1. Provide the mechanism for the following transformation:

\[ \text{Cat. Pd(OAc)}_2, \text{LiCl, Benzoquinone} \]
\[ \text{HOAc-Acetone, 20°C} \]

2. Provide the final product for the following reactions.

3. Provide the final product for the following reactions.
3. Provide the name and the mechanism for the following Name Reaction.


**Passerini Reaction**
4. This is a recent work of Guangbin Dong. Propose a suitable mechanism for this transformation:

\[
\text{Ph} \quad \text{Et} \quad \text{Ph} \quad \text{Ph}
\]

\[
\begin{align*}
\text{catalyst} & \quad \text{Rb\text{io}c\text{cCl}}_2, \\
\text{Mes, TsOH.H}_2\text{O} & \quad \text{toluene, 130°C}
\end{align*}
\]

\[
\text{IMes = Mes} \quad \text{Mes} \quad \text{Mes}
\]

5. Provide the mechanism for the following reaction (Au catalyst is only a Lewis acid here):

\[
\begin{align*}
\text{Et} & \quad \text{Ph} \\
\text{PhCHO} & \quad \text{PhCHO}
\end{align*}
\]

\[
\begin{align*}
5.0 \text{ mol % Pd} & \quad \text{PPh}_3, \\
2.0 \text{ equiv } \text{MeSOH} & \quad \text{toluene, rt, 2h} \\
\text{then NaHCO}_3 (\text{aq}) & \quad \text{T.M.}
\end{align*}
\]

\[
\text{J. Am. Chem. Soc., Just Accepted}
\]
6. Provide the mechanism, name for the following Name Reaction and the conditions to complete synthesis.

Tsuji-Trost Reaction.