Aldol Reaction Encyclopedia Article

Aldol Reaction

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Aldol Reaction

The aldol reaction, or aldol condensation, is a reaction between two open chain (aliphatic) aldehyde molecules to produce a compound called a beta hydroxyaldehyde (an aldol). This reaction is an example of a polymerization reaction and it occurs only with those compounds containing the CH_2CHO **functional group**.

An aldol is both an aldehyde and an **alcohol** at the same time, meaning that it possesses both -COH (aldehyde) and -OH (alcohol) functional groups. Aldols can be produced by reacting an aldehyde with a range of alkaline condensing reagents (for example, **sodium** ethanoate or dilute sodium hydroxide)in the presence of a catalyst (frequently **potassium** cyanide) at low temperatures.**Aldehydes** with a closed **ring** structure (aromatic aldehydes) undergo a similar reaction called the Cannizzaro reaction. [This reaction is named for Italian chemist **Stanislao Cannizzaro** (1826-1910) who discovered it in the nineteenth century.]

The product of this reaction is capable of losing **water** quite easily; this then returns to the starting point of unsaturated aldehydes. Aliphatic **ketones** (ketones with an open chain structure) react in a similar manner. This reaction can take place between aldehydes or between ketones and it can also take place between aldehydes and ketones. When a ketone is involved the resultant product is a beta hydroxyketone.

The simplest aldol—$CH_3CHOHCH_2CHO$—is produced from ethanal. This is the first stage in the manufacture of 1-butanol which is an important solvent for resins and lacquers. The United States produces some 40,000 metric tons of 1-butanol annually.