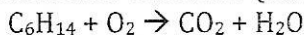


1. Given the following equation for the combustion of hexane (C_6H_{14}):



a) What is the balanced equation?



b) What mass of CO_2 is produced by burning 268 g of C_6H_{14} ?

$$268g C_6H_{14} \times \frac{1 \text{ mol } C_6H_{14}}{86.21g} \times \frac{12 \text{ mol } CO_2}{2 \text{ mol } C_6H_{14}} \times \frac{44.01g}{1 \text{ mol } CO_2} = 821 g CO_2$$

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

$$3.00 \text{ kg } C_6H_{14} \times \frac{1000g C_6H_{14}}{1 \text{ kg } C_6H_{14}} \times \frac{1 \text{ mol } C_6H_{14}}{86.21g C_6H_{14}} \times \frac{19 \text{ mol } O_2}{2 \text{ mol } C_6H_{14}} \times \frac{32.00g O_2}{1 \text{ mol } O_2} = 1.06 \times 10^4 g O_2$$

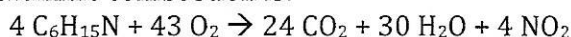
d) If burning a quantity of hexane produces 78.0 grams of H_2O , what mass of CO_2 would be produced at the same time?

$$78.0g H_2O \times \frac{1 \text{ mol } H_2O}{18.02g} \times \frac{12 \text{ mol } CO_2}{14 \text{ mol } H_2O} \times \frac{44.01g}{1 \text{ mol } CO_2} = 163g CO_2$$

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

$$20.0 \text{ mol } C_6H_{14} \times \frac{12 \text{ mol } CO_2}{2 \text{ mol } C_6H_{14}} \times \frac{44.01g}{1 \text{ mol } CO_2} = 5280 g CO_2 \text{ or } 5.28 \times 10^3 g CO_2$$

2. The balanced equation for hexamine combustion is:



a) Calculate the molar mass for each compound.

$$C_6H_{15}N = 101.22g/mol$$

$$O_2 = 32.00g/mol$$

$$CO_2 = 44.01g/mol$$

$$H_2O = 18.02g/mol$$

$$NO_2 = 46.01g/mol$$

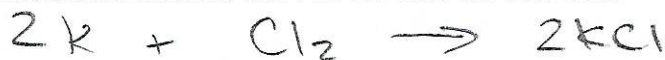
b) What mass of oxygen is required to react with 763.2 g of $C_6H_{15}N$?

$$763.2g C_6H_{15}N \times \frac{1 \text{ mol } C_6H_{15}N}{101.22g} \times \frac{43 \text{ mol } O_2}{4 \text{ mol } C_6H_{15}N} \times \frac{32.00g}{1 \text{ mol } O_2} = 2594g O_2$$

c) Calculate the mass of water produced when 253 g of O_2 are consumed.

$$253g O_2 \times \frac{1 \text{ mol } O_2}{32.00g} \times \frac{30 \text{ mol } H_2O}{43 \text{ mol } O_2} \times \frac{18.02g H_2O}{1 \text{ mol } H_2O} = 99.4g H_2O$$

3. 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?



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

$$250.0g \text{ KCl} \times \frac{1 \text{ mol KCl}}{74.55g \text{ KCl}} \times \frac{1 \text{ mol Cl}_2}{2 \text{ mol KCl}} \times \frac{70.90g}{1 \text{ mol Cl}_2} = \boxed{118.9g \text{ Cl}_2}$$

4. Aluminum reacts with Fe_2O_3 to give aluminum oxide and iron. If 40.2 g of iron are produced, find the masses of the other chemicals involved.

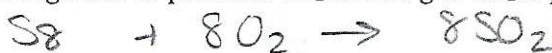


$$40.2g \text{ Fe} \times \frac{1 \text{ mol Fe}}{55.85g \text{ Fe}} \times \frac{2 \text{ mol Al}}{2 \text{ mol Fe}} \times \frac{26.98g}{1 \text{ mol Al}} = \boxed{19.4g \text{ Al}}$$

$$40.2g \text{ Fe} \times \frac{1 \text{ mol Fe}}{55.85g \text{ Fe}} \times \frac{1 \text{ mol Fe}_2O_3}{2 \text{ mol Fe}} \times \frac{159.70g}{1 \text{ mol Fe}_2O_3} = \boxed{57.5g \text{ Fe}_2O_3}$$

$$40.2g \text{ Fe} \times \frac{1 \text{ mol Fe}}{55.85g \text{ Fe}} \times \frac{1 \text{ mol Al}_2O_3}{2 \text{ mol Fe}} \times \frac{101.96g}{1 \text{ mol Al}_2O_3} = \boxed{36.7g \text{ Al}_2O_3}$$

5. Sulphur and oxygen react together to produce SO_2 . If 356 g of SO_2 is produced, find the masses of the two reactants.



$$356g \text{ SO}_2 \times \frac{1 \text{ mol SO}_2}{64.07g \text{ SO}_2} \times \frac{1 \text{ mol S}_8}{8 \text{ mol SO}_2} \times \frac{256.56g}{1 \text{ mol S}_8} = \boxed{178g \text{ S}_8}$$

$$356g \text{ SO}_2 \times \frac{1 \text{ mol SO}_2}{64.07g \text{ SO}_2} \times \frac{8 \text{ mol O}_2}{8 \text{ mol SO}_2} \times \frac{32.00g \text{ O}_2}{1 \text{ mol O}_2} = \boxed{178g \text{ O}_2}$$

6. When isopropanol (C_3H_8O) burns in oxygen, carbon dioxide and water are produced. Determine how many grams of carbon dioxide and water are produced when 5682 kg of isopropanol is burned.



$$5682 \text{ kg } C_3H_8O \times \frac{1000g}{1 \text{ kg}} \times \frac{1 \text{ mol } C_3H_8O}{60.11g \text{ } C_3H_8O} \times \frac{6 \text{ mol } CO_2}{2 \text{ mol } C_3H_8O} \times \frac{44.01g}{1 \text{ mol } CO_2} = 12480 \text{ kg } CO_2$$

$$5682 \text{ kg } C_3H_8O \times \frac{1000g}{1 \text{ kg}} \times \frac{1 \text{ mol } C_3H_8O}{60.11g \text{ } C_3H_8O} \times \frac{8 \text{ mol } H_2O}{2 \text{ mol } C_3H_8O} \times \frac{18.02g}{1 \text{ mol } H_2O} = 6813 \text{ kg } H_2O$$

1b. 821g 1c. 1.06×10^4g 1d. 163g 1e. 5.28×10^3g 2a. 101.22g/mol, 32.00g/mol, 44.01g/mol, 18.02g/mol, 46.01g/mol 2b. 2594g
2c. 99.4g 3. 131.1g K, 118.9g Cl_2 4. 19.4g Al, 57.5g Fe_2O_3 , 36.7g Al_2O_3 5. 178g S_8 , 178g O_2 6. 1.248×10^4kg CO_2 , 6813kg H_2O