Chemistry 2202sem Quiz
March 5, 2013   Name: _____

Part A: Multiple Choice (5 marks)
Use the balanced chemical equation below to answer questions 1-3.

$$N_2(g) \quad + \quad 3 H_2 (g) \quad \rightarrow \quad 2 NH_3(g)$$
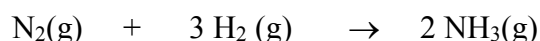
(1) How many moles of hydrogen will combine with 2.00 mol of nitrogen?
      (a) 0.666 mol   (b) 2.00 mol
      (c) 3.00 mol   (d) 6.00 mol

(2) If 3 moles of nitrogen gas are reacted with excess hydrogen gas, how many moles of NH_3 are produced?
      (a) 3 moles   (b) 6 moles
      (c) 6.67 moles   (d) 10 moles

(3) If 6 moles of hydrogen gas are reacted with excess nitrogen gas, how many moles of NH_3 are produced?
      (a) 3 moles   (b) 4 moles
      (c) 9 moles   (d) 12 moles

(4) Given the reaction below, what is the mole ratio if you are given the mass of $CaCl_2$ and are looking for the mass of NaCl?
      $NaOH \ + \ CaCl_2 \rightarrow NaCl \ + \ Ca(OH)_2$
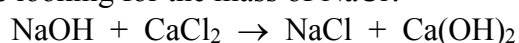
      (a) $\dfrac{1}{1}$ (b) $\dfrac{1}{2}$

      (c) $\dfrac{2}{1}$ (d) $\dfrac{2}{2}$

(5) An experiment is conducted to find the formula of a hydrate of lead (II) nitrate. $(Pb(NO_3)_2 \cdot XH_2O)$. The following mass data was collected:
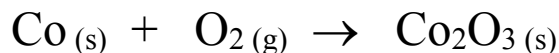
Mass of empty beaker	12.65 g
Mass of beaker + $Pb(NO_3)_2 \cdot XH_2O$ (before heating)	50.61 g
Mass of beaker + $Pb(NO_3)_2$ (after heating)	38.98 g

What mass of water was lost from the sample?
      (a) 11.63 g   (b) 26.33 g
      (c) 37.96 g   (d) 38.98 g

Part B: Short Answer (10 Marks)
(1) Calculate the mass of cobalt(III) oxide that will be produced when 2.60 g of cobalt metal reacts with excess oxygen gas according to the equation below. (4)

$$Co_{(s)} \ + \ O_{2 \, (g)} \rightarrow \ Co_2O_{3 \, (s)}$$

(2) An experiment is conducted to find the formula of a hydrated calcium chloride.
($CaCl_2 \cdot XH_2O$). The following mass data was collected:

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Mass of empty beaker	71.26 g
Mass of beaker + $CaCl_2 \cdot XH_2O$ (before heating)	80.75g
Mass of beaker + $CaCl_2$ (after heating)	75.70g

(a) Complete the following table **[1]**

Mass of $CaCl_2 \cdot XH_2O$ used	
Mass of $CaCl_2$ left after heating	
Mass of water lost	

(b) Find the number of moles of water that was lost by heating **[1]**

(c) Find the number of moles of calcium chloride left after heating **[2]**

(d) Use your answers from (b) and (c) above to find the formula of the hydrate **[2]**

(3) Silver metal may be precipitated from a solution of silver nitrate using copper metal:

$$Cu(s) + 2\,AgNO_3(aq) \rightarrow 2\,Ag(s) + Cu(NO_3)_2\,(aq)$$
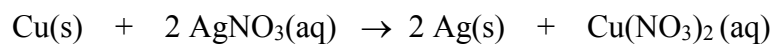
   (a) If 10.0g of copper metal is reacted with 30.0g of silver nitrate, determine the mass of silver produced by finding the limiting reagent. (6)

(b) If 20.0 g of silver metal is collected in the lab, calculate the % yield of this reaction (2)