

CAIE Chemistry A-level

18: Carboxylic Acids and Derivatives Definitions

This work by [PMT Education](https://www.pmt.education) is licensed under [CC BY-NC-ND 4.0](https://creativecommons.org/licenses/by-nc-nd/4.0/)





Definitions and Concepts for CAIE Chemistry A-level Carboxylic Acids and Derivatives

Acid: A substance with a pH less than 7 that dissociates to release H^+ ions in solution.

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 $Cr_2O_7^{2-}/H^+$.

Alkali: A substance with a pH greater than 7. An alkali is a water-soluble base.

Carbonate: A salt containing the ion CO_3^{2-} .

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

Catalyst: A substance that speeds up the rate of a reaction without being used up. It increases the rate of reaction by providing an alternative reaction pathway with a lower activation energy.

Condensation: A type of reaction where two molecules react together to form one larger molecule and a small molecule as a by-product.

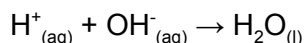
Ester: A compound containing the $R-COO-R'$ functional group (where R and R' are alkyl groups).

Ester hydrolysis: Esters can either be hydrolysed with hot aqueous acid (forming carboxylic acids and alcohols) or with hot aqueous alkali (forming carboxylate salts and alcohols). Polyesters can be hydrolysed in a similar way.

Esterification: The process of making esters. Esters can be made by the reaction between carboxylic acids and alcohols in the presence of an acid catalyst, or by the reaction between acid anhydrides and alcohols.

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

Neutralisation: A reaction between an acid and a base to form water and a salt. The ionic equation for neutralisation is:



Nitrile: A molecule with the functional group $-CN$.

Oxidation: Process involving the loss of electrons. Results in 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 $\text{Cr}_2\text{O}_7^{2-}/\text{H}^+$ to form either an aldehyde or a carboxylic acid, depending on the conditions.

Redox reaction: A reaction in which reduction and oxidation occur simultaneously.

Reduction: Process involving the gain of electrons. Results in a decrease in oxidation number.

Reflux: The continual boiling and condensing of a reaction mixture. This technique is often used to make sure a volatile liquid reaches a high enough temperature to ensure that the reaction goes to completion.

Secondary alcohol: An alcohol in which the -OH is attached to a secondary carbon atom (i.e. R_2CHOH). Secondary alcohols can be oxidised under reflux with $\text{Cr}_2\text{O}_7^{2-}/\text{H}^+$ to form a ketone.

Tertiary alcohol: An alcohol in which the -OH is attached to a tertiary carbon atom (i.e. R_3COH). Tertiary alcohols cannot be oxidised.

