4 + _____ $FeSO_4$ + _____ $(NH_4)_2SO_4$ + _____ CO

2. Sodium metal reacts with water to produce hydrogen gas. a. Write at balanced chemical reaction for this process. b. What volume of hydrogen gas, at 15.0°C and 755.0 torr, would be produced by the reaction of 1.56 g of sodium with excess water?

3. What volume of 3.686 M hydrochloric acid is required to completely react with 0.9933 g of iron metal? (Hint: the salt formed is iron (III) chloride).

4. $Na_2Cr_2O_7\ (s)$ + $NH_4Cl\ (s)$ → $Cr_2O_3\ (s)$ + $NaCl\ (s)$ + $N_2\ (g)$ + $H_2O\ (g)$. a. Balance the reaction. b. What mass of sodium chromate is required to completely react with 170.00 g of ammonium chloride? c. What is the theoretical yield of chromium (III) oxide using 170.00 g of ammonium chloride? d. What would the percent yield be if we conducted this reaction and produced 72.00 grams of chromium (III) oxide?

5. Use the solubility rules to determine what precipitate, if any, will form after the combination of the following reagents:

a. $Hg_2(NO_3)_2\ (aq)$ + $CuSO_4(aq)$

b. $K_2CO_3\ (aq)$ + $MgI_2\ (aq)$

c. $Ni(NO_3)_2\ (aq)$ + $CaCl_2\ (aq)$

6. Balance the following equations and then write the ionic equation and the net ionic equation for each reaction:

a. ____ $(NH_4)_2CO_3\ (aq)$ + ____ $Fe_2(SO_4)_3\ (aq)$ → ____ $Fe_2(CO_3)_3\ (s)$ + ____ $(NH_4)_2SO_4\ (aq)$

ionic:

net ionic:

b. ____ $LiOH\ (aq)$ + ____ $H_2SO_3\ (aq)$ → ____ $Li_2SO_3\ (aq)$ + ____ $H_2O\ (l)$

ionic:

net ionic:

8. Determine the oxidation number for each element in these ions and compounds:

a. PO_4^{3-} b. N_2O_3 c. CH_4 d. $KClO_2$

9. For each of the following reactions, identify the element that is oxidized, the element that is reduced, the oxidizing agent, and the reducing agent.

a. $CuCl_2$ (aq) + Zn (s) → Cu (s) + $ZnCl_2$ (aq)

b. Fe_2O_3 (s) + 3CO (g) → 2Fe (s) + $3CO_2$ (g)