A variety interesting organic transformations are shown below. Provide a reasonable mechanism for each.

1. For this mechanism, also provide a rationale for why the reverse reaction is not favored.

\[
\begin{align*}
\text{O} & \quad \text{0.5 N NaOH} & \quad \text{HO} \\
\text{O} & \quad \text{O} & \quad \text{HO}
\end{align*}
\]

2. For this mechanism, assume that a buffer acid/base pair is present.

\[
\begin{align*}
\text{N} & \quad \text{N} & \quad \text{N} & \quad \text{45 C} & \quad \text{N}
\end{align*}
\]

3. 

\[
\begin{align*}
\text{O} & \quad \text{DABCO, THF} & \quad \text{O}
\end{align*}
\]

4. 

\[
\begin{align*}
\text{Br} & \quad \text{Br}
\end{align*}
\]
5. KH, -78 C
1. benzene, reflux 5 h
2. warm to room temp.

6. For this problem, assume that the ammonium salt is in equilibrium with a small amount of free amine and tetrafluoroboric acid.

7. For this problem, in addition to providing a reasonable mechanism, explain why only one epoxide regioisomer is formed (upon casual inspection, one might expect to obtain a 1:1 mixture of two regioisomers).

8. For this problem, assume that the ammonium salt is in equilibrium with a small amount of free amine and tetrafluoroboric acid.

1. benzene, reflux 5 h
2. aqueous NaOH

1. n-BuLi, -100 C
2. 25 C, 21 hours

1. Ph$_3$P, DEAD