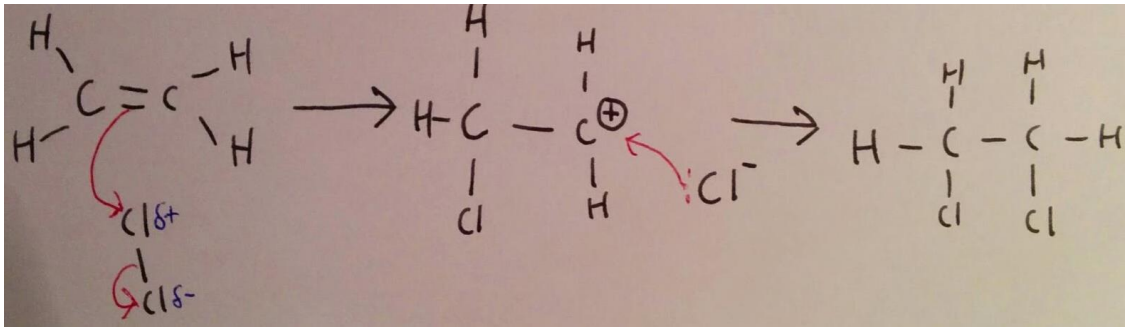
Basic Concepts and Hydrocarbons

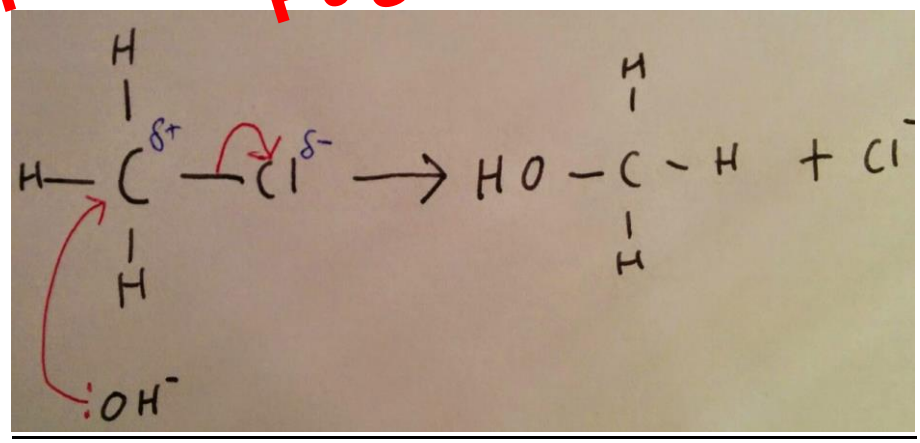
Mechanisms

Electrophilic Addition:

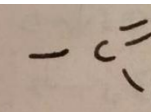
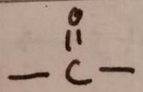
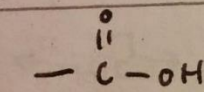
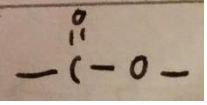


When Cl_2 approaches, the Cl-Cl bond becomes polar. A pair of electrons flows from the double bond to the slightly positive Cl atom and a bond is formed. A curly arrow represents the movement of a pair of electrons.

Nucleophilic Substitution:



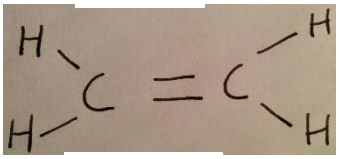
The nucleophile attacks the back of the carbon atom donating an electron pair. This causes a new bond to form and the carbon-halogen bond to break. A curly arrow represents the movement of a pair of electrons.

Aldehyde	
Ketone	
Carboxylic Acid	
Ester	

Alkenes:

Saturated hydrocarbons have single bonds only.

Start with: Alkene



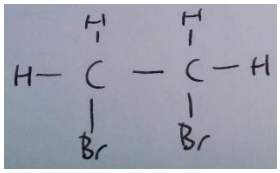
Ethene

1. Halogenation

Add Br_2 (or any Halogen)

R.T.P.

Dihalogenoalkane

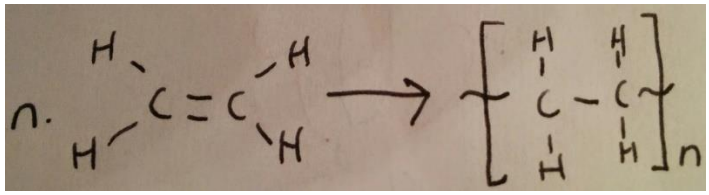


1, 2-dibromoethane

2. Monomer

3. Addition Polymerisation

Polymer

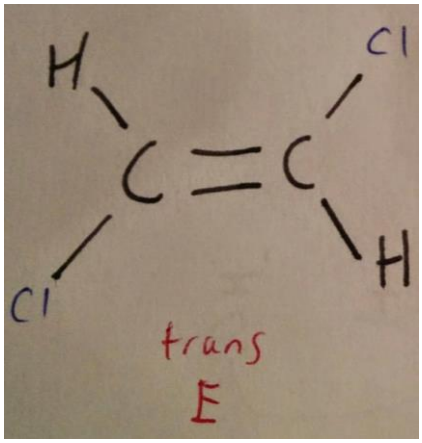


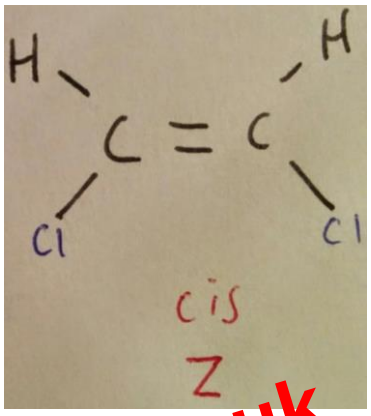
Ethene

Poly(ethene)

- Sigma (σ) bonds are formed from overlapping s-orbitals; Pi (π) bonds are formed from overlapping p-orbitals.
- The atoms can't rotate in a double bond because the pi bond stops this rotation.
- The Pi bond is much weaker than the Sigma bond, which is why in addition reactions only the Pi bond breaks.

Stereoisomers are compounds with the same structural formula but a different arrangement of atoms in space. Think E/Z isomers:





Combustion of Alkanes:

*Exothermic reaction

$$Alkane + Oxygen \gg Carbon\ Dioxide + Water$$

Example: $C_3H_8 + 5O_2 \gg 3CO_2 + 4H_2O$

Test for Alkenes (Unsaturation):

1. Add Bromine to the organic molecule
2. Orange >> Colourless if organic molecule is an alkene

Polymers and the Environment:

Dealing with Waste Polymers:

1. Landfill—limited space, bad for environment
2. Recycling—some can be melted + remoulded—some can be cracked into monomers then used to make more plastics ('feedstock recycling')
3. Burning them—heat produces electricity, toxic gases released