

Editorial on Ethers and Epoxides

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EDITORIAL

An epoxide is three-atom ring cyclic ether. Because this ring resembles an equilateral triangle, it is strained and thus more reactive than other ethers. They are mass-produced in vast quantities for a variety of uses.

Alkoxy groups are named after ether groups

Because ethers lack intramolecular hydrogen bonding (unlike alcohols), their intermolecular forces are greatly reduced, resulting in boiling temperatures that are significantly lower than similar sized alcohols.

Getting ethers ready

To make ether from an alkene, alkoxymercuration is utilised.

Ether reactions: Acidic cleavage

Strong acids can cleave the carbon-oxygen bonds of ethers by nucleophilic substitution or elimination processes.

Claisen rearrangement of ether reactions

The Claisen rearrangement is a sigmatropic [3,3] reaction that transforms aryl or enol ethers into carbonyl compounds (albeit the aromatic version rearranges into a phenol to re-establish aromaticity).

Epoxides are cyclic ethers

Epoxides, also known as oxiranes, are three-membered rings that contain one oxygen and two carbon atoms.

Alkenes can be converted to epoxides by reacting with peroxy acids (MCPBA for example).

By reacting halohydrin molecules with a base, epoxides are produced, resulting in intramolecular Williamson ether synthesis.

Epoxide reactions: Ring opening

When epoxides are ring opened under basic circumstances, the

nucleophile adds to the less substituted side of the epoxide via the SN_2 process.

When epoxides are ring opened under acidic conditions, the nucleophile adds to the more substituted side of the epoxide via the SN_1 process.

The outcome of ring opening epoxides in aqueous processes is an anti-diol.

Anti-halohydrins can be made by mixing halo acids with epoxides.

Crown ethers are cyclic ethers that include multiple oxygen atoms.

The number of total atoms in the ring is used to name crown ethers, followed by the word crown, and finally the number of oxygen atoms (18-crown-6 for example).

Ethers spectroscopy

Infrared images of ethers reveal conventional C-H stretches and bends, as well as a strong C-O stretch approximately 1000 cm^{-1} .

Hydrogens on carbons next to oxygen often emerge between 3.4 and 4.5 ppm in 1H NMR.

In 1H NMR, hydrogens on the carbons of an epoxide ring often occur between 2.5 and 3.5 ppm.

An epoxide is three-atom ring cyclic ether. Because this ring resembles an equilateral triangle, it is strained and thus more reactive than other ethers. Low molecular weight epoxides are often colourless, nonpolar and volatile.

The difference between epoxide and ether is that ether is (organic compound countable) a compound with an oxygen atom bonded to two hydrocarbon groups, whereas epoxide is (organic chemistry) any of a class of organic compounds known as cyclic ethers, which have a three-membered ring and are made by selective oxidation of alkenes or ring-closure.

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Received: 16 September, 2021, **Accepted:** 21 September, 2021, **Published:** 26 September, 2021

Citation: Sandhya K (2021) Editorial on Ethers and Epoxides. Organic Chem Curr Res. 10: 243.

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