Problem Set 8

1. Only one major product is formed in the following transformation. Explain.

\[
\begin{array}{c}
\text{O} \quad + \\
\text{NaOEt, EtOH} \\
\end{array}
\]

\[
\begin{array}{c}
\text{H} \\
\text{O} \\
\end{array}
\]

2. Complete the following scheme. Specify stereochemistry.

\[
\begin{array}{c}
\text{Bu}_{2}\text{BOTf, EtN(i-Pr)}_{2} \\
\text{Et}_{2}O, -78 \degree C \\
\end{array}
\]

\[
\begin{array}{c}
\text{B} \\
\text{C} \\
\end{array}
\]

3. Only one product is formed in the following reactions. Explain.

a)

\[
\begin{array}{c}
\text{O} \\
\text{NaOMe, MeOH} \\
\end{array}
\]

\[
\begin{array}{c}
\text{H} \\
\text{O} \\
\text{O} \\
\text{O} \\
\text{O} \\
\text{O} \\
\end{array}
\]

b)

\[
\begin{array}{c}
\text{NaOEt, EtOH} \\
\end{array}
\]

\[
\begin{array}{c}
\text{O} \\
\text{O} \\
\text{O} \\
\text{O} \\
\text{O} \\
\end{array}
\]

4. Explain the following result. Show any putative intermediates.

\[
\begin{array}{c}
\text{NaOEt, EtOH} \\
\end{array}
\]

\[
\begin{array}{c}
\text{O} \\
\text{O} \\
\text{O} \\
\end{array}
\]

5. Complete the following scheme.
6. Propose a mechanism for the following reaction known as the Darzens reaction.

7. Propose synthesis of the following compounds:

   a) \[\text{acetic acid and 4-bromobutanoic acid}\]

   b) \[\text{ethylbenzene} \rightarrow \text{ethylacetate}\]

   c) \[\text{benzylcyanide} \rightarrow \text{phenyl} + \text{acetonitrile}\]

8. Explain the mechanism of the biosynthesis of PEP (Phosphoenol pyruvate) catalysed by an enzyme named PEP carboxykinase.

   \[\text{PEP-carboxykinase} \rightarrow \text{phosphoenolpyruvate}\]

   \(\text{P}^\circ\) : phosphate