

JLODIBE ANTHONY UDENNA

19/ENG 02/026

COMPUTER ENGINEERING

CHEM 102

1) Give the IUPAC names of the following organic compounds

a CH_3OCH_3 : Methoxymethane

b $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_3$: Ethoxyethane

c $(\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2)_2\text{O}$: Dodecane

d $\text{CH}_3\text{CH}_2\text{OCH}_3$: Methoxyethane

e $\text{CH}_3\text{CH}_2\text{CH}_2\text{OCH}_2\text{CH}_3$: Ethoxypropane

2 Discuss the properties of ethers

A Physical Properties

- i An ether molecule has a net dipole moment due to the polarity of C-O bonds
- ii The boiling point of ethers is comparable to the alkanes but much lower than that of alcohols of comparable molecular mass despite the polarity of the C-O bond.
- iii Ether molecules are miscible in water. This is attributed to the fact that like alcohol, the oxygen atom of ether can also form hydrogen bonds with a water molecule.
- iv 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.
- v Reactivity: Ethers are inert at moderate temperature. Their inertness at moderate temperatures leads to their wide use as a reaction media.

B Chemical Properties

- i Doesn't react with bases, active metals, oxidizing agents and reducing agents
- ii Strong acids will cleave ethers at elevated temperatures
- iii When stored in presence of oxygen, ethers will form explosive peroxides such as diethyl ether peroxide

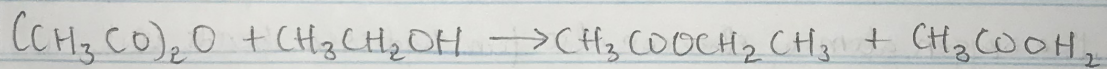
iv Electrophilic Substitution: The alkyl group in ethers activates the aromatic ring at ortho and para positions for electrophilic substitutions - Common electrophilic substitution reactions are halogenation, Friedel Craft's reaction etc

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

i Making esters from acid anhydrides

This reaction can again be used to make esters from both alcohols and phenols. The reactions are slower than the corresponding reactions with acyl chlorides, and you usually need to warm the mixture. In the case of a phenol, you can react the phenol with sodium hydroxide solution first, producing the more reactive phenoxide ion.

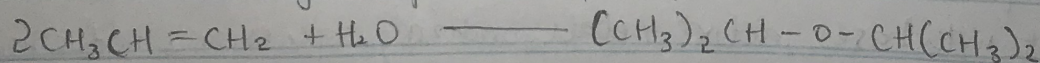
Taking ethanol reacting with ethanoic anhydride as a typical reaction involving an alcohol. There is a slow reaction at room temperature (or faster on warming). There is no visible change in the colorless liquids, but a mixture of ethyl ethanoate and ethanoic acid is formed.



The reaction with phenol is similar, but will be slower. Phenyl ethanoate is formed together with ethanoic acid.

If the phenol is first converted into sodium phenoxide by adding sodium hydroxide solution, the reaction is faster. Phenyl ethanoate is again formed, but this time the other product is sodium ethanoate rather than ethanoic acid.

ii Controlled Catalytic hydration of olefins



4 State three uses of ethylene Oxide

i A small but important use of ethylene oxide is the sterilization of medical equipment, including the sterilization of personal protective

equipment used by doctors and hospitals - across the country —

ii) Most ethylene oxide is used as an intermediate in the production of other chemicals used to manufacture products, such as fabrics for clothes, upholstery, carpet and pillows.

iii) Ethylene glycol, which is derived from ethylene oxide, is used to manufacture fibreglass used in products ranging from jet skis to bath tubs to bowling balls, as well as polyethylene terephthalate (PET) plastic resin to make beverage containers and packaging film.