CARBOXYLIC ACIDS: REDUCTION

1. Carboxylic acids can be reduced using lithium tetrahydridoaluminate, $LiAlH_4$, which contains the $[AlH_4]^-$ ion.

   a) Carboxylic acids are reduced to alcohols in this way. What kind of alcohols?

   b) Describe the bonding between the aluminium and the four hydrogens in the $[AlH_4]^-$ ion.

   c) Writing the reducing agent as [H], write a simple equation to show the reduction of propanoic acid.

   d) The reaction is carried out at room temperature in dry ethoxyethane (diethyl ether) as solvent. Why must the ethoxyethane be dry?

   e) The initial product of the reaction between propanoic acid and lithium tetrahydridoaluminate is a complex aluminium ion, $[(CH_3CH_2CH_2O)_4Al]^-$, and the alcohol has to be released from that.

      (i) What would you add to the solution to release the alcohol?

      (ii) Write the ionic equation for this reaction.