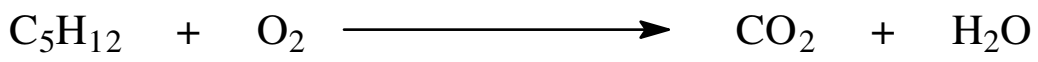
CHM 161 Chemistry for the Life Sciences Name_____
Problem set for Chapter 6

1.(20) When organic compounds are burned in O_2, they react to form CO_2 and H_2O. The combustion of pentane is shown below.

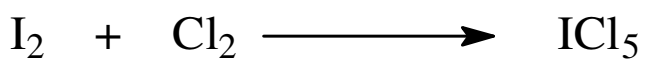


a) Balance the above reaction.
b) According to the balanced reaction, how many moles of O_2 are needed to burn 10 mol of C_5H_{12}?

c) If 1.4 mol of C_5H_{12} reacts with excess O_2, how many moles of water will form?

d) If I use 8.0 moles of C_5H_{12} and 8.0 moles of O_2 in this reaction, which reactant will have some remaining *unreacted* (which reactant is used in excess)? How many moles of this compound will be left over unreacted?

2.(20) The following questions refer to the chemical equation below.



a) Balance the equation.
b) Assuming excess Cl_2 is available, how many moles iodine pentachloride will form from 2.5 moles of iodine?

c) How many molecules iodine pentachloride is this?

d) How many moles of chlorine are needed to react with 0.250 moles of iodine?

e) What mass (grams) of Cl_2 is needed to react with 0.250 moles of iodine?

3.(20) Balance the following reactions:

a) $Ca(NO_3)_2 + H_2SO_4 \longrightarrow CaSO_4 + HNO_3$

b) $NaHCO_3 + HBr \longrightarrow NaBr + CO_2 + H_2O$

c) $C_{12}H_{22}O_{11} + H_2O \longrightarrow C_2H_6O + CO_2$

d) $HCl + Al \longrightarrow AlCl_3 + H_2$

4.(20) Consider the chemical reaction shown below (edited from question 6.103).

$$Cu + HNO_3 \longrightarrow Cu(NO_3)_2 + NO_2 + H_2O$$

a) Balance the reaction.

b) How many moles are there in 5.00g of Cu?

c) Using your answer from parts a) and b), how many moles of HNO_3 are needed to react with the 5.00g of Cu?

d) How many grams of HNO_3 are needed to react with 5.00g of Cu?