GENERAL CHEMISTRY I UNIT TWO REVIEW PROBLEMS TPS rev 09012012

1) $CH_3OH_{(l)} \rightarrow CO_{(g)} + 2H_2$ delta H = -128.1 kJ How many kJ of heat are released when 15.5 grams decomposes? ***Answer = 62.0 kJ***

2) Specific heat of Pb is 0.13 J/g*K. How much heat is required to raise the temperature of 15 g of Pb from 22°C to 37°C? ***Answer = 29 J***

   How much heat for 30 grams?

3) $Ag_2O_{(s)} + H_2S_{(g)} \rightarrow Ag_2S_{(s)} + H_2O_{(l)}$ Use table of standard enthalpies of formation to estimate the enthalpy of reaction. ***Answer = -267 kJ***

   (heat of formation for silver sulfide is -31.8kJ/mole

4) $Cu_{(s)} + 2\ AgNO_{3(aq)} \rightarrow 2\ Ag_{(s)} + Cu(NO_3)_{2(aq)}$. What is oxidized? What is reduced? What is the oxidizing agent?

5) You mix 25 ml of 0.100M NaCl with 50 ml of 0.100M NaBr. What are the resulting concentrations of Na^+ ?/ Cl^- ? Br^- ?.

6) You have 1 liter of 80 proof vodka (40% by weight ethanol in water) and someone removes 3 shots (100 ml). What is the resulting concentration (proof)? Next someone fills the bottle back up with water, what is the resulting proof?

7) Given $N_2 + 2O_2 \rightarrow 2NO_2$ delta H = 66.4 kJ
   $2NO + O_2$ --> $2NO_2$ delta H = -114.2 kJ

   Estimate delta H for $N_2 + O_2 \rightarrow 2NO$
   All species are in the gas phase ***Answer = 180.6 kJ***

8) 2 Na2O2 + 2H2O → 4NaOH + O2 delta H = -126 kJ
   How much heat is released when 25 grams of Na_2O_2 is reacted with excess water? ***Answer = 20.2 kJ***

9) Using quantum numbers, define shell, sub shell, and orbital.

10) Draw the outer shell (valence) electron configuration for: alkali metal, noble gases, and halogens.

11) What is the wavelength in nanometers of light that has a frequency of 4.62×10^{14} wave numbers?

12) What is the wavelength of a photon that has energy of 1.51×10^{-17} J?

13) In the Bohr model of the H atom, an electron moves from n=6 to n=2. What is the wavelength in nanometers of the light emitted?

14) Which quantum numbers must be the same for orbitals to be degenerate in a H atom? In a many electron atom?

15) What elements are represented by the following notation? $[Ne]3s^2 3p^5$? $[He]2s^1$?