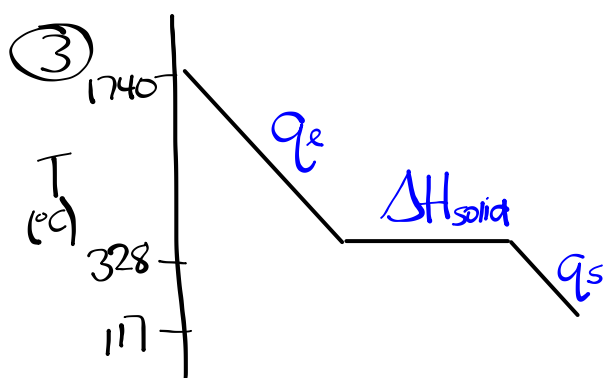


Homework - Total Energy Worksheet



$$\Delta E_T = q_e + \Delta H_{\text{solid}} + q_s$$

$$q_e = mC\Delta T$$

$$q_e = (150.0\text{g})(0.159\frac{\text{J}}{\text{g}\cdot\text{C}})(-1412^\circ\text{C})$$

$$q_e = -33676.2\text{ J}$$

$$\Delta H_{\text{solid}} = n\Delta H_{\text{solid}}$$

$$\Delta H_{\text{solid}} = \left(\frac{150.0\text{g}}{207.20\text{g/mol}}\right)\left(-4.77\frac{\text{kJ}}{\text{mol}}\right)$$

$$\Delta H_{\text{solid}} = -3.453\text{ kJ}$$

$$q_s = mC\Delta T$$

$$q_s = (150.0\text{g})(0.159\frac{\text{J}}{\text{g}\cdot\text{C}})(-211^\circ\text{C})$$

$$q_s = -5032.35\text{ J}$$

$$\Delta E_T = q_e + \Delta H_{\text{solid}} + q_s$$

$$\Delta E_T = (-33.7\text{ kJ}) + (-3.45\text{ kJ}) + (-5.03\text{ kJ})$$

$$\Delta E_T = -42.2\text{ kJ}$$

Types of Systems

Classifying types of systems:

1. Open system - a system where both matter and energy can flow into or out of the system.
2. Closed system - a system where energy is allowed to be transferred into and out but matter cannot be transferred.
3. Isolated system - a system where neither matter nor energy is allowed to enter or leave the system.

Calorimetry

CALORIMETRY - is the technological process of measuring energy changes using an **isolated system** called a calorimeter.

In the calorimeter the system being studied is surrounded by a known quantity of water. Energy is then transferred between the chemical system and the water. The heat gained by the water can be determined and thus equals the heat lost by the system.

ASSUMPTIONS IN CALORIMETRY

1. no heat is transferred between the calorimeter and the outside environment.
2. any heat absorbed or released by the calorimeter materials is negligible.
3. a dilute aqueous solution has the same density and specific heat capacity as pure water.

Assumption #2 implies

$$\Delta H_{\text{system}} = -q_{\text{calorimeter}}$$

