- Draw the constitutional formula(s) of the major organic product(s) formed in each of the following reactions.

\[
\begin{align*}
\text{HO} & \quad \text{O} \\
\text{CH}_3\text{C} & \quad \text{Cl} \\
\end{align*}
\]

\[
\begin{align*}
\text{CH}_3\text{CH}_2\text{C} & \quad \text{O} \\
\text{Cl} & \quad \text{excess CH}_3\text{NH}_2 \\
\end{align*}
\]
Complete the three step mechanism for the reaction given below. Draw intermediate structures, curly arrows and partial charges as appropriate to illustrate the bonding changes that take place.
- Draw the structure(s) of the major organic product(s) formed in each of the following reactions. Give the names of the products where requested.

<table>
<thead>
<tr>
<th>Reaction</th>
<th>Products</th>
</tr>
</thead>
</table>
| \[
\text{Br} \quad \text{conc. K}^+ \text{OH}^- \quad \text{heat}
\] | Name(s): |
| \[
\text{OH} \quad \text{Cr}_2\text{O}_7^{2-} / \text{H}^+ / \text{H}_2\text{O}
\] | |
| \[
\text{OH} \quad \text{conc. HBr}
\] | Name(s): |
| \[
\text{H}^+ / \text{H}_2\text{O} / \text{heat}
\] | |
- Compound X can be reduced by treatment with sodium borohydride followed by dilute hydrochloric acid to form a mixture of diol compounds.

\[ \text{X} \]

Clearly draw all possible product stereoisomers that can form from this reduction, taking care to represent clearly the stereochemistry of the products.

Clearly label each isomer drawn above as either chiral or achiral (not chiral).

Circle one of the product isomers you have drawn above and provide a full systematic name for this compound below. Make sure you include all relevant stereochemical descriptors.