Quiz 6.3 – Enthalpy

Name: _Key_

Question 1 (2 points)

A bomb calorimeter has a calibrated heat capacity of $C_{cal} = 2.673 \frac{kJ}{°C}$

$1.25\ g$ of sucrose $(C_{12}H_{22}O_{11})$ are burned in the calorimeter and the temperature rises by $7.71\ °C$

Calculate ΔH_{rxn} for the combustion of sucrose

$$\frac{1.25g\ C_{12}H_{22}O_{11}\ |\ 1\ mol\ C_{12}H_{22}O_{11}}{|\ 342.30\ g\ C_{12}H_{22}O_{11}} = 0.003652\ moles\ C_{12}H_{22}O_{11}$$

$$\Delta H_{rxn} = \frac{-C\,\Delta T}{n} = \frac{-2.673\frac{kJ}{°C}\cdot 7.71\,°C}{0.003652\ moles} = -5,640\ \frac{kJ}{mol}$$

Question 2 (3 points)

Consider the reaction: $H_2S(g) + 2\,O_2(g) \longrightarrow SO_3(g) + H_2O(l)$ $\qquad \Delta H_{rxn} = -207\ \frac{kJ}{mol}$

If $5.2\ g$ of H_2S are reacted with excess O_2, how much heat will be released?

$$\frac{5.2g\ H_2S\ |\ 1\ mol\ H_2S\ |\ -207\ kJ}{|\ 34.08\ g\ H_2S\ |\ 1\ mol\ H_2S} = -31.6\ kJ$$

$31.6\ kJ$ released