

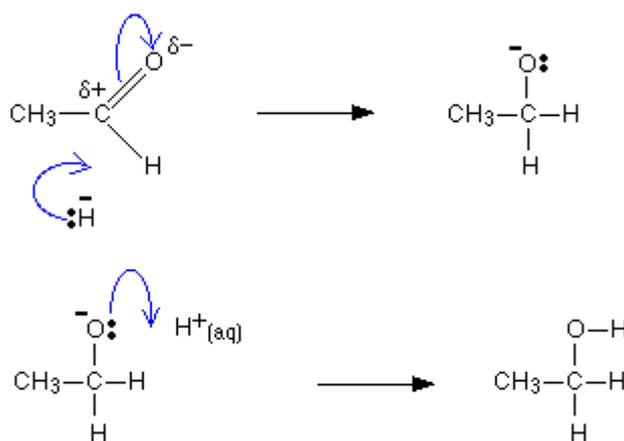
Chemguide – questions

NUCLEOPHILIC ADDITION: REDUCING C=O

This set of questions should only be used if your syllabus allows the reaction involving BH_4^- ions to be simplified to attack by H^- ions.

1. One way of using NaBH_4 to reduce the carbon-oxygen double bond in an aldehyde or ketone is to react the carbonyl compound with a solution of NaBH_4 in water to which a little sodium hydroxide has been added. Following the initial reaction, the reaction is completed by acidifying the solution.

Simplifying things so that the BH_4^- ion is considered as a source of hydride ions, H^- , the mechanism for the reduction of an aldehyde like ethanal is:



- a) Describe and explain what is happening during these reactions.
 - b) What type of alcohol is produced every time an aldehyde is reduced using NaBH_4 ?
2. NaBH_4 can also be used under different conditions by doing the reaction in an alcohol like ethanol as the solvent, followed by boiling the reaction mixture with water.
 - a) Write the mechanism for the reduction of the ketone propanone under these conditions.
 - b) What type of alcohol is produced every time a ketone is reduced using NaBH_4 ?