CHEM 130 **Name** _____

Quiz 6 – Due at the start of class Monday, October 8, 2018

Complete the following problems. Write your final answers in the blanks provided. You must show your work to receive full credit. Show your answers to the correct number of significant figures with the correct units.

Rules for this take-home quiz.

DO NOT OPEN THE QUIZ UNTIL YOU ARE READY TO TAKE IT!

- You may allocate a maximum of **50 continuous minutes** for this quiz, split in to two 25-minute segments.
- For the first 25-minute segment, you will take the quiz using only the materials on these pages, a calculator and a **pencil**. Treat this time as though you were taking the quiz in the classroom. You may not use your book, notes, electronic sources or anyone else to help. Record the start and end of the first 25 minutes below.
- For the second 25 minutes, you may use your book, notes or electronic resources to make any corrections to your work. **Make these corrections in blue or red pen.** You **MAY NOT** ask anyone else for help. Record the end of the second 25 minute block below.
- Once you have completed the quiz, sign below to affirm that the quiz was taken following the rules above. This signature is your pledge that the quiz was completed in an ethical manner!

Start time: _____ End of 1st 25 minutes: _____ End of 2nd 25 minutes: _____

Signature_____Date_____

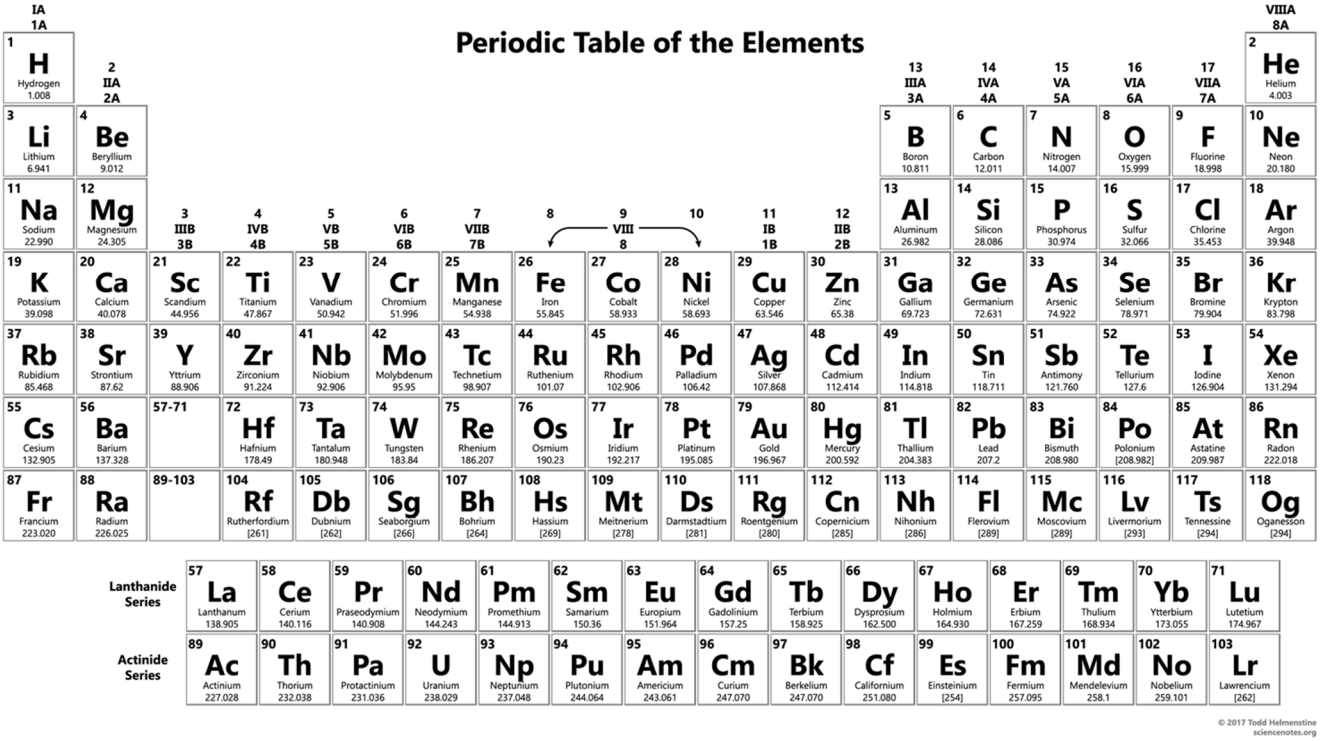

TABLE 5.1 Solubility Guidelines for Common Ionic Solids

Follow the lower-numbered guideline when two guidelines are in conflict. This leads to the correct prediction in most cases.

1. Salts of group 1 cations (with some exceptions for Li^+) and the NH_4^+ cation are soluble.
2. Nitrates, acetates, and perchlorates are soluble.
3. Salts of silver, lead, and mercury(I) are insoluble.
4. Chlorides, bromides, and iodides are soluble.
5. Carbonates, phosphates, sulfides, oxides, and hydroxides are insoluble (sulfides of group 2 cations and hydroxides of Ca^{2+}, Sr^{2+}, and Ba^{2+} are slightly soluble).
6. Sulfates are soluble except for those of calcium, strontium, and barium.

1. Write balanced overall reactions and net ionic equations for each of the following: Indicate the state (*s, l, g, aq*) of each of the reactants and products. (9 pts)

a. $KI(aq) + Pb(NO_3)_2(aq) \rightarrow$

Balanced Reaction:

$$2KI(aq) + Pb(NO_3)_2(aq) \rightarrow PbCl_2(s) + 2KNO_3(aq)$$

Net Ionic Equation:

$$Pb^{2+} + 2I^- \rightarrow PbI_2(s)$$

b. $H_2SO_4(aq) + Ba(OH)_2(aq) \rightarrow$

Balanced Reaction:

$$H_2SO_4(aq) + Ba(OH)_2(aq) \rightarrow BaSO_4(s) + 2H_2O(l)$$

Net Ionic Equation:

$$2H^+ + 2OH^- + SO_4^{2-} + Ba^{2+} \rightarrow BaSO_4(s) + 2H_2O(l)$$

c. aqueous sodium carbonate and aqueous calcium nitrate.

Balanced Reaction:

$$Na_2CO_3(aq) + Ca(NO_3)_2(aq) \rightarrow 2NaNO_3(aq) + CaCO_3(s)$$

Net Ionic Equation:

$$Ca^{2+} + CO_3^{2-} \rightarrow CaCO_3(s)$$

2. Your lab partner has prepared a dilute solution by pipetting 5.00 mL of an iron solution of unknown concentration into a 100.0 mL volumetric flask and diluting it to the mark with water to prepare solution A. She then pipets 3.00 mL of solution A in to a 50.0 mL volumetric flask and dilutes to the mark to prepare solution B. You measure the concentration of iron in solution B to be 0.000264 M. What was the iron concentration in the original unknown solution? (8 pts)

Two dilutions to account for:

Last dilution: $M_AV_A = M_BV_B$

$$M_B = \frac{M_AV_A}{V_B} = \frac{0.00264\,M \times 50.00\,mL}{3.00\,mL} = 0.00440M$$

Last dilution: $M_{Stock}V_{Stock} = M_AV_A$

$$M_{Stock} = \frac{M_AV_A}{V_{Stock}} = \frac{0.00440M \times 100.00\,mL}{5.00\,mL} = \mathbf{0.0880\,M}$$

Answer____0.0880 M_____

3. Consider the precipitation reaction that occurs when aqueous calcium chloride and aqueous silver (I) nitrate are mixed. If 25.0 mL of 0.325 M calcium chloride is mixed with 50.0 mL of 0.225 M silver nitrate, what mass of precipitate will form, assuming the reaction produces 75.0% yield? (8 pts)

$$CaCl_2(aq) + 2AgNO_3(aq) \rightarrow 2AgCl(s) + Ca(NO_3)_2(aq)$$

$$0.0250\ L \times \frac{0.325\ mol\ CaCl_2}{1\ L} \times \frac{2\ mol\ AgCl}{1\ mol\ CaCl_2} \times \frac{143.32\ g\ AgCl}{1\ mol\ AgCl} = 2.329\ g\ AgCl$$

$$0.0500\ L \times \frac{0.225\ mol\ AgNO_3}{1\ L} \times \frac{2\ mol\ AgCl}{2\ mol\ AgNO_3} \times \frac{143.32\ g\ AgCl}{1\ mol\ AgCl} = 1.612\ g\ AgCl$$

Therefore, $AgNO_3$ is the limiting reactant and the theoretical yield (assuming 100% yield) is 1.61 g AgCl. Since the reaction produces 75.0% yield, the actual yield will be 0.750(1.61g) = **1.21 g AgCl**

Answer____1.21 g AgCl_____