OCR (A) Chemistry A-level

Topic 4.2.2 - Haloalkanes

Flashcards

What are haloalkanes?

What are haloalkanes?

Saturated organic compounds that contain carbon atoms and at least one halogen atoms

Are halogenoalkanes soluble in water?

Are halogenoalkanes soluble in water?

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

Do halogenoalkanes have a polar bond? Why?

Do halogenoalkanes have a polar bond? Why?

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

What type of intermolecular forces do they have? Why?

What type intermolecular forces do they have? Why?

Permanent dipole-dipole and London forces of attraction

C-X bond polarity creates permanent dipoles

When would they have higher boiling points?

When would they have higher boiling points?

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?

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

Greater as mass of halogen > mass of H

What is the most important factor in determining halogen reactivity?

What is the most important factor in determining halogen reactivity?

The strength of carbon halogen bond

What would bond polarity suggest the order of reactivity would be?

What would bond polarity suggest the order of reactivity would be?

C-F would be most reactive as most polar bond

What would bond enthalpies suggest the order of reactivity would be?

What would bond enthalpies suggest the order of reactivity would be?

C-I would be most reactive as lowest bond enthalpy

What is a primary halogen?

What is a primary halogen?

The halogen atom is present at the end of the chain

Define nucleophile

Define nucleophile

Electron pair donor

Give 3 examples of nucleophiles

Give 3 examples of nucleophiles

$:OH^-$

$:CN^-$

$:NH_3$

What is nucleophilic substitution?

What is nucleophilic substitution?

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

What is hydrolysis?

What is hydrolysis?

A reaction where water is a reactant

What reactant often produces hydroxide ions for hydrolysis?

What reactant often produces hydroxide ions for hydrolysis?

Water

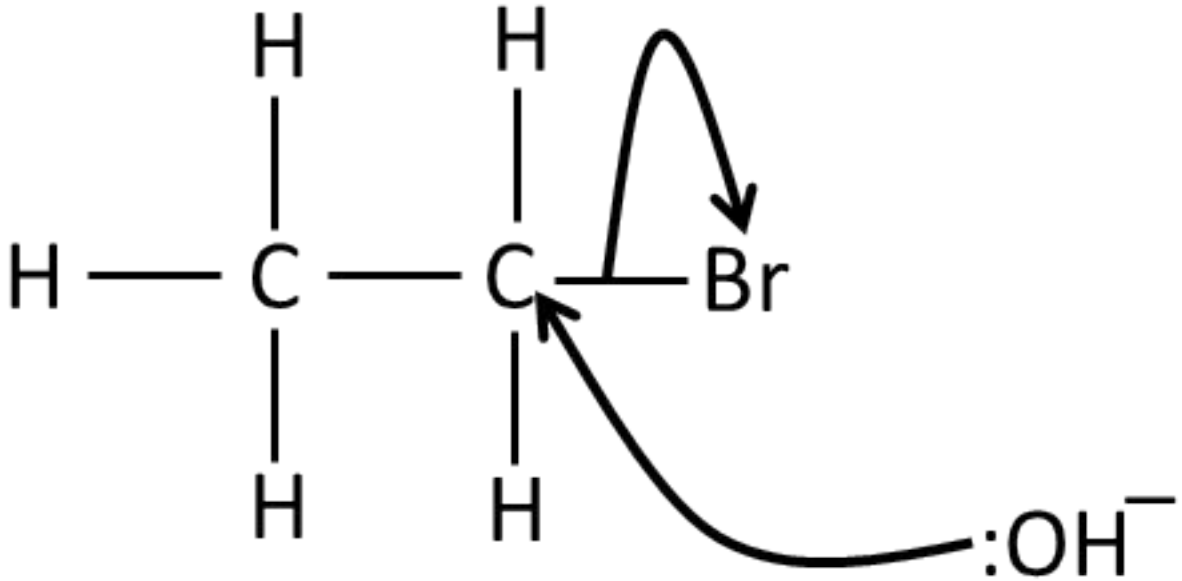
What fission does water undergo to produce OH^- ?

What fission does water undergo to produce OH- ?

Heterolytic fission

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

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



What are CFCs?

What are CFCs?

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

What is the problem with CFCs?

What is the problem with CFCs?

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

What is the main function of ozone layer?

What is the main function of ozone layer?

Provides protection from harmful UV radiation

Does ozone play a protection role in all layers of the atmosphere?

Does ozone play a protection role in all layers of the atmosphere?

No, in the troposphere it contributes towards photochemical smog

How do CFCs break the ozone layer down?

How do CFCs break the ozone layer down?

Free radical substitution

Write an equation for the overall decomposition of ozone into oxygen (O_2)

Write an equation for the overall decomposition of ozone into oxygen (O_2)

$$2O_3 \rightarrow 3O_2$$

Write free radical substitution equations to show how Cl free radicals catalyse the breakdown of O_3

Write free radical substitution equations to show how Cl free radicals catalyse the decomposition of O_3

$Cl_2 \rightarrow 2Cl\bullet$ (in presence of UV light)

$Cl\bullet + O_3 \rightarrow ClO\bullet + O_2$

$ClO\bullet + O_3 \rightarrow 2O_2 + Cl\bullet$

Overall: $2O_3 \rightarrow 3O_2$

Write free radical substitution equation to show how nitrogen monoxide can decompose ozone

Write free radical substitution equation to show how nitrogen monoxide can decompose ozone

$\square NO + O_3 \rightarrow \square NO_2 + O_2$

$\square NO_2 + O \rightarrow \square NO + O_2$

Overall- $O_3 + O \rightarrow 2O_2$