

## Chemguide – questions

### ALDEHYDES AND KETONES: REDUCTION

1. Two reducing agents used to reduce aldehydes and ketones are lithium tetrahydridoaluminate(III) and sodium tetrahydridoborate(III).
  - a) Both of these are ionic compounds, containing tetrahydridoaluminate(III) ions and tetrahydridoborate(III) ions respectively. Write the formulae for those ions.
  - b) Because the reactions are quite complicated to write proper equations for, it is quite common to represent either of these by [H] in an equation at this level. Using this form, write equations for the reduction (using either of these compounds) of the following:
    - (i) ethanal
    - (ii) propanone
    - (iii) butanone
    - (iv) butanal
  - c) What class of compound do you always get if you reduce
    - (i) an aldehyde,
    - (ii) a ketone?
2. Reaction conditions for the use of lithium tetrahydridoaluminate(III) and sodium tetrahydridoborate(III) as reducing agents are different.
  - a) Lithium tetrahydridoaluminate(III) is the more difficult to handle. Explain why.
  - b) What solvent is used for reactions involving lithium tetrahydridoaluminate(III)?
  - c) The reaction involves the formation of an intermediate product which has to be treated further to produce the sorts of product you should have shown in Q1(b). How is the intermediate converted into the final product?
  - d) How would what you have described in the earlier parts of this question differ if you used sodium tetrahydridoborate(III) as the reducing agent? Explain your answer.

(I am not asking questions about the actual detailed chemistry of these reactions because at this level you probably won't need it. Check this with your syllabus and past papers. If you do need it, find out what exactly your examiners want, and then learn that.)