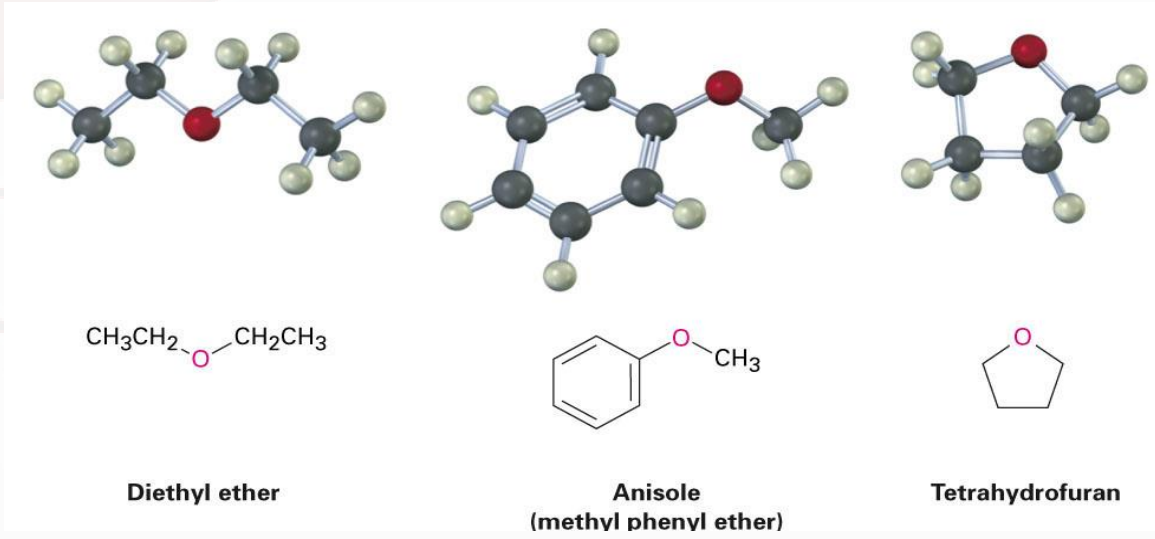
Ethers and Epoxides

GALGOTIAS UNIVERSITY

Ethers and Their Relatives

- An **ether** has two organic groups (alkyl, aryl, or vinyl) bonded to the same oxygen atom, R–O–R′
- Diethyl ether is used industrially as a solvent
- Tetrahydrofuran (THF) is a solvent that is a cyclic ether
- *Thiols* (R–S–H) and *sulfides* (R–S–R′) are sulfur (for oxygen) analogs of alcohols and ethers

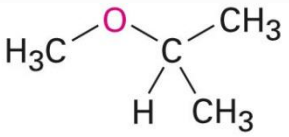


To finish covering functional groups with C-O and C-S single bonds

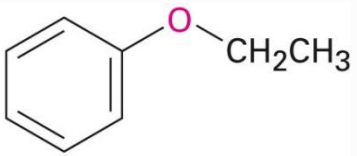
Focus on ethers and look at thiols and sulfides before going on to C=O

Names and Properties of Ethers

- Simple ethers are named by identifying the two organic substituents and adding the word *ether*
- If other functional groups are present, the ether part is considered an alkoxy substituent
- R–O–R ~ tetrahedral bond angle (112° in dimethyl ether)
- Oxygen is sp^3-hybridized
- Oxygen atom gives ethers a slight dipole moment



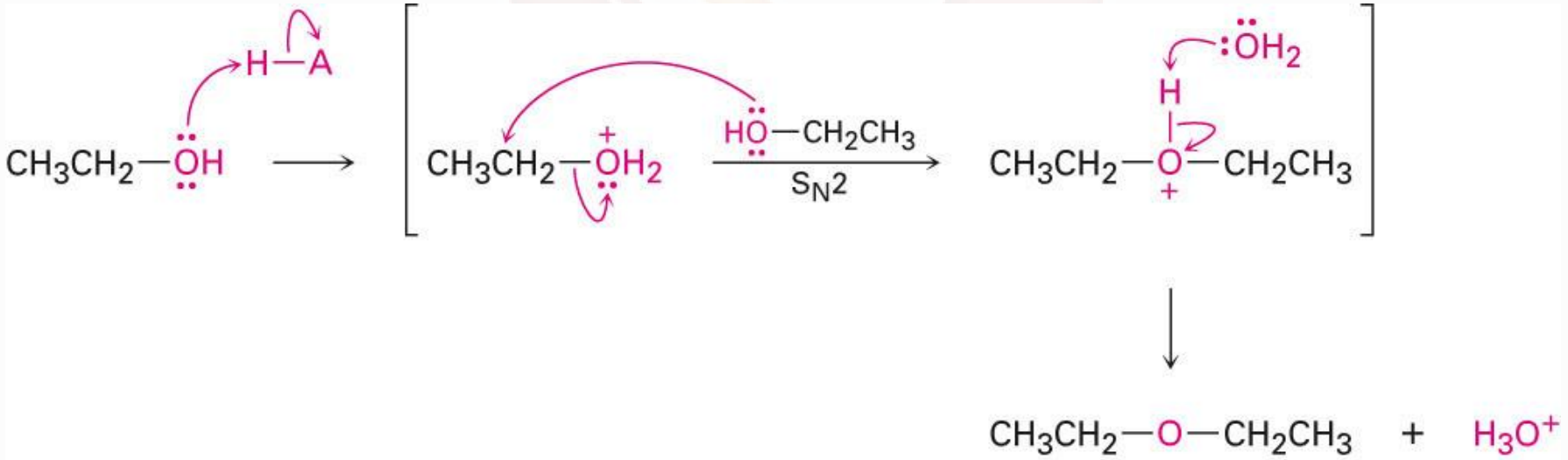
Isopropyl methyl ether



Ethyl phenyl ether

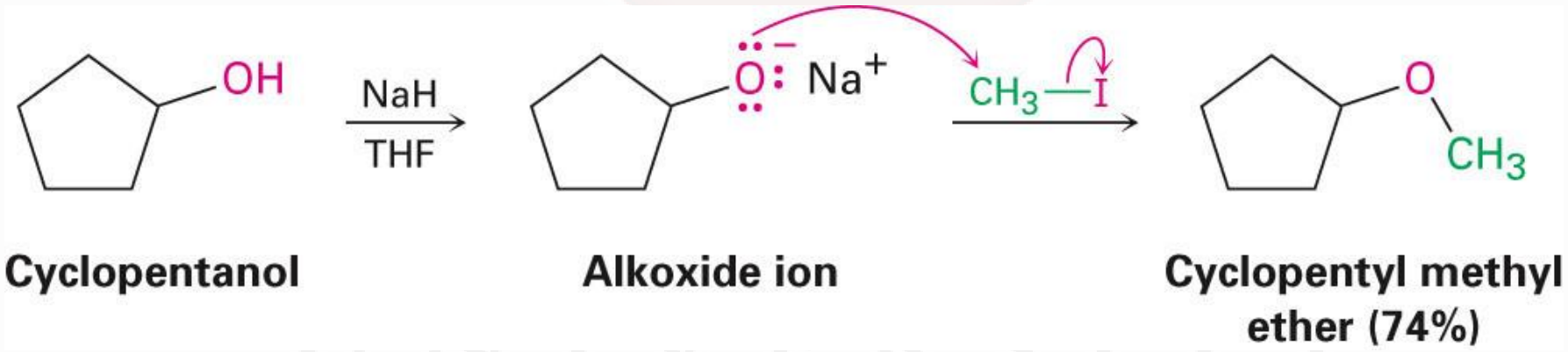
Synthesis of Ethers

- Diethyl ether prepared industrially by sulfuric acid–catalyzed dehydration of ethanol – also with other primary alcohols



The Williamson Ether Synthesis

- Reaction of metal alkoxides and primary alkyl halides and tosylates
- Best method for the preparation of ethers
- Alkoxides prepared by reaction of an alcohol with a strong base such as sodium hydride, NaH



Cyclopentanol **Alkoxide ion** **Cyclopentyl methyl ether (74%)**

Source & References:

The materials presented in this lecture has been taken from various books and internet websites. This instruction materials is for instructional purposes only.

1. http://www.aspu.edu.sy/laravel-filemanager/files/18/007%20chapter%2004%20Ethers%20and%20Epoxides_%20Thiols%20and%20Sulfides.pdf
2. https://chem.libretexts.org/Bookshelves/Organic_Chemistry/Map%3A_Organic_Chemistry_(McMurry)/18%3A_Ethers_and_Epoxides_Thiols_and_Sulfides

Thank You.....

GALGOTIAS UNIVERSITY