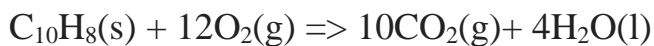


Mothballs are composed primarily of the hydrocarbon naphthalene ($C_{10}H_8$). When 1.274 g of naphthalene burns in a bomb calorimeter, the temperature rises from 26.214 °C to 30.284 °C.

Find Δ_rH for the combustion of naphthalene at 298 K. When considering phase, assume all reactants and products are at 298 K.



$$m(C_{10}H_8) = 1.274 \text{ g}$$

$$T_1 = 26.214 \text{ }^\circ\text{C}$$

$$T_2 = 30.284 \text{ }^\circ\text{C}$$

The Δ_rH sign of methanol will be negative because it is exothermic.

The heat capacity of the bomb calorimeter - C

$$\Delta T = 30.284 \text{ }^\circ\text{C} - 26.214 \text{ }^\circ\text{C} = 4.07$$

$$C = q_a / \Delta T$$

$$q_a = C * \Delta T = 4.07 \text{ C (kJ)}$$

$$n(C_{10}H_8) = m(C_{10}H_8) / M(C_{10}H_8) = 1.274 \text{ g} / 128.17 \text{ g} \cdot \text{mol}^{-1} = 0.01 \text{ mol}$$

$$\Delta_rH = q_a / n(C_{10}H_8) = 4.07 * \text{C kJ} / 0.01 \text{ mol} = -407 * \text{C kJ} \cdot \text{mol}^{-1}.$$

Answer provided by www.AssignmentExpert.com