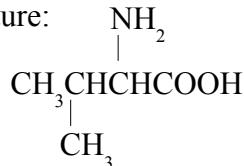


Chemguide – questions

ALDEHYDES AND KETONES: SIMPLE ADDITION REACTIONS

1. Aldehydes and ketones undergo addition reactions involving hydrogen cyanide in which H and CN add on across the carbon-oxygen double bond.
 - a) Why isn't hydrogen cyanide itself normally used in these reactions?
 - b) Give a mixture which can be used instead of starting with hydrogen cyanide itself.
 - c) Draw the structures and give the names of the products of the reaction between hydrogen cyanide and
 - (i) ethanal
 - (ii) propanone
 - d) One use of the products of these reactions (known as hydroxynitriles) is as a part of a sequence of reactions to make more complicated molecules like amino acids from more simple ones.

The amino acid valine has the structure:



- (i) Write the structure of the hydroxynitrile which you would have to modify in order to make valine. (Don't be scared by this fairly complicated structure, bits of which may not be very familiar to you. You should be able to do this just by comparison with the sort of structures you wrote in part (b).)
 - (ii) Write the structure of the aldehyde or ketone which you would have to react with hydrogen cyanide in order to get that hydroxynitrile.
2. Check your syllabus to see if you need to know about the addition of sodium hydrogensulphite to aldehydes and ketones. If you don't, ignore this question.

The reaction is done by shaking a ketone containing at least one methyl group or any aldehyde with a saturated solution of sodium hydrogensulphite in water.

 - a) What would you see if a reaction occurred?
 - b) Write the equation for the reaction between propanone and sodium hydrogensulphite showing the essential structure of the product. You don't need to show the structure of the sulphur-containing group.
 - c) How can this reaction be used during the purification of an aldehyde?