1) Estimate the enthalpy of the following reaction using bond dissociation energies.

\[
\begin{align*}
\text{Br}_2 + \text{Cl}^- & \rightleftharpoons \text{acetone / H}_2\text{O} \rightarrow \text{Cl}_2 + \text{Br}^- \\
\text{C-Br} & = 285 \text{ kJ/mol} \\
\text{C-Cl} & = 339 \text{ kJ/mol}
\end{align*}
\]

\[\Delta H = -5.4 \text{ kJ/mol}\]

The reaction proceeds by a one-step mechanism.

Sketch a reaction-energy diagram for the reaction process. Show the relative energies of the reactants, products, and the transition state. Label the activation energy and the \(\Delta H^\circ\) for the reaction.

![Reaction Energy Diagram](Image)
2) Estimate the enthalpy of the following reaction using bond dissociation energies.

\[
\begin{array}{ccc}
\text{C-O} & 358 \\
\text{C-H} & 413 \\
\text{C-C} & 346 \\
\end{array}
\]
\[\text{1117} \]

\[\Delta H = +44 \text{ kJ/mol} \]

The reaction proceeds by a two-step mechanism where the second step is the slow step.

Sketch a reaction-energy diagram for the reaction process. Show the relative energies of the reactants, products, intermediate and the transition state. Label the activation energy and the \( \Delta H^o \) for the reaction.