Pyridinium chlorochromate or PCC (1), an ionic compound, is an oxidizing agent.

It is commercially available or can be readily prepared using the following procedure.

PCC is primarily used to oxidize primary alcohols to aldehydes.

**eg:**

\[
\text{CH}_3\text{CH}_2\text{OH} \xrightarrow{\text{PCC}} \text{CH}_3\text{CHO}
\]

Oxidation of a primary alcohol with chromic acid yields a carboxylic acid as the organic product via the corresponding aldehyde.

**eg:**

\[
\text{CH}_3\text{CH}_2\text{OH} \xrightarrow{\text{H}_2\text{CrO}_4} \text{CH}_3\text{CHO} \xrightarrow{\text{H}_2\text{CrO}_4} \text{CH}_3\text{CO}_2\text{H}
\]

The oxidation of the aldehyde can not be prevented by using one molar equivalent of chromic acid. (If one molar equivalent of chromic acid is used, some aldehyde and some carboxylic acid are obtained as organic products, and, since there are not enough chromic acid molecules to react with all the alcohol molecules, some unreacted alcohol is recovered.) The aldehyde itself does not react with chromic acid. It reacts with water to give a gem diol that is oxidized by chromic acid to the carboxylic acid.

**eg:**

\[
\text{CH}_3\text{CH}_2\text{OH} \xrightarrow{\text{H}_2\text{CrO}_4} \text{CH}_3\text{CHO} \xrightarrow{\text{H}_2\text{O}} \text{CH}_3\text{CHOHCH}_2\text{OH} \xrightarrow{\text{H}_2\text{CrO}_4} \text{CH}_3\text{CO}_2\text{H}
\]

The key to preventing the oxidation of the aldehyde to the carboxylic acid is to exclude water from the system, thereby preventing the conversion of aldehyde to the gem diol, which is not possible when chromic acid is the oxidizing agent.
because, to generate chromic acid, water is required. PCC can be used under anhydrous conditions and, therefore, provides an effective method to convert primary alcohols to aldehydes.

PCC can also be used as an alternative to cromic acid in the oxidation of secondary alcohols to ketones.

eg:

\[
\begin{align*}
(CH_2)_2CHOH & \xrightarrow{\text{PCC}} (CH_2)_2CO \\
\text{solvent: CH}_2\text{Cl}_2 & \\
\end{align*}
\]

Contributors

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