

Chemguide – questions

ALCOHOLS: DEHYDRATION

- Ethanol can be converted into ethene by passing the vapour over hot aluminium oxide, and collecting the ethene over water. Write the equation for the reaction.
 - Ethanol can also be converted into ethene by heating it at 170°C with excess concentrated sulphuric acid. Before collecting it, the gas has to be passed through sodium hydroxide solution to remove acidic impurities. What are those impurities, and why are they formed?
 - If you use concentrated phosphoric(V) acid instead of sulphuric acid, you don't get acidic impurities. Suggest the reason for this.
 - Cyclohexanol can be dehydrated to cyclohexene by heating with concentrated phosphoric(V) acid. Write the equation for this reaction, showing clearly the structures of the cyclohexanol and cyclohexene.
- Draw the structures of the alkene(s) you might get if you dehydrated the following alcohols.
 - propan-1-ol: $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$
 - propan-2-ol: $\begin{array}{c} \text{CH}_3\text{CHCH}_3 \\ | \\ \text{OH} \end{array}$
 - butan-1-ol: $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$
 - butan-2-ol: $\begin{array}{c} \text{CH}_3\text{CH}_2\text{CHCH}_3 \\ | \\ \text{OH} \end{array}$
 - pentan-3-ol: $\begin{array}{c} \text{CH}_3\text{CH}_2\text{CHCH}_2\text{CH}_3 \\ | \\ \text{OH} \end{array}$