

**Assignment Title:** Assignment on Ether  
**Course Title:** General Chemistry II  
**Course Code:** CHM 102

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**COLLEGE:** Medicine and Health Sciences    **DEPARTMENT:** Medicine and Surgery  
**LEVEL: 100**

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### Question

#### Assignment

1. Give the IUPAC names of the following organic compounds

$\text{CH}_3\text{OCH}_3$  = Methoxymethane

$\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_3$  = Ethoxyethane

$(\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2)_2\text{O}$  = Butoxymethane

$\text{CH}_3\text{CH}_2\text{OCH}_3$  = Methoxyethane

$\text{CH}_3\text{CH}_2\text{CH}_2\text{OCH}_2\text{CH}_3$  = Ethoxypropane

2. Discuss the properties of ethers

**(1) Physical states**

Ethers are colourless, neutral liquids with pleasant odours at room temperature. Lower aliphatic form of ethers are highly flammable gases or volatile liquids.

**(2) Solubility**

They are generally less soluble in water than are the corresponding alcohols. Methoxymethane and Methoxyethane that are lower molecular weight ethers are fairly

soluble in water since the molecules are able to form hydrogen bonds with the water molecules but as the hydrocarbon content of the molecules increases, there is a rapid decline in solubility. They are miscible with most organic solvents.

### (3) Density

Most of the simple ethers are less dense than water, although the density increases with increasing relative molecular mass and some of the aromatic ethers are in fact denser than water

### (4) Boiling point

Low molecular mass ethers have a lower boiling point than the corresponding alcohols but those ethers containing alkyl radicals larger than four carbon atoms, the reverse is true. The boiling point of ethers tend to approximate those of hydrocarbons of same relative molecular mass from which it can be concluded that the molecules are not associated in the liquid phase as there are no suitably available hydrogen for association through hydrogen bonds,

### (5) Reactivity

Ethers are inert at moderate temperature. Their inertness at moderate temperatures leads to their wide use as reaction media

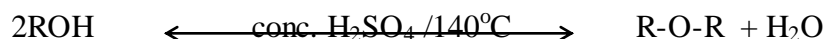
Simple ethers are not found commonly in nature but the ether linkage is present in such natural products as sugars, starches and cellulose

3. Discuss explicitly two methods of preparing ethers and show equations of reaction

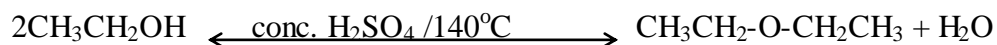
Two methods of preparing ethers ;

### 1. Partial dehydration of alcohols

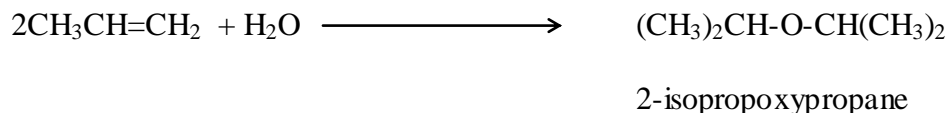
By the use of catalytic dehydration, simple ethers are manufactured from alcohols. The alcohol in excess and concentrated tetraoxosulphate(vi) acid is heated at temperature of 140°C. This process is known as continuous etherification. It is important to note that if excess alcohol is not used, and the temperature is as high as 170-180°C, further dehydration to yield alkene occurs.



Examples



### 2. Controlled catalytic hydration of olefins



### 3. State three uses of ethylene oxide

The three uses of ethylene oxide are;

1. Ethylene oxide is used as an intermediate in the hydrolytic manufacture of ethylene glycol.
2. Ethylene oxide is used in the preparation of nonionic emulsifying agents, plastics, plasticizers and several synthetic textiles.
3. Ethylene oxide is used as a gaseous sterilizing agent.