

# CAIE Chemistry A-level

## 30: Hydrocarbons

(A-level only)

Definitions

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## Definitions and Concepts for CAIE Chemistry A-level Hydrocarbons

**Aromatic compound/Arene:** A compound containing at least one benzene ring.

**Benzene:** A 6-membered carbon ring ( $C_6H_6$ ) containing a delocalised  $\pi$  system. Benzene has a planar structure and an intermediate bond length between a single and double bond. Delocalisation of the p electrons into the  $\pi$  system makes benzene more stable than expected.

**Catalyst:** A substance that increases the rate of a reaction without being changed in chemical composition or amount. They work by providing an alternative reaction pathway with a lower activation energy.

**Delocalisation of p electrons:** In benzene, the empty p orbital on each carbon atom overlaps with the others to form a delocalised  $\pi$  system that contains 6 electrons.

**Directing effects:** Substituents on a benzene ring can donate or withdraw electron density from the ring, this can change where on the benzene ring a further substitution occurs.

**Electrophile:** An electron pair acceptor.

**Electrophilic substitution:** A reaction in which an electrophile replaces an atom/group of atoms in a compound.

**Friedel-Crafts acylation:** An important synthetic reaction involving an electrophilic aromatic substitution reaction between benzene and acyl chlorides or anhydrides used to form monoacylated benzene rings.  $AlCl_3$  is used as a catalyst.

**Friedel-Crafts alkylation:** An important synthetic reaction involving an electrophilic aromatic substitution reaction between benzene, a haloalkane and aluminium chloride.

**Halogenation:** A reaction that involves the addition of a halogen.

**Halogenoarene:** A molecule with a benzene ring directly attached to a halogen atom.

**Hydrogenation:** A reaction between  $H_2$  and another substance, this often reduces or saturates a compound. These reactions usually require a metal catalyst, like nickel.





**Mechanism:** A step by step sequence of reactions that occur during a chemical change when reactants are converted to products. Mechanisms show the movement of electrons during the reaction, represented by curly arrows.

**Monosubstituted benzene ring:** A benzene ring with one hydrogen replaced by another atom/group of atoms. E.g. Nitrobenzene,  $C_6H_5NO_2$ .

**Nitration:** A reaction that involves the addition of a nitro group.

**Oxidation:** Process involving the loss of electrons. Results in an increase in oxidation number.

**Substitution reaction:** A reaction in which one atom/group of atoms is replaced by another atom/group of atoms.

