AQA Chemistry A-level

Topic 3.3 - Haloalkanes

Flashcards

Are halogenoalkanes soluble in water?

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Insoluble as C-H bonds are non-polar, not compensated for enough by C-X bond polarity

Do halogenoalkanes have a polar bond? why?

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Yes polar, as halogen has a higher electronegativity than C (halogen is δ-, carbon is δ+)

Which intermolecular forces do they have? why?

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Permanent dipole-dipole and van der Waals forces of attraction

C-X bond polarity creates permanent dipoles

When would they have higher boiling points?

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Increase Carbon chain length

Halogen further down group 7

How would the mass of a haloalkane compare with the mass of an alkane of the same chain length?

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Greater as mass of halogen > mass of H

What is the most important factor in determining their reactivity?

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Carbon-halogen bond enthalpy

What is the order of reactivity of halogenoalkanes?

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Although C-F is the most polar bond, the bond enthalpy of C-X decreases down the group, so reactivity increases down the group

What is a nucleophile?

What is a nucleophile?

A negatively charged ion/δ− atom with a lone pair of electrons which can be donated to an electron deficient atom

Give 3 examples of nucleophiles

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$:OH^-$

$:CN^-$

$:NH_3$

What is nucleophilic substitution?

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A reaction where a nucleophile donates a lone pair of electrons to δ+ C atom, δ− atom leaves molecule (replaced by nucleophiles)

Draw the mechanism for the reaction of bromoethane with NaOH (aq).

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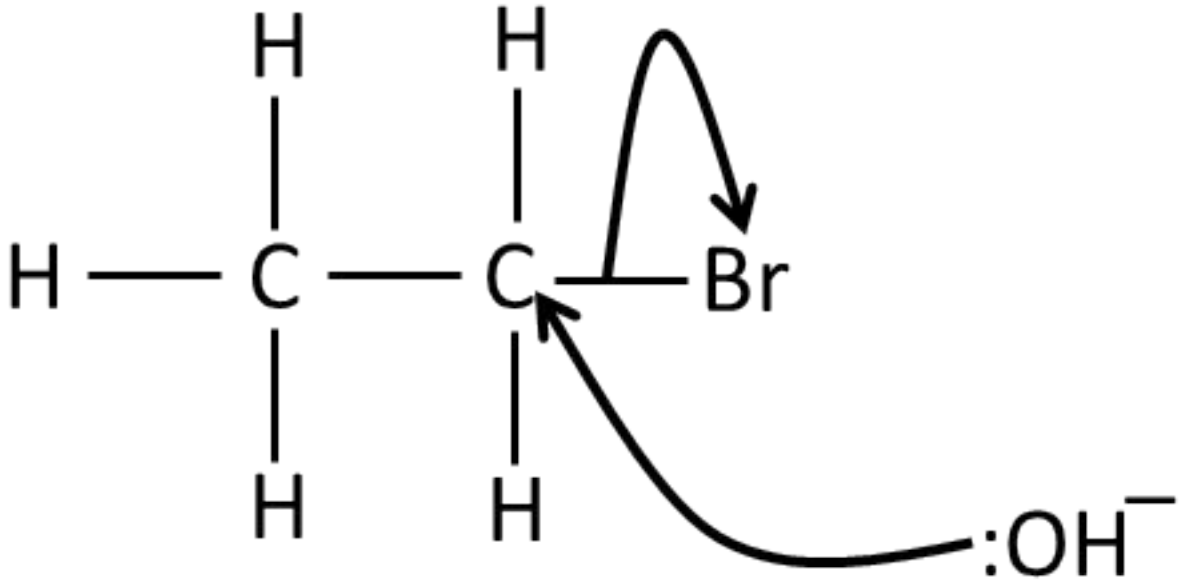

Draw the mechanism for the reaction of bromoethane with KCN

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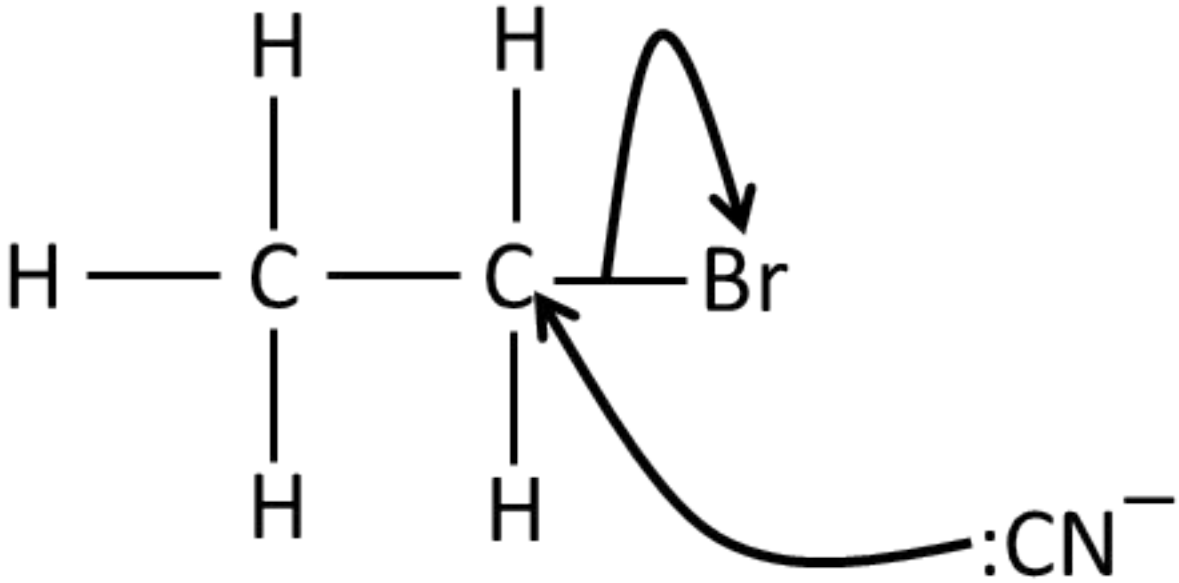

Draw the mechanism for the reaction of bromoethane with NH_3

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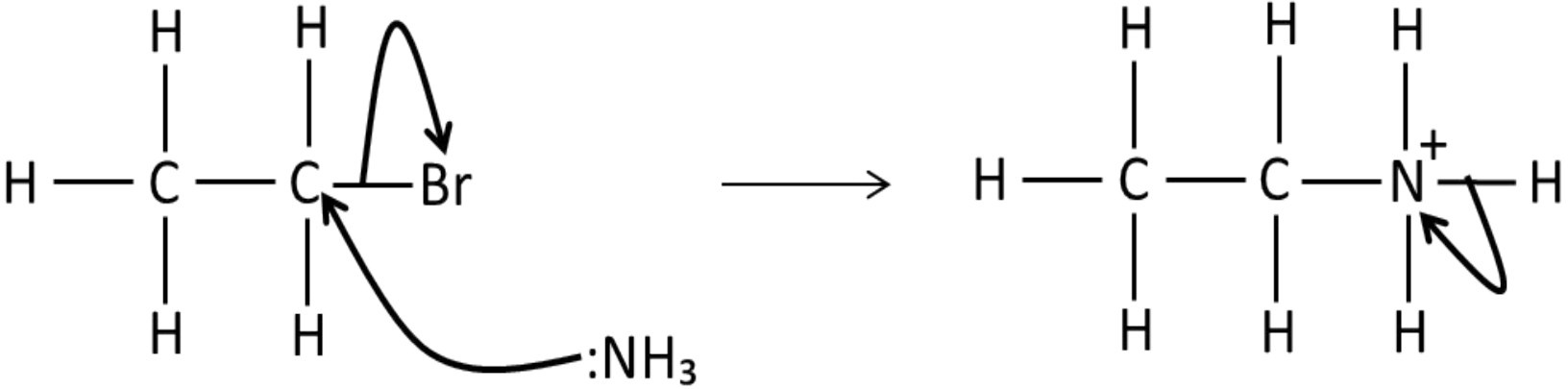

Draw a mechanism for the reaction of bromoethane with NaOH in ethanol

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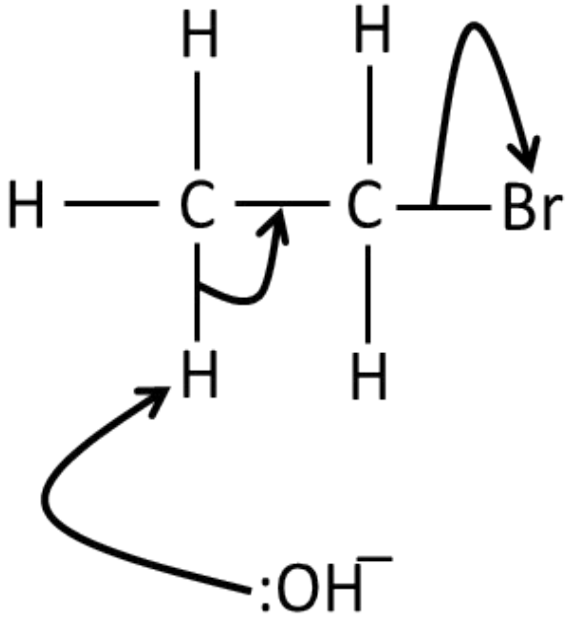

What are CFCs?

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Chlorine-fluoro-carbons - haloalkanes containing C, F and Cl only (no H)

What is the problem with CFCs?

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Although unreactive under normal conditions, they catalyse the breakdown of ozone in the atmosphere via free radical substitution

What are CFCs being replaced with?

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HCFCs (hydrogen, chlorine, fluorine, carbon)

HFCs (hydrogen, fluorine, carbon)

What are the conditions/ reactants needed for the elimination reaction of haloalkanes?

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NaOH or KOH dissolved in ethanol (no water present)

Heated

What is formed in the elimination reaction of haloalkanes?

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An alkene, water and halogen ion