General Chemistry I

Quiz 4

October 24, 2005

Instructions: Print your name ————> Name ___________________

Work #1

Work 2 of # 2-4 problems

Show your work for partial credit
Use the correct number of significant figures

A periodic table is included as the last page

Standard Constants
R = 0.08206 lit-atm/mol-K
R = 8.3145 J/mol-K
h = 6.626 X 10⁻³⁴ J-s
C = 2.9979 X 10⁸ m/s

TOTAL(75) ________.
1. A reaction is run with 113.9 g of lead(II)sulfide and 25.97 g of dioxygen. Determine with calculations which is the limiting reactant and calculate the maximum amount of sulfur dioxide in g that could form from this reaction.

\[ 2 \text{PbS(s)} + 3 \text{O}_2(\text{g}) \rightarrow 2 \text{ PbO(s)} + 2 \text{SO}_2(\text{g}) \]
Solubility Rules

1. All compounds containing alkali metal cations and the ammonium ion are soluble.
2. All compounds containing NO$_3^-$, ClO$_4^-$, ClO$_3^-$, and C$_2$H$_5$O$_2^-$ anions are soluble.
3. All chlorides, bromides, and iodides are soluble except those containing Ag$^+$, Pb$^{2+}$, or Hg$^{2+}$.
4. All sulfates are soluble except those containing Hg$^{2+}$, Pb$^{2+}$, Sr$^{2+}$, Ca$^{2+}$, or Ba$^{2+}$.
5. All hydroxides are insoluble except compounds of the alkali metals, Ca$^{2+}$, Sr$^{2+}$, and Ba$^{2+}$.
6. All compounds containing PO$_4^{3-}$, S$^2-$, CO$_3^{2-}$, and SO$_3^{2-}$ ions are insoluble except those that also contain alkali metals or NH$_4^+$.

2. Solutions of potassium sulfide and copper(II)nitrate, Cu(NO$_3$)$_2$, are mixed together and a greenish precipitate forms. For the following equations, do not forget the state labels (s), (l), (g), or (aq) for each substance. For ionic equations do not forget the charges on the ions.

(a) Write the balanced equation for this reaction.

(b) Write the total ionic equation for this reaction.

(c) Write the net ionic equation for this reaction.

(d) What are the spectator ions in this reaction?
3. For the following reactions, predict the products for the reaction and write a balanced equation for the reaction. If a reaction occurs, it will either be a precipitation reaction or an acid base reaction. If no precipitate is predicted and no acid base reaction occurs, write NO REACTION on the product side.

(a) $\text{Zn(ClO}_4\text{)}_2(aq) + \text{K}_2\text{CO}_3(aq)$ →

(b) $\text{KBr(aq) + AgNO}_3(aq)$ →

(c) $\text{NH}_4\text{Br(aq) + Ni(NO}_3\text{)}_2(aq)$ →

(d) $\text{Ca(OH}_2(s) + \text{H}_2\text{SO}_4(aq)}$ →

(e) $\text{HNO}_3(aq) + \text{MgCO}_3(s)$ →

4. Some portable breathalyzers contain sulfuric acid and potassium dichromate (orange) this mixture reacts with the alcohol in breath to form chromium$^{3+}$ ions (green). The reaction for this process is below. In a reaction ethyl alcohol, $\text{C}_2\text{H}_5\text{OH(g)}$, completely reacts with 26.9 g of potassium dichromate and excess sulfuric acid. How many grams of potassium sulfate, $\text{K}_2\text{SO}_4$, can be produced.

$$8\text{H}_2\text{SO}_4(aq) + 2\text{K}_2\text{Cr}_2\text{O}_7(aq) + \text{C}_2\text{H}_5\text{OH(g)} \rightarrow 2\text{Cr}_2\text{(SO}_4\text{)}_3(aq) + 2\text{K}_2\text{SO}_4(aq) + 11\text{H}_2\text{O(liq)} + 2\text{CO}_2(g)$$