Nov 6, 2017

Mn

CHEM 261 Review:



Note: The above reactions are stereospecific

Dihydroxylation of Alkenes

- this is a stereospecific, syn addition -
- 2 hydroxyl groups added to the same side of a double bond -

General scheme



Example 1: KMnO₄ (Potassium Permanganate) Reaction in COLD CONDITIONS

General Scheme:



*cold = $\sim 20 \,^{\circ}$ C Some application of KMnO₄ – sterilizing water

MECHANISM



Example 2



Meso Compound

The compound is Achiral

Plane of symmetry

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Example 3
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Racemate



In cold conditions (room temperature or below), the reaction stops at the diol.

KMnO₄ (Potassium Permanganate) Reaction in HOT CONDITIONS

General Scheme:



NB: If an aldehyde is formed the reaction proceed to give an acid



If R is also a Hydrgen, Formaaldehyde it oxidizes to give

 $\begin{array}{c} H \\ C = O \\ H \end{array} \qquad \begin{array}{c} KMnO_4 \\ \hline H_2O \\ hot \\ or \\ cold \end{array} \qquad \begin{array}{c} CO_2 + H_2O \\ CO_2 + H_2O \\ \hline H_2O \\ hot \\ or \\ cold \end{array}$

Example 5

In KMnO₄ aldehydes get oxidized to carboxylic acids, and formaldehyde to H_2O/CO_2



if ketone (carbon on both sides) = the reaction stops here

if aldehyde (carbon on one side, hydrogen on the other) = reaction continues to alcohol if formaldehyde (hydrogen on both sides) = reaction continues to carbon dioxide & water



Hot potassium permanganate will not stop oxidation at the diol. It can break C-C bonds to form the corresponding carboxylic acids from the original alkene.



The use of Lindlar catalyst for hydrogenation of alkynes stops the reaction at the alkene stage without further reaction progression to the alkane stage

Example 11





NB:

Because of the electron withdrawing bromine groups, the reaction can stop at the dibromide stage. This is because the carbons bearing the double bond becomes less electron rich due to electron withdrawing effect of bromine

Example 13

HYDROGEN HALIDE



This reaction follows the markovnikov rule





