

WJEC (Eduqas) Chemistry A-level

OA2 - Organic Compounds Containing Oxygen

Definitions and Concepts

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

OA 2 - Organic Compounds Containing Oxygen

OA2.1 - Alcohols and Phenols

Carbonyl: The C=O functional group. Aldehydes and ketones are carbonyl compounds.

Carboxylic acid: An organic compound containing the -COOH functional group.

Halogenoalkane: An organic compound containing a halogen atom attached to an alkyl chain.

Phenol: A benzene ring where one of the hydrogen atoms has been substituted for a hydroxyl group.

Primary alcohol: An alcohol in which the -OH is attached to a primary carbon atom (i.e. RCH_2OH). Primary alcohols can be oxidised with $Cr_2O_7^{2-}/H^+$ to form either an aldehyde or a carboxylic acid, depending on the conditions.

Secondary alcohol: An alcohol in which the -OH is attached to a secondary carbon atom (i.e. R_2 CHOH). Secondary alcohols can be oxidised under reflux with $Cr_2O_7^{2-}/H^+$ to form a ketone.

Tertiary alcohol: An alcohol in which the -OH is attached to a tertiary carbon atom (i.e. R₃COH).

OA2.2 - Aldehydes and Ketones

Aldehyde: A compound containing the -CHO functional group at the end of an alkyl chain. Aldehydes can be oxidised to carboxylic acids by heating them under reflux with $Cr_2O_7^{-2}/H^+$.

Carbonyl: The C=O functional group. Aldehydes and ketones are carbonyl compounds.

Fehling's solution: A deep blue solution used to identify aldehydes from ketones. When aldehydes are present the solution forms a brick-red precipitate. When ketones are present the solution remains blue.

Ketone: A compound containing the C=O functional group within an alkyl chain. Ketones cannot be oxidised further.

Nucleophile: An atom or molecule that donates an electron pair to form a covalent bond. Attracted to electron-deficient areas.





Nucleophilic addition: A reaction in which an electrophilic π bond reacts with a nucleophile, breaking the π bond and forming two new σ bonds. Examples include carbonyl compounds reacting with NaBH₄ to form alcohols, or with HCN to form hydroxynitriles.

Oxidation: The loss of electron(s) which leads to an increase in oxidation number.

Primary alcohol: An alcohol in which the -OH is attached to a primary carbon atom (i.e. RCH_2OH). Primary alcohols can be oxidised with $Cr_2O_7^{2-}/H^+$ to form either an aldehyde or a carboxylic acid, depending on the conditions.

Reduction: The gain of electrons/decrease in oxidation number.

Secondary alcohol: An alcohol in which the -OH is attached to a secondary carbon atom (i.e. R_2 CHOH). Secondary alcohols can be oxidised under reflux with $Cr_2O_7^{2-}/H^+$ to form a ketone.

Tollens' reagent: Also known as ammoniacal silver nitrate, this reagent forms a silver mirror in the presence of an aldehyde and can be used to distinguish between aldehydes and ketones. An aldehyde is oxidised to a carboxylic acid while silver ions in Tollens' are reduced to silver, forming a silver mirror on the wall of the test tube.

OA2.3 - Carboxylic Acids and their Derivatives

Acid chloride: A compound containing the functional group COCI. Acyl chlorides are a derivative of carboxylic acids, but the -OH is substituted by -CI.



Alcohol: An organic compound containing the -OH functional group.

Aldehyde: A compound containing the -CHO functional group at the end of an alkyl chain. Aldehydes can be oxidised to carboxylic acids by heating them under reflux with $Cr_2O_7^{2-}/H^+$.

Amide: A molecule containing the functional group -CONR₂, where R can be an alkyl chain or a hydrogen atom.

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

Carboxylic acid: An organic compound containing the -COOH functional group.





Decarboxylation: A type of reaction that involves the removal of a carboxyl group, releasing CO₂.

Ester: A compound containing the R-COO-R' functional group (where R and R' are alkyl groups).

Halogenoalkane: A saturated molecule where one or more of the hydrogen atoms in an alkane have been substituted for a halogen.

Hydrolysis: A reaction in which water is used to break down a compound.

Hydroxynitrile: A molecule with a -CN functional group and an -OH functional group bonded to the same carbon atom.

Nitrile: A molecule with a -CN functional group.

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

Phenol: A benzene ring where one of the hydrogen atoms has been substituted for a hydroxyl group.

Reduction: The gain of electron(s) which leads to a decrease in oxidation number.

