Which is a simple ether?

ETHERS

Continued from January 6th..

- NATALITE(mixture of alcohol and ether), a substitute for petrol
- Refrigerant along with dry ice (solid CO_2) which produces a temperature around $-110^{\circ}C$

Estimation of number of alkoxy groups by Zeisel method

This method is used for the estimation of number of alkoxy groups in ethers by reaction with HI followed by $AgNO_3$ solution. From this weight of AgI formed is calculated to determine the number of alkoxy groups.

$R-O-R+2HI \rightarrow 2R-I+H_2O$

$2RI+2AgNO_3 \rightarrow 2AgI+2RNO_3$

Exclusive for JEE - ADVANCE

- **Reactions of alkyl group (Halogenation):** Diethyl ether reacts with chlorine or bromine to form halogen substituted ethers.Hydrogens at α carbon atoms are easily substituted in the dark condition.

$CH_3CH_2OCH_2CH_3 \xrightarrow[Dark]{Cl_2}$

$CH_3 - \overset{\alpha}{C}H(Cl) - O - \overset{\alpha'}{C}H(Cl) - CH_3$

(α,α' dicholoro diethyl ether)

$CH_3CH_2OCH_2CH_3 \xrightarrow[Sunlight]{Cl_2}$

$C_2Cl_5 - O - C_2Cl_5$

(perchloro diethyl ether)

- Reactions of ethereal oxygen

$C_2H_5-O-C_2H_5+(O) \rightarrow C_2H_5-\underset{\underset{O}{\|}}{O}-C_2H_5$

(Peroxide)

- **Formation of oxonium Salts**

$C_2H_5-O-C_2H_5 + HBr \rightarrow \left[C_2H_5-\overset{\overset{H}{|}}{O}-C_2H_5\right]Br^-$

Diethyl oxonium bromide

$C_2H_5-O-C_2H_5+H_2SO_4 \rightarrow \left[C_2H_5-\overset{\overset{H}{|}}{O}-C_2H_5\right]HSO_4^-$

Diethyl oxonium hydrogen sulphate

- Hydrolysis

$C_2H_5-O-C_2H_5+H_2O \rightarrow 2C_2H_5OH$ (steam)

- Action of PCl_5

$C_2H_5-O-C_2H_5+PCl_5 \rightarrow 2C_2H_5Cl+POCl_3$

- **Action of acetyl chloride and acetic anhydride**

$C_2H_5-O-C_2H_5+CH_3COCl \xrightarrow{AlCl_3} C_2H_5Cl+CH_3COOC_2H_5$

$C_2H_5-O-C_2H_5+(CH_3CO)_2O \xrightarrow{ZnCl_2} 2CH_3COOC_2H_5$

- **Action of carbon monoxide**

$C_2H_5-O-C_2H_5+CO \xrightarrow[500atm]{BF_3/150^{\circ}C} C_2H_5COOC_2H_5$

(ethylpropionate)

- **Oxidation**

$C_2H_5O\,C_2H_5+(O) \xrightarrow{acid.K_2Cr_2O_7} 2CH_3CHO \xrightarrow{acid.K_2Cr_2O_7} 2CH_3COOH$

- **Dehydration**

$C_2H_5O\,C_2H_5 \xrightarrow{Al_2O_3/360^{\circ}C} 2CH_2=CH_2+H_2O$

LEVEL I A

NOMENCLATURE

1. The compound which is not isomeric with diethyl ether is
1) Butanone 2) Methyl propyl ether
3) 2-methyl propane-2-ol 4) Butanol-1

2. The number of metameric ethers possible with the formula $C_4H_{10}O$ are
1) 4 2) 3 3) 2 4) 5

3. The IUPAC name of $C_2H_5OC_2H_5$
1) Diethyl ether 2) Ethoxy ethane
3) Ethoxy propane 4) Dimethyl ether

PREPARATION METHODS

4. Phenol on heating with NaOH followed by reaction with alkyl halide gives
1) Acetone 2) Ether 3) Ethanol 4) Acetic acid

5. Ethers are obtained by
1) Reaction of alkyl halide with dry ZnO
2) Reaction of alkyl halide with moist ZnO
3) Reaction of alkyl halide with dry Ag_2O
4) Reaction of alkyl halide with moist Ag_2O

PROPERTIES AND USES OF ETHERS

6. Following one is formed when a diethyl ether is exposed to air for longer period
1) Ethyl alcohol 2) Acetaldehyde
3) Ethylene 4) Peroxide of diethyl ether

7. The compound which has the lowest boiling point is

1) H_2O 2) C_2H_5OH 3) $\underset{OH}{\overset{CH_2-CH_2}{|\quad|}}\quad\underset{OH}{}$ 4) CH_3OCH_3

8. Total number of lone pair of electrons around oxygens in diethyl peroxide is / are
1) 2 2) 3 3) 4 4) 0

9. Ethyl chloride reacts with sodium ethoxide to form a compound (A). Which of the following reactions also yields (A)?

1) $C_2H_5Cl, KOH(alc), \Delta$

2) $2C_2H_5OH, conc.H_2SO_4, 140^{\circ}C$

3) $C_2H_5Cl, Mg(dry\ ether)$ 4) $C_2H_2, dil.H_2SO_4, HgSO_4$

10. The IUPAC name of $C_2H_5-O-CH(CH_3)_2$
1) Ethoxy propane 2) 1,1-dimethyl ether
3) 2-Ethoxy isopropane 4) 2-Ethoxy propane

11. '<u>A</u>' reacts with C_2H_5I giving '<u>B</u>' and NaI. Here '<u>A</u>' and '<u>B</u>' respectively are

1) CH_3COONa, CH_3OCH_3

2) $C_2H_5OC_2H_5, C_2H_5COOC_2H_5$

3) $C_2H_5ONa, C_2H_5OC_2H_5$

4) $C_2H_5OH, C_2H_5OC_2H_5$

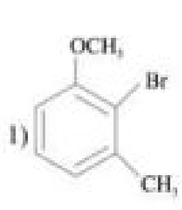
12. Which of the following compounds when heated with CO at 150°C and 500 atm. pressure in presence of BF_3, forms ethyl propionate ?

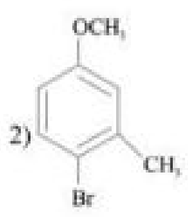
1) C_2H_5OH 2) CH_3OCH_3

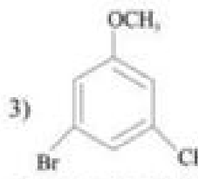
3) $C_2H_5OC_2H_5$ 4) $CH_3OC_2H_5$

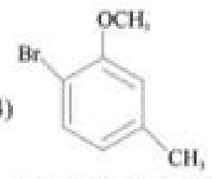
13. One mole of diethyl ether on heating with conc.HI gives
1) 1 Mole of C_2H_5I and 1 mole of C_2H_5OH
2) 2 Moles of iodoethane
3) 2 Moles of ethanol
4) Iodoethane and ethanol but not in a 1:1 mole ratio

14. The major product obtained on the monobromination (with $Br_2/FeBr_3$) of the following compound is

1) 

2) 

3) 

4) 

15. Among the following compounds, the one which does not react with sodium is
1) $CH_3CHOHCH_3$ 2) CH_3OCH_3
3) CH_3COOH 4) C_2H_5OH

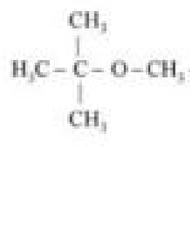
16. Which of the following halogen acids is most reactive towards the given reaction ?

$R-O-R \xrightarrow{HX}$

1) HCl 2) HI 3) HBr 4) Equally reactive

17. Which of the following compounds is produced when this reaction takes place ?

$H_3C-\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}-O-CH_3 \xrightarrow[cold]{HI}$

1) 

2)

18. Alcohols can be distinguished from ethers by
1) Sodium metal 2) Ester formation
3) Iodoform test 4) All the above

19. $CH_2CH=CH_2 \xrightarrow{HCl} X \xrightarrow[Heat]{Dry\ Ag_2O} Y$ The product Y in the above sequence is
1) Di isopropyl ether 2) Di n - propyl ether
3) 2 - Propanol 4) 1, 2 - Epoxypropane

20. A mixture of ether and ..... gives temperature as low as 163 K
1) NaCl 2) Ice 3) Solid CO_2 4) C_2H_5OH

JEE MAIN Special

Options of Q.No.21-26

1) Both A and R are true and R is the correct explanation to A
2) Both A and R are true and R is not the correct explanation to A
3) A is true but R is false
4) A is false but R is true

21. *Assertion (A) :* Ethers behave as Lewis base in the presence of mineral acids.
***Reason (R) :* Oxygen atom in ether is having lone pair electrons.**

22. *Assertion (A) :* Diethyl ether is used as general anaesthesia.
***Reason (R) :* Diethyl ether produces unconsciousness without effecting lungs.**

23. Assertion (A): Ethers are relatively inert when compared to C_2H_5OH
Reason (R): The hybridization of C and O in CH_3-O-CH_3 is SP^3

24. Assertion(A): Diethyl ether reacts with hot $Conc\ H_2SO_4$ and gives ethyl hydrogen sulphate
Reason (R) : The reaction involves cleavage of C-O bond in diethyl ether.

25. Assertion (A): Ethers behave as base in presence of mineral acids
Reason (R): Oxygen atom in ether is having lonepair

26. Assertion (A): Alkyl aryl ethers on reacton with HI give alkyl iodide, phenols
Reason (R): Aryl - oxygen bond is weaker than alkyl oxygen bond.

LEVEL I A KEY

1) 1 2) 2 3) 2 4) 2 5) 3 6) 4 7) 4
8) 3 9) 2 10) 4 11) 3 12) 3 13) 2 14) 4
15) 2 16) 2 17) 2 18) 4 19) 1 20) 3 21) 1
22) 1 23) 2 24) 1 25) 1 26) 1

LEVEL I B

NOMENCLATURE

1. The following represents ether
1) $(RCO)_2O$ 2) RCOOR 3) RCOR 4) ROR

2. The dialkyl derivative of H_2O is
1) Alcohol 2) Ether 3) Ester 4) Ketone

3. Which of the following is a simple ether?
1) CH_3OCH_3 2) $CH_3OC_2H_5$
3) $CH_3CH_2OCH(CH_3)_2$ 4) $C_2H_5OC_3H_7$

4. Ethers are isomeric with
1) Aldehydes 2) Acids
3) Alcohols 4) Ketones

5. $C_nH_{2n+2}O$ is the general formula of ethers. To exhibit the functional group isomerism 'n' must be minimum
1) 1 2) 2 3) 3 4) 4

PREPARATION METHODS

6. Heating together sodium ethoxide and ethyl chloride will give
1) ether 2) ethyl alcohol
3) acetaldehyde 4) acetic acid

7. Williamsons synthesis is used to prepare
1) Diethyl ether 2) PVC
3) Bakelite 4) Ethyl alcohol

8. Which of the following is not an isomer of diethyl ether ?
1) 2-methyl - 2- propanol 2) 2-Methoxypropane
3) 2-Methyl-1-propanol 4) Ethoxyethane

PROPERTIES AND USES OF ETHERS

9. The compound in which hydrogen bonding is not possible is
1) $C_6H_5OCH_3$ 2) CH_3CH_2OH
3) H_2O 4) CH_3COOH

10. Diethyl ether is used as
1) Anaesthetic 2) Solvent 3) Refrigerant 4) All

11. The safest general anaesthesia used at present is
1) chloroform 2)diethyl ether
3) acetylene 4) halothane

12. Formula of halothane is
1) CF_2Cl_2 2) CF_3Cl
3) CF_3-$CHClBr$ 4) $(C_2F_4)_n$

13. The IUPAC name of an unsymmetrical ether with the molecular formula $C_4H_{10}O$
1) Ethoxypropane 2) Methoxyethane
3) Ethoxyethane 4) Methoxypropane

14. Consider the following reaction
$C_2H_5I \xrightarrow{\Delta}$ (Pleasant smelling liquid), X is
1) Sodium 2) Dry silver oxide
3) Ethyl chloride 4) Dry silver powder

15. $C_2H_5-O-C_2H_5+\underset{excess}{HI} \xrightarrow[(hot)]{\Delta} X+Y$, here X and Y are
1) C_2H_5I and C_2H_5OH 2) C_2H_5I and H_2O
3) $C_2H_5OH+H_2O$ 4) $C_2H_4+H_2O$

16. Which one of these is formed on heating sodium phenoxide with ethyl iodide ?
1) Phenetole 2) Ethyl phenyl alcohol
3) Phenone 4) None of these

17. Anisole with conc. HNO_3 and conc. H_2SO_4 gives
1) Phenol 2) Nitrobenzene
3) O- and - P-Nitroanisole 4) O- Nitroanisole

18. Oxygen atom in ether is
1) Very active 2) Replaceable
3) Active 4) Relatively inert

LEVEL I B - KEY

1) 4 2) 2 3) 1 4) 3 5) 2 6) 1 7) 1
8) 4 9) 1 10) 4 11) 4 12) 3 13) 4 14) 2
15) 2 16) 1 17) 3 18) 4

LEVEL II A

METHODS OF PREPARATION

1. Which of the following pairs of reagents will not form ether
1) $C_2H_5Br + C_2H_5ONa$ 2) $C_2H_5Br + CH_3ONa$
3) $CH_3Br + C_2H_5ONa$ 4) $C_2H_5Br + HCOONa$

2. What is Y in the following reactions
$C_2H_5I + NaOC_2H_5 \rightarrow X + NaI$
$X + 2HI \rightarrow 2Y + H_2O$
1) C_2H_6 2) C_2H_5I 3) C_2H_4 4) $C_2H_5OC_2H_5$

3. Which of the following cannot be prepared by using Williamson synthesis ?
1) Methoxybenzene 2) Benzyl-*p*-nitrophenol ether
3) Methyl tert-butyl ether 4) Ditertiary butyl ether

4. Methoxy benzene is called anisole.

How many more structures can be drawn for the same formula ?
1) 5 2) 4 3) 3 4) 2

LEVEL II A - KEY

1) 4 2) 2 3) 4 4) 2