1. Calculate the enthalpy for this reaction:

\[ 2\text{C(s)} + \text{H}_2(\text{g}) \rightarrow \text{C}_2\text{H}_2(\text{g}) \]

\[ \Delta H^\circ = ??? \text{ kJ} \]

Given the following thermochemical equations:

\[ \text{C}_2\text{H}_2(\text{g}) + \frac{5}{2}\text{O}_2(\text{g}) \rightarrow 2\text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l}) \]

\[ \Delta H^\circ = -1299.5 \text{ kJ} \]

\[ \text{C(s)} + \text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) \]

\[ \Delta H^\circ = -393.5 \text{ kJ} \]

\[ \text{H}_2(\text{g}) + \frac{1}{2}\text{O}_2(\text{g}) \rightarrow \text{H}_2\text{O}(\text{l}) \]

\[ \Delta H^\circ = -285.8 \text{kJ} \]

2. Calculate the standard enthalpy of combustion for the following reaction:

\[ \text{C}_6\text{H}_{12}\text{O}_6(\text{s}) + 6\text{O}_2(\text{g}) \rightarrow 6\text{CO}_2(\text{g}) + 6\text{H}_2\text{O}(\text{l}) \]

To solve this problem, we must know the following \( \Delta H^\circ_f \) values:

| \( \text{C}_6\text{H}_{12}\text{O}_6(\text{s}) \) | -1275.0 |
| \( \text{O}_2(\text{g}) \) | zero |
| \( \text{CO}_2(\text{g}) \) | -393.5 |
| \( \text{H}_2\text{O}(\text{l}) \) | -285.8 |
3. Calculate the enthalpy of the following chemical reaction:

\[ \text{CS}_2(\ell) + 3\text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) + 2\text{SO}_2(\text{g}) \]

\[
\text{C(s) + O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) \quad \Delta H = -393.5 \text{ kJ/mol}
\]

\[
\text{S(s) + O}_2(\text{g}) \rightarrow \text{SO}_2(\text{g}) \quad \Delta H = -296.8 \text{ kJ/mol}
\]

\[
\text{C(s) + 2S(s) \rightarrow CS}_2(\ell) \quad \Delta H = +87.9 \text{ kJ/mol}
\]

4. Calculate \( \Delta E \) for a system undergoing an endothermic process in which 15.6 kJ of heat flows and where 1.4 kJ of work is done on the system.

\[
\Delta E = q + w
\]

5. A student must use 225 mL of hot water in a lab procedure. Calculate the amount of heat required to raise the temperature of 225 mL of water from 20.0 °C to 100.0 °C.