Catalytic hydrogenation of an alkyne using a typical transition-metal catalyst, such as Pt, Pd, or Ni, yields an alkane.

eg:

\[
\text{CH}_3\text{C}≡\text{C}\text{CH}_3 + 2\text{H}_2 \xrightarrow{\text{catalyst}} \text{H}_2 \rightarrow \text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3
\]

The reaction occurs in two stages.

\[
\text{CH}_3\text{C}≡\text{C}\text{CH}_3 + 2\text{H}_2 \xrightarrow{\text{catalyst}} \text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3
\]

Hydrogenation of the alkene can not be prevented by using one molar equivalent of H\textsubscript{2}. (If one molar equivalent of H\textsubscript{2} is used, some alkene and some alkyne are obtained as products, and, since there are not enough H\textsubscript{2} molecules to react with all the alkyne molecules, some unreacted alkyne is recovered.) To prevent hydrogenation of the alkene, a less active catalyst must be employed. Lindlar catalyst, which is a mixture of Pd, CaCO\textsubscript{3}, and lead salts, is the catalyst of choice in catalytic hydrogenation of alkynes to give alkenes.

eg:

\[
\text{CH}_3\text{C}≡\text{C}\text{CH}_3 \xrightarrow{\text{Lindlar catalyst}} 1\text{molar eq.}\text{H}_2 \rightarrow \text{CH}_3\text{CH}=\text{CHCH}_3
\]

see also dissolving-metal reduction

Contributors

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