

# CAIE Chemistry A-level

## 17: Carbonyl Compounds Definitions

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## Definitions and Concepts for CAIE Chemistry A-level Carbonyl Compounds

**Aldehyde:** A compound containing the  $\text{-CHO}$  functional group at the end of an alkyl chain. Aldehydes can be oxidised to carboxylic acids by heating them under reflux with  $\text{Cr}_2\text{O}_7^{2-}/\text{H}^+$ .

**Distillation:** A technique used to purify a liquid by heating and cooling. When the liquid evaporates it moves into a condenser where it is cooled, recondensed and collected.

**Fehling's reagent:** A solution used to distinguish between aldehydes and ketones. When heated in Fehling's solution an aldehyde is oxidised and forms a brick red solution whereas a ketone is not oxidised and the solution remains blue.

**Hydroxynitrile:** A molecule that has a carbon bonded to both a nitrile and hydroxy functional group.

**Ketone:** A compound containing the  $\text{C=O}$  functional group within an alkyl chain. Ketones cannot be oxidised further.

**Nucleophilic addition:** A reaction in which an electrophilic  $\pi$  bond reacts with a nucleophile, breaking the  $\pi$  bond and forming 2 new  $\sigma$  bonds. Examples include carbonyl compounds reacting with  $\text{NaBH}_4$  to form alcohols or with  $\text{HCN}$  to form hydroxynitriles.

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

**Primary alcohol:** An alcohol in which the  $\text{-OH}$  is attached to a primary carbon atom (i.e.  $\text{RCH}_2\text{OH}$ ). 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.

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

**Secondary alcohol:** An alcohol in which the  $\text{-OH}$  is attached to a secondary carbon atom (i.e.  $\text{R}_2\text{CHOH}$ ). 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  $\text{-OH}$  is attached to a tertiary carbon atom (i.e.  $\text{R}_3\text{COH}$ ). Tertiary alcohols cannot be oxidised.

**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.

