

Unit 5 Halogenoalkanes and Alkenes (Paper 2 & 3)

5.1 Halogenoalkanes

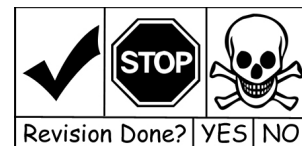
Nucleophilic substitution

Halogenoalkanes contain polar bonds.

Halogenoalkanes undergo substitution reactions with the nucleophiles OH^- , CN^- and NH_3

You should be able to:

- outline the nucleophilic substitution mechanisms of these reactions
- explain why the carbon–halogen bond enthalpy influences the rate of reaction.

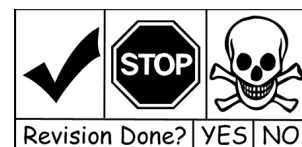


Elimination

The concurrent substitution and elimination reactions of a halogenoalkane (eg 2-bromopropane with potassium hydroxide).

You should be able to:

- explain the role of the reagent as both nucleophile and base
- outline the mechanisms of these reactions.



Ozone depletion

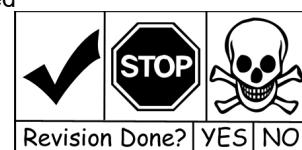
Ozone, formed naturally in the upper atmosphere, is beneficial because it absorbs ultraviolet radiation.

Chlorine atoms are formed in the upper atmosphere when ultraviolet radiation causes C–Cl bonds in chlorofluorocarbons (CFCs) to break.

Chlorine atoms catalyse the decomposition of ozone and contribute to the hole in the ozone layer.

Appreciate that results of research by different groups in the scientific community provided evidence for legislation to ban the use of CFCs as solvents and refrigerants. Chemists have now developed alternative chlorine-free compounds.

You should be able to use equations, such as the following, to explain how chlorine atoms catalyse decomposition of ozone:



5.2 Alkenes

Structure, bonding and reactivity

Alkenes are unsaturated hydrocarbons.

Bonding in alkenes involves a double covalent bond, a centre of high electron density.

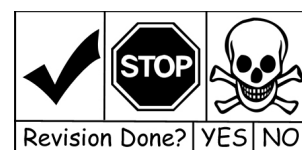
Addition reactions of alkenes

Electrophilic addition reactions of alkenes with HBr, H_2SO_4 and Br_2

The use of bromine to test for unsaturation.

You should be able to:

- outline the mechanisms for these reactions
- explain the formation of major and minor products by reference to the relative stabilities of primary, secondary and tertiary carbocation intermediates.



Addition polymers

Addition polymers are formed from alkenes and substituted alkenes.

The repeating unit of addition polymers.

IUPAC rules for naming addition polymers.

Addition polymers are unreactive.

Appreciate that knowledge and understanding of the production and properties of polymers has developed over time.

Typical uses of poly(chloroethene), commonly known as PVC, and how its properties can be modified using a plasticiser.

You should be able to:

- draw the repeating unit from a monomer structure
- draw the repeating unit from a section of the polymer chain
- draw the structure of the monomer from a section of the polymer
- explain why addition polymers are unreactive
- explain the nature of intermolecular forces between molecules of polyalkenes.

