HW 5. Homework Problems: Chapter 5

1. **To convert a given number of moles into the number of atoms, you would multiply by which of the following factors?**
   a. 6.02×10^{23} atoms/1 mol b. 1 mol/6.02×10^{23} atoms c. 1.66×10^{-24} atoms/1 mol
   d. 1 mol/1.66×10^{-24} atoms
2. **How many molecules of water are there in 4.00 mol of water?**
   a. 1.41×10^{24} b. 3.41×10^{23} c. 2.41×10^{24} d. 6.45×10^{24}
3. **How many grams of sulfur make up 3.01 mol of sulfur atoms? [Use atomic** weight: S= 32.06 g/mol]
   a. 1.81×10^{24} g b. 32.06 g c. 3.01 g d. 0.150 g e. 96.5 g
4. **Calculate the number of grams in 0.125 moles of nitrogen molecules.**
   a. 0.0107 g b. 3.50 g c. 112 g d. 1.75 g e. 0.0046 g
5. **How many atoms are in a 10.0 g sample of molybdenum (Mo)?**
   a. 1.10×10^{23} b. 1.43×10^{23} c. 6.27×10^{22} d. 2.53×10^{26} e. 5.78×10^{26}
6. **The Haber process combines nitrogen gas with hydrogen gas at high temperature and pressure to produce ammonia:**
   ___$N_2(g)$ + ___$H_2(g)$ --> ___$NH_3(g)$
   The coefficient of the hydrogen in the balanced equation is
   a. 1. b. 2. c. 3. d. 6.
7. **What is the sum of all coefficients when the following equation is balanced?**
   $C_2H_6(g) + O_2(g)$ ------> $CO_2(g) + H_2O(g)$
   a. 13 b. 15 c. 17 d. 19 e. 21
8. **Given $Fe_2O_3(s) + 3CO(g) \rightarrow 2Fe(s) + 3CO_2(g)$; How many CO molecules are required to react with 25 formula units of Fe_2O_3?**
   a. 15 CO molecules b. 75 CO molecules c. 55 CO molecules d. 40 CO molecules
9. How many moles of HCl can be formed when 2 mol of hydrogen gas react with chlorine? $H_2(g) + Cl_2(g)$ ------> HCl(g) (unbalanced)
   a. 0.5 mol b. 1 mol c. 2 mol d. 4 mol e. 8 mol
10. **$Fe_2O_3(s) + 3CO(g) \rightarrow 2Fe(s) + 3CO_2(g)$; What mass of CO is required to react with 146 grams of Fe_2O_3?**
    a. 16.3 g CO b. 56.8 g C c. 76.7 g d. 94.7 g CO e. 14.2 g CO
11. **For the reaction given below, how many moles of $AlBr_3$ will be produced if 12 moles of Br_2 react with 8 moles of aluminum?**
    $2Al(s) + 3Br_2(l)$ ---> $2AlBr_3(s)$
    a. 4 b. 8 c. 12 d. 16 e. 20
12. **In the reaction given below, how many grams of sodium metal are consumed if 14.2 g of chlorine gas react to produce 23.4 g of sodium chloride? $2Na(s) + Cl_2(g)$ ---> $2NaCl(g)$**
    a. 4.3 g b. 9.2 g c. 14.2 g d. 18.8 g e. 33.0 g
13. **The efficiency of a particular synthesis method is evaluated by determining the:**
    a. limiting reactant b. theoretical yield c. percent yield
    d. molecular weight of the product e. stoichiometric coefficients
14. **If 95.0 g of cesium reacts in sufficient chlorine to produce cesium chloride, what is the theoretical yield?**
    $2Cs(s) + Cl_2(g)$ ---> $2CsCl(s)$
    a. 95.0 g b. 120. g c. 146 g d. 236 g e. 285 g
15. **If 4 $Fe_3O_4(s)$ (4.00 g) + $O_2(g)$ (excess) $\rightarrow$ $6Fe_2O_3$ and actual yield is 3.55 g, what is the theoretical yield of Fe_2O_3?**
    a. 50.5 % b. 91.1 % c. 85.7 % d. 100 %