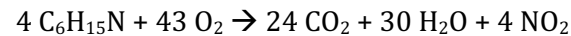


1. The balanced equation for hexamine combustion is:



a) Calculate the molar mass for each compound.

$$\text{C}_6\text{H}_{15}\text{N} = 101.22 \text{ g/mol}$$

$$\text{H}_2\text{O} = 18.02 \text{ g/mol}$$

$$\text{O}_2 = 32.00 \text{ g/mol}$$

$$\text{NO}_2 = 46.01 \text{ g/mol}$$

$$\text{CO}_2 = 44.01 \text{ g/mol}$$

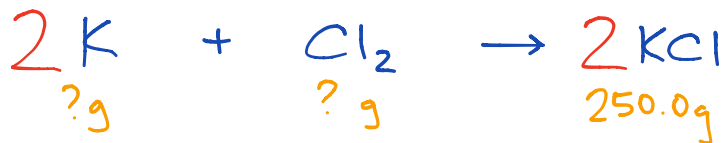
b) What mass of oxygen is required to react with 763.2 g of  $\text{C}_6\text{H}_{15}\text{N}$ ?

$$763.2 \text{ g } \cancel{\text{C}_6\text{H}_{15}\text{N}} \times \frac{1 \text{ mol } \cancel{\text{C}_6\text{H}_{15}\text{N}}}{101.22 \text{ g } \cancel{\text{C}_6\text{H}_{15}\text{N}}} \times \frac{43 \text{ mol } \text{O}_2}{4 \text{ mol } \cancel{\text{C}_6\text{H}_{15}\text{N}}} \times \frac{32.00 \text{ g } \text{O}_2}{1 \text{ mol } \text{O}_2} = \boxed{2594 \text{ g } \text{O}_2}$$

c) Calculate the mass of water produced when 253 g of  $\text{O}_2$  are consumed.

$$253 \text{ g } \cancel{\text{O}_2} \times \frac{1 \text{ mol } \cancel{\text{O}_2}}{32.00 \text{ g } \cancel{\text{O}_2}} \times \frac{30 \text{ mol } \text{H}_2\text{O}}{43 \text{ mol } \cancel{\text{O}_2}} \times \frac{18.02 \text{ g } \text{H}_2\text{O}}{1 \text{ mol } \text{H}_2\text{O}} = \boxed{99.4 \text{ g } \text{H}_2\text{O}}$$

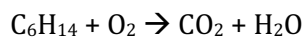
2. A reaction between potassium and chlorine produced 250.0 grams of the product. How many grams of potassium and chlorine were needed for the reaction?



$$250.0 \text{ g } \text{KCl} \times \frac{1 \text{ mol } \text{KCl}}{74.55 \text{ g } \text{KCl}} \times \frac{2 \text{ mol } \text{K}}{2 \text{ mol } \text{KCl}} \times \frac{39.10 \text{ g } \text{K}}{1 \text{ mol } \text{K}} = \boxed{131.1 \text{ g } \text{K}}$$

$$\times \frac{1 \text{ mol } \text{Cl}_2}{2 \text{ mol } \text{KCl}} \times \frac{70.90 \text{ g } \text{Cl}_2}{1 \text{ mol } \text{Cl}_2} = \boxed{118.9 \text{ g } \text{Cl}_2}$$

3. Given the following equation for the combustion of hexane (C<sub>6</sub>H<sub>14</sub>):



a) What is the balanced equation? (Hint: use the algebraic method)



b) What mass of CO<sub>2</sub> is produced by burning 268 g of C<sub>6</sub>H<sub>14</sub>?

$$268 \text{ g C}_6\text{H}_{14} \times \frac{1 \text{ mol C}_6\text{H}_{14}}{86.21 \text{ g C}_6\text{H}_{14}} \times \frac{12 \text{ mol CO}_2}{2 \text{ mol C}_6\text{H}_{14}} \times \frac{44.01 \text{ g CO}_2}{1 \text{ mol CO}_2} = \boxed{821 \text{ g CO}_2}$$

c) What mass of oxygen is consumed when 3.00 kg of hexane reacts?

$$3.00 \text{ kg C}_6\text{H}_{14} \times \frac{1000 \text{ g C}_6\text{H}_{14}}{1 \text{ kg C}_6\text{H}_{14}} \times \frac{1 \text{ mol C}_6\text{H}_{14}}{86.21 \text{ g C}_6\text{H}_{14}} \times \frac{19 \text{ mol O}_2}{1 \text{ mol C}_6\text{H}_{14}} \times \frac{32.00 \text{ g O}_2}{1 \text{ mol O}_2} = \boxed{1.06 \times 10^4 \text{ g O}_2}$$

d) If burning a quantity of hexane produces 78.0 grams of H<sub>2</sub>O, what mass of CO<sub>2</sub> would be produced at the same time?

$$78.0 \text{ g H}_2\text{O} \times \frac{1 \text{ mol H}_2\text{O}}{18.02 \text{ g H}_2\text{O}} \times \frac{12 \text{ mol CO}_2}{14 \text{ mol H}_2\text{O}} \times \frac{44.01 \text{ g CO}_2}{1 \text{ mol CO}_2} = \boxed{163 \text{ g CO}_2}$$

e) Carbon dioxide is a greenhouse gas. What mass of carbon dioxide is produced by burning 20.0 moles of hexane?

$$20.0 \text{ mol C}_6\text{H}_{14} \times \frac{12 \text{ mol CO}_2}{2 \text{ mol C}_6\text{H}_{14}} \times \frac{44.01 \text{ g CO}_2}{1 \text{ mol CO}_2} = \boxed{5.28 \times 10^3 \text{ g CO}_2}$$

1. a. C<sub>6</sub>H<sub>14</sub> = 101.22 g/mol; O<sub>2</sub> = 32.00 g/mol; CO<sub>2</sub> = 44.01 g/mol; H<sub>2</sub>O = 18.02 g/mol; NO<sub>2</sub> = 46.01 g/mol

b. 2594 g O<sub>2</sub>

c. 99.4 g H<sub>2</sub>O

2. 131.1 g K; 118.9 g Cl<sub>2</sub>

3. a. 2, 19, 12, 14

b. 821 g CO<sub>2</sub>

c. 1.06 x 10<sup>4</sup> g O<sub>2</sub>

d. 163 g CO<sub>2</sub>

e. 5.28 g CO<sub>2</sub>

x 10<sup>3</sup>