

College of Pharmacy - Tikrit University

**Organic ChemistryIII
Heterocyclic Lecture(8)
2nd semester 2nd stage**

Prepared and presented by:

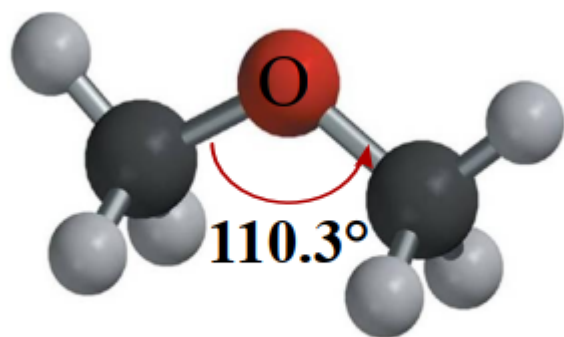
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Ethers & Epoxides

- **Ether** is a class of organic compounds that contain an **ether group** — (an **oxygen** atom connected to **two alkyl** or **aryl groups**) — of general formula **R–O–R**

The **functional group** of an ether is **an oxygen atom** bonded to **two carbon atoms**.



Ball and stick model

Classification of Ethers

1-Aliphatic ethers are those in which **R** and **R'** are both **alkyl groups**.

Example:



Butylmethylether

2-Aromatic ethers are those in which **either one** or **both R** and **R'** are **aryl groups**.

Types of Ethers

1- Simple Ethers or Symmetrical Ethers

If **R'** are the same the ethers are called “**simple ethers**”

2- Mixed Ethers or Unsymmetrical Ethers

Epoxides

Epoxides or Cyclic ethers

Epoxides are cyclic ethers in which the ether oxygen is part of a three-membered. **Epoxides** are also called **oxiranes**

▪ The simplest and the most important epoxide is **ethyleneoxide**

General methods of preparation of Epoxides

Epoxides are often prepared from reacting with organic peroxy acids ("peracids") ex; $\text{CH}_3\text{C}(\text{O})\text{OOH}$ in a process called **epoxidation**.

Peroxide Epoxidation

General equation

Reaction of epoxide:-

- Epoxide ring has angle strain because the bond angle is about 60° much smaller than the tetrahedral bond angle of 109.5°. As a result most of the epoxides reactions are ring opening reactions.

Acid catalysed ring opening: When an epoxide is treated with a nucleophile (H_2O , R-OH etc) in the presence of an acid, C-O cleavage. In unsymmetrical epoxides the bond cleavage takes place in such a way that most stable carbocation is formed.

.Example:-

2-Base catalysed ring opening: In the presence of a base like sodium alkoxides, ammonia/amines, nucleophilic attack takes place at less sterically hindered side

3. Reaction with Grignard reagents.:-

THANK YOU