

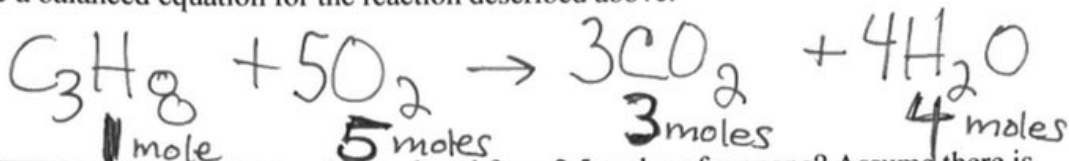
STOICHIOMETRY PROBLEMS 1

KEY

Directions: Use your mole map to help you answer the following questions. SHOW ALL WORK USING DIMENSIONAL ANALYSIS!! Label all numbers with both units and the formula of the compound.

Propane, C_3H_8 , burns in oxygen to produce carbon dioxide and water.

a. Write a balanced equation for the reaction described above:



b. How many moles of water can be produced from 2.5 moles of propane? Assume there is an EXCESS of oxygen.

$$\frac{2.5 \text{ moles } C_3H_8}{1} \times \frac{4 \text{ moles } H_2O}{1 \text{ mole } C_3H_8} = 10. \text{ moles } H_2O$$

bal. eq.

c. How many grams of carbon dioxide can be formed from 3.00 moles of oxygen reacting with an excess of propane?

$$\frac{3.00 \text{ moles } O_2}{1} \times \frac{3 \text{ moles } CO_2}{5 \text{ moles } O_2} \times \frac{44.01 \text{ g } CO_2}{1 \text{ mole } CO_2} = 79.2 \text{ g } CO_2$$

bal. eq.

d. If 25.0 g of propane is reacted with an excess of oxygen, how many grams of carbon dioxide will be produced?

$$\frac{25.0 \text{ g } C_3H_8}{1} \times \frac{1 \text{ mole } C_3H_8}{44.11 \text{ g } C_3H_8} \times \frac{3 \text{ moles } CO_2}{1 \text{ mole } C_3H_8} \times \frac{44.01 \text{ g } CO_2}{1 \text{ mole } CO_2} = 74.8 \text{ g } CO_2$$

bal. eq.

e. How many grams of propane are necessary to produce 5.00 kg of water?

$$\frac{5.00 \text{ kg } H_2O}{1} \times \frac{1000 \text{ g } H_2O}{1 \text{ kg } H_2O} \times \frac{1 \text{ mole } H_2O}{18.02 \text{ g } H_2O} \times \frac{1 \text{ mole } C_3H_8}{4 \text{ moles } H_2O} \times \frac{44.11 \text{ g } C_3H_8}{1 \text{ mole } C_3H_8} = 3060 \text{ g } C_3H_8$$

f. How many water molecules will be produced from the reaction of 36.5 g of oxygen with an excess amount of propane?

$$\frac{36.5 \text{ g } O_2}{1} \times \frac{1 \text{ mole } O_2}{32.00 \text{ g } O_2} \times \frac{4 \text{ moles } H_2O}{5 \text{ moles } O_2} \times 6.02 \times 10^{23} \text{ molecules } H_2O = 5.49 \times 10^{23} \text{ molecules } H_2O$$

g. How many molecules of oxygen are needed to make 4.03×10^{30} molecules of water?

$$\frac{4.03 \times 10^{30} \text{ molecules } H_2O}{1} \times \frac{1 \text{ mole } H_2O}{6.02 \times 10^{23} \text{ molecules } H_2O} \times \frac{5 \text{ moles } O_2}{4 \text{ moles } H_2O} \times \frac{6.02 \times 10^{23} \text{ molecules } O_2}{1 \text{ mole } O_2} = 5.04 \times 10^{30} \text{ molecules } O_2$$

h. How many grams of carbon dioxide would be needed to react exactly with 50.0 g of propane?

$$\frac{50.0 \text{ g } O_2}{1} \times \frac{1 \text{ mole } O_2}{32.00 \text{ g } O_2} \times \frac{1 \text{ mole } C_3H_8}{5 \text{ moles } O_2} \times \frac{44.11 \text{ g } C_3H_8}{1 \text{ mole } C_3H_8} = 13.8 \text{ g } C_3H_8$$