Chemistry – Chapter 17 Book problems #1: q = mCΔt

1. The production of iron and carbon dioxide from iron (III) oxide and carbon monoxide is an exothermic reaction. How many kilojoules of heat are produced when 3.40 mol Fe_2O_3 reacts with an excess of CO?

$$Fe_2O_{3(s)} + 3\ CO_{(g)} \rightarrow 2\ Fe_{(s)} + 3\ CO_{2(g)} + 26.3\ kJ$$

2. When carbon disulfide is formed from its elements, heat is absorbed. Calculate the amount of heat (in kJ) absorbed when 5.66 g of carbon disulfide is formed.

$$C_{(s)} + 2\ S_{(s)} \rightarrow CS_{2(l)} \qquad \Delta H = 89.3\ kJ$$

3. When 2 mol of solid magnesium (Mg) combines with 1 mol of oxygen gas (O_2), 2 mol of solid magnesium oxide (MgO) is formed and 1204 kJ of heat is released. Write the thermochemical equation for this combustion reaction.

4. Gasohol contains ethanol, $C_2H_6O_{(l)}$. When ethanol burns, it reacts with $O_{2(g)}$ to produce $CO_{2(g)}$ and $H_2O_{(l)}$. How much heat is released when 12.5 g of ethanol burns?

$$C_2H_6O_{(l)} + 3\ O_{2(g)} \rightarrow 2\ CO_{2(g)} + 3\ H_2O_{(l)} \qquad \Delta H = -1368\ kJ$$

5. The burning of magnesium is a highly exothermic reaction.

$$2\ Mg_{(s)} + O_{2(g)} \rightarrow 2\ MgO_{(s)} + 1204\ kJ$$

How many kilojoules of heat are released when 0.75 mol of Mg burn in an excess of O_2?

6. The combustion of ethene (C_2H_4) is an exothermic reaction.

$$C_2H_{4(g)} + 3\ O_{2(g)} \rightarrow 2\ CO_{2(g)} + 2\ H_2O_{(l)} \qquad \Delta H = -1.40 \times 10^3\ kJ$$

Calculate the amount of heat liberated with 4.79 g of C_2H_4 reacts with excess oxygen.