Chromic acid is the oxoacid that has the molecular formula H$_2$CrO$_4$ and the structural formula:

\[
\begin{array}{c}
\text{O} \\
\text{HO} \quad \text{Cr} \quad \text{OH} \\
\text{O}
\end{array}
\]

Chromic acid is unstable and, therefore, must be generated in situ when needed, using one of the following methods.

1. Reaction of chromium (III) oxide with water

\[
\text{CrO}_3 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{CrO}_4
\]

2. Reaction of potassium or sodium dichromate with sulfuric acid

\[
\text{K}_2\text{Cr}_2\text{O}_7 + \text{H}_2\text{SO}_4 \rightarrow \text{H}_2\text{Cr}_2\text{O}_7 + \text{K}_2\text{SO}_4 + \text{H}_2\text{O}
\]

Chromic acid is a strong oxidizing agent, used to oxidize many classes of organic compounds, the most common of which is alcohols. There are two generalizations that help understand oxidation of alcohols using chromic acid.

1. Any alcohol containing at least one alpha hydrogen is oxidized by chromic acid, meaning tertiary alcohols are not oxidized by chromic acid.

2. Any organic product formed whose molecule has at least one hydrogen atom bonded to the carbonyl carbon is further oxidized by chromic acid.

Oxidation of a primary alcohol by chromic acid results in a carboxylic acid as the organic product.

eg:
Oxidation of a secondary alcohol by chromic acid results in a ketone as the organic product.

\[
\text{CH}_2\text{CH}_2\text{OH} + \text{OH} - \overset{\text{CH}_2\text{CH}_2\text{O} - \text{OH}}{\longrightarrow} \text{CH}_2\text{CH}_2\text{O} - \text{OH} + \text{H}_2\text{O}
\]

\[
\text{H}_2\text{O}^- + \text{CH}_3\text{CHO} + \overset{\text{CH}_3\text{CH}_2\text{OH}}{\longrightarrow} \text{CH}_3\text{CH}_2\text{OH} + \text{H}_2\text{O}
\]

see also chromate ester, pyridinium chlorochromate

**Contributors**

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