

WJEC (Eduqas) Chemistry A-level

OA1 - Higher Concepts in Organic Chemistry

Definitions and Concepts

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Definitions and Concepts for WJEC (Eduqas) Chemistry A-level

OA 1 - Higher Concepts in Organic Chemistry

OA1.1 - Stereoisomerism

Cahn-Ingold-Prelog (CIP) Priority Rules: A set of rules used to identify whether a stereoisomer is E or Z. Atoms with a higher atomic number have a higher priority. If the highest priority substituents are on the same side of the double bond (both above or below), it is the Z isomer, whereas if the highest priority groups are on the opposite sides (one above and one below), it is the E isomer.

Chain isomers: Structural isomers that have carbon backbones of differing lengths. These occur due to the branching in the carbon chain.

Chiral centre: A carbon atom that is bonded to four different atoms/groups of atoms.

Functional group isomers: Structural isomers that contain different functional groups. This means they belong to different homologous series.

Enantiomers: Molecules that are non-superimposable mirror images of one another. Enantiomers have opposite effects on plane-polarised light.

E/Z isomerism: A type of stereoisomerism that occurs due to the restricted rotation around the carbon double bond. This results in two different groups on either end of the double bond. If the highest priority groups for each carbon are found on the same side of the molecule, then it is the Z-isomer. If the highest priority groups for each carbon are found on opposite sides of the molecule, then it is the E-isomer.

Optical activity: The ability of a molecule to rotate plane polarised light.

Optical isomerism: A type of stereoisomerism present in compounds that are non-superimposable mirror images of one another, caused by the presence of a chiral centre. They have the same molecular formula but have different arrangements of atoms in space.

Position isomer: Structural isomers that differ in their position of one or more functional groups. The carbon backbone of the molecules are the same.

Racemic mixture (racemate): A mixture containing equal amounts of enantiomers, a 50:50 mix of a pair of enantiomers.

Stereoisomers: Two or more molecules who differ only by their spatial arrangement of atoms.



Structural isomer: Structural isomers are compounds which have the same molecular formula but a different structural formula. Structural isomers include chain isomers, functional group isomers and position isomers.

OA1.2 - Aromaticity

Addition: Joining two or more molecules together to form a larger molecule. *Hydration* is the addition of a H_2O molecule. *Halogenation* involves the addition of a halogen. *Hydrogenation* is the addition of H. *Electrophilic addition* describes all the above examples.

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

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

Electrophile: An electron pair acceptor.

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

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

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

Monosubstituted benzene ring: A benzene ring with one hydrogen replaced by another atom/group of atoms. E.g. Nitrobenzene, $\text{C}_6\text{H}_5\text{NO}_2$.

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

