Chemistry 140 Name(s):

Exercise 6: Various reactions

1. Given the equation:

$BaCl_2$ (aq) + $Pb(NO_3)_2$ (aq) →

a. Determine the **products** and **balance** the equation. Table 4.1 on page 143 in the text will be valuable in identifying the **phases** of the products.

b. Below, write the **full ionic** equation of the reaction above.

c. Below, write the **net ionic** equation of the reaction above. Yes, the precipitate should be included in the equation.

d. You mix a solution with 10.0 g of barium chloride to a solution containing 10.0 g of lead (II) nitrate. How much **precipitate** (in grams) do you expect?

e. You mix 100.0 mL of 0.100 M solution of barium chloride with 50.00 mL of 0.100 M solution of lead (II) nitrate. How much **precipitate** (in grams) do you expect?

2. You are trying to figure out the weight/volume (w/v) **percent acetic acid** ($HC_2H_3O_2$) in **vinegar**. First, you dilute the vinegar by a factor of ten: you take 10.00 mL of vinegar and add 90.00 mL of distilled water, giving you a total diluted volume of 100.00 mL. You set up a titration with 0.09881 M NaOH in the buret. Then, drop by drop, you add the sodium hydroxide solution until the vinegar solution is neutral. You note the following volume data:

Volume before titration on buret of NaOH: _____ mL

Volume after titration on buret of NaOH: _____ mL

Note: A "weight/volume" (w/v) concentration means "grams of solute divided by milliliters of solution".

a. Does it matter how much water you initially dilute the vinegar with?

b. What is the **concentration** (**w/v**) of acetic acid in vinegar?

c. The label on the bottle of vinegar reads "5% w/v acetic acid". Rounding off our value, is the label on the bottle **accurate**? If not, suggest how the concentration in the bottle might have changed.

3. Assign oxidation numbers to each atom in the following species:

a. NO_3^- (nitrate anion)

b. $SbCl_5$ (antimony chloride)

c. $CaHAsO_4$

d. I_3^- (triiodide anion)

4. Determine whether the following changes are an oxidation, a reduction or neither. Show the oxidation number change that proves your point:

a. SO_3^{2-} to SO_4^{2-}

b. Cl_2 to ClO_3^-

c. N_2O_4 to NH_3

d. PbO to $PbCl_4^{2-}$

5. Balance the following half-reactions in an **acidic** solution (you'll have to add other chemicals):

a. $NO \rightarrow NO_3^-$

b. $P_4 \rightarrow HPO_3^{2-}$

6. Balance the following half-reactions in a **basic** solution:

a. $Cl_2 \rightarrow OCl^-$

b. $S_2O_4^{2-} \rightarrow SO_4^{2-}$

7. Balance the following reaction in an **acidic** solution:

$H_2SeO_3 + I^- \rightarrow I_2 + Se$

8. Balance the following reaction in a **basic** solution:

$SeO_3^{2-} + I^- \rightarrow I_2 + Se$