Answer on the question #70170, Chemistry / Other

Question:

1. Laboratory experiment, 30. J of heat was added to a gas piston assembly as the piston did 75 J of work on it surroundings. Calculate triangle E for the system
2. A 15.0 g piece of graphite is heated to 100.0°C and placed in a calorimeter. The graphite releases 815.1 J of heat to reach a final temperature of 23.9°C. What is the specific heat of graphite?
3. Calculate the standard enthalpy of reaction for the reaction 2 Na(s) + 2 H2O(l)----> 2 NaOH(aq) + H2(g). Standered enthalpies of formation are -285.8 kJ/Mom for H2O(l) and -470.11 kJ/mol for NaOH(aq)

Answer:

1. The change in the energy of the system described equals heat transferred to the assembly **minus** the work made **on** its surroundings:
$$\Delta E = Q - W = 30J - 75J = -45J$$
2. The heat is related to the change in temperature of the closed system as:
$$\boldsymbol{Q = cm\Delta T};$$
Then, the specific heat is:
$$c = \frac{Q}{m\Delta T} = \frac{815.1\,J}{15.0\,g \cdot (100 - 23.9)°C} = 0.714\,J\,g^{-1}\,°C^{-1}$$
3. According to the **Hess law:**
$$\Delta H° = 2\Delta H°_f(NaOH) - 2\Delta H°_f(H_2O) = -2 \cdot 470.11 + 2 \cdot 285.8$$
$$= -368.6\,kJ\,mol^{-1}$$