**Additional questions on enthalpy change calculations**

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| **1.** The equation for the combustion of magnesium is:  2Mg + O2 → 2MgO ∆H = -1200kJ  Calculate the enthalpy change when:  i) 1 mole of magnesium reacts with oxygen.  ii) 0.35 moles of magnesium reacts with oxygen.  iii) 1.5g of magnesium reacts with oxygen. | **2.** The Thermite reaction is used to weld railway tracks.  2Al(*s*) + Fe2O3(*s)* arrow Al2O3(*s*) + 2Fe(*s*)  i) In a controlled demonstration of the reaction, 2.1 g of aluminium was  reacted with excess iron(III) oxide and 70.3 kJ of energy was released.  Calculate ∆*rH* for the reaction.  ii**)** Calculate the mass of iron produced when 240kJ of heat energy is given off. |
| **3.** The energy released when sucrose, reacts with oxygen is 5650 kJ mol–1. A person running 5 km needs 1640kJ of energy. Calculate the mass of sucrose needed to provide the energy for a 5 km run.  *M* (sucrose) = 342 g mol–1 | **4.** Octane (C8H18), a component of petrol burns in excess oxygen to produce carbon dioxide and water. The heat of combustion of octane is -5530kJ mol–1  If the density of petrol is 0.698 gcm-3, calculate the energy released when 40 litres of petrol burns completely in oxygen (assume that petrol is entirely composed of octane) |
| **5.** Calculate the enthalpy change for the combustion of 0.256 mol of BBQ gas (propane)  C3H8(g) + 5O2(g) 🡪 3CO2(g) + 4H2O(l) *∆rH* = -2220.1 kJ mol–1 | **6.**Ethanoic acid is made industrially by reacting methanol with carbon monoxide.  CH3OH(*l*) + CO(g) arrow CH3COOH(*l*) *∆rH* = -356 kJ mol–1   1. i) Calculate the quantity of heat evolved during the reaction if 1.5 dm3 of ethanoic acid is produced. The density of ethanoic acid is 1.05g/cm3   ii) Calculate the volume of ethanoic acid made when 3 × 104 kJ of energy are produced. |

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