A concerted reaction is a reaction in which 1) \# covalent bonds broken + \#covalent bonds formed > 1, 2) \# steps = 1.

eg. 1:

\[
\text{CH}_3\text{Br} + \text{KCN} \rightarrow \text{CH}_3\text{CN} + \text{KBr}
\]

mechanism: The reaction is a nucleophilic aliphatic substitution occurring via S_n2 mechanism.

\[
\begin{align*}
\text{NC}^- & \quad \text{C} & \quad \text{H} \\
\uparrow & \quad \text{C} & \quad \text{H} \\
\text{broken} & \quad \text{formed} & \quad \text{formed}
\end{align*}
\]

\# covalent bonds broken = 1
\# covalent bonds formed = 1
\# covalent bonds broken + \# covalent bonds formed = 1 + 1 = 2
\# steps = 1

Thus, the reaction is a concerted reaction.

eg. 2:

\[
\text{CH}_3\text{C} = \text{C} = \text{H} + (\text{SiH})_2\text{SH} \rightarrow \text{CH}_3\text{C} = \text{C} = \text{H}
\]

mechanism: The reaction is an electrophilic addition.

\[
\begin{align*}
\text{CH}_3 & \quad \text{C} & \quad \text{C} & \quad \text{H} \\
\uparrow & \quad \text{C} & \quad \text{H} & \quad \text{H} \\
\text{broken} & \quad \text{formed} & \quad \text{formed} & \quad \text{formed}
\end{align*}
\]

\# covalent bonds broken = 2
\# covalent bonds formed = 2
\# covalent bonds broken + \# covalent bonds formed = 2 + 2 = 4
\# steps = 1

Thus, the reaction is a concerted reaction.

see also pericyclic reaction

Contributors

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