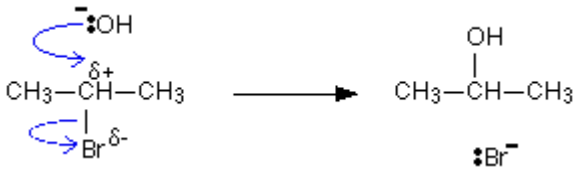
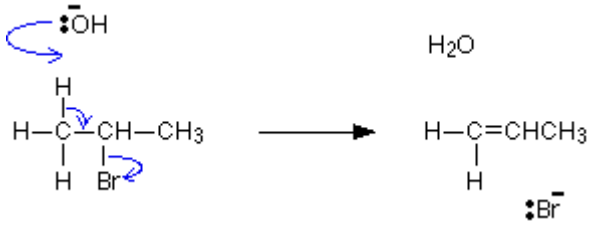
ELIMINATION MECHANISMS

1. In the presence of sodium hydroxide solution, 2-bromopropane can undergo either a substitution reaction or an elimination reaction.

   A mechanism for the substitution reaction is



   A mechanism for the elimination reaction is



   a) In the substitution reaction, the hydroxide ion is acting as a nucleophile, attracted by the slightly positive carbon atom attached to the bromine. How is the hydroxide ion acting in the elimination reaction?

   b) Use the mechanism to help you explain exactly what is happening during the elimination reaction.

   c) Both substitution and elimination will happen during the reaction between a mixture of 2-bromopropane and sodium hydroxide solution. State the conditions which will give you the greatest chance of getting elimination rather than substitution.

   d) Comparing primary, secondary and tertiary halogenoalkanes, which of these is most likely to give elimination as the main reaction, and which is most likely to give substitution?

2. 2-bromobutane reacts with sodium hydroxide solution under suitable conditions to give a mixture of but-1-ene and but-2-ene.

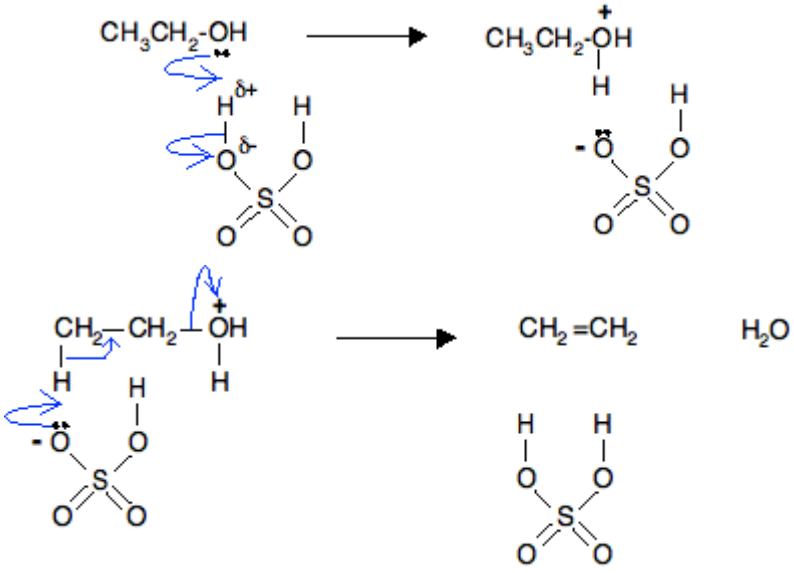
   a) Write the mechanism for the formation of but-1-ene.

   b) Write the mechanism for the formation of but-2-ene.

   c) In fact, the reaction to produce but-2-ene gives a mixture of two different but-2-enes. Explain, with the help of a diagram, how it is possible to have two different but-2-enes.

3. a) Write the mechanism for the dehydration of propan-2-ol by concentrated sulphuric acid, using the mechanism which goes through a carbocation (carbonium ion) intermediate.

b) The mechanism for the dehydration of ethanol doesn't go through a carbocation intermediate, but instead uses the mechanism:



Describe and explain in words what is happening in this mechanism.

c) Why does ethanol use this mechanism rather than one going via the carbocation $CH_3CH_2^+$?

d) Name the alkenes produced by the dehydration of butan-2-ol using concentrated sulphuric acid.