CHEMISTRY

BOOKS - KALYANI CHEMISTRY (ENGLISH)

ALCOHOLS , PHENOLS AND ETHERS

Multiple Choice Questions

1. When acetaldehyde is treated with grignard reagent, followed by hydrolysis the product

formed is:

A. Primary alcohol

B. Secondary alcohol

C. Carboxylic acid

D. Tertiary alcohol

Answer: B

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2. When oxalic acid is heated with glycerol we get:

A. Formic acid

B. Acetic acid

C. Lactic acid

D. Tartaric acid

Answer: A

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3. Ethanol on heating with conc. H_2SO_4 at 445 K gives:

A. Diethyl sulphate

B. Ethylene, C_2H_4

C. Diethyl ether , $(C_2H_5)_2O$

D. Ethyl hydrogen sulphate, $C_2H_5HSO_4$

Answer: B

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4. Which of the following is most acidic?

A. H_2O

B. CH_3OH

C. C_2H_5OH

D. $CH_3CH_2CH_2OH$

Answer: A

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5. Which one of the following will produce a primary alcohol by reacting with CH_3MgI?

A. Acetone

B. Methyl cyanide

C. Ethylene oxide

D. Ethyl acetate

Answer: C

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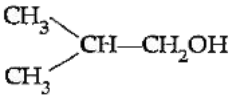
6. Which of the following has highest boiling point?

A. $CH_3CH_2CH_2OH$

B. 

C. $CH_3CH_2CH_2CH_2OH$

D. $CH_3 - \overset{\overset{CH_3}{|}}{\underset{\underset{CH_3}{|}}{C}} - OH$

Answer: D

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7. Chlorine reacts with ethanol to give:

A. Diethyl chloride

B. Chloroform

C. Acetaldehyde

D. Chloral

Answer: D

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8. Which of the following alcohol is least soluble in water?

A. N-Butyl alcohol

B. Iso-Butyl alcohol

C. Tert-Butyl alcohol

D. Sec-Butyl alcohol

Answer: A

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9. Glycerol on heating with potassium bisulphate yields:

A. Acetone

B. Glyceraldehyde

C. Acrolein

D. Propanol

Answer: C

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10. The reaction of Lucas reagent is fastest with:

A. $(CH_3)_3COH$

B. $(CH_3)_2CHOH$

C. $CH_3(CH_2)_2OH$

D. CH_3CH_2OH

Answer: A

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11. The ionization constant of phenol is higher than that of ethanol because:

A. Phenoxide ion is a stronger base than ethoxide ion

B. Phenoxide ion is stabilized through delocalization

C. Phenoxide ion is less stable than ethoxide ion

D. Phenoxide ion is buikier than ethoxide ion

Answer: B

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12. The correct order of boiling points for primary (1°), secondary (2°) and tertiary alcohol (3°) is:

A. $1^{\circ} > 2^{\circ} > 3^{\circ}$

B. $3^{\circ} > 2^{\circ} > 1^{\circ}$

C. $2^{\circ} > 1^{\circ} > 3^{\circ}$

D. $2^{\circ} > 3^{\circ} > 1^{\circ}$

Answer: A

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13. Which of the following is the most suitable method for removing the traces of water from ethanol?

A. Heating with Na metal

B. Passing dry HCl gas through it

C. Distilling Cl^-

D. Reacting with Mg

Answer: D

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14. Phenol is heated with $CHCl_3$ and alcoholic KOH when salicylaldehyde is produced. This reaction is known as:

A. Rosenmund's reaction

B. Reimer-Tiemann reaction

C. Friedel-Crafts reaction

D. Sommelet reaction

Answer: B

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15. Lucas test is used for distinction of:

A. Alcohols

B. Phenols

C. Alkyl halides

D. Aldehydes

Answer: A

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16. Which of the following is simple ether?

A. $C_2H_5OCH_3$

B. CH_3OCH_3

C. $C_6H_5OCH_3$

D. All are simple ethers.

Answer: B

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17. Alcohols of low molecular weight are:

A. Insoluble in water

B. Soluble in water

C. Insoluble in all solvents

D. Soluble in water on heating

Answer: B

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18. The boiling point of methanol is greater than that of methyl thiol because:

A. There is intermolecular hydrogen bonding in methanol and no hydrogen bonding in methyl thiol.

B. There is intramolecular hydrogen bonding in methanol and no hydrogen bonding in methyl thiol.

C. There is intramolecular hydrogen bonding in methanol and intermolecular hydrogen bonding in methyl thiol.

D. There is no hydrogen bonding in methanol and intermolecular hydrogen bonding in methyl thiol

Answer: A

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19. In the reaction of phenol with $CHCl_3$, and aqueous NaOH at $70^\circ C$, the electrophile attacking the ring is:

A. $CHCl_3$

B. $CHCl_2$

C. CCl_2

D. $COCl_2$

Answer: B

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20. Which of the following statements about phenol are incorrect?

(i) It is insoluble in water.

(ii) It has lower melting point as compared to aromatic hydrocarbons of comparable molecular weight.

(iii)It does not show acidic property.

(iv)It has higher boiling point than toluene.

A. (i) and (ii) are correct

B. (i) and (iii) are correct

C. (ii) and (iv) are correct

D. (i), (ii) and (iii) are correct.

Answer: D

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21. Alcohols can be obtained from all methods except:

A. Hydroboration-oxidation

B. Oxymercuration-demercuration

C. Reduction of aldehyde/ketones with Zn-Hg/HCl

D. By fermentation of starch

Answer: C

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22. When phenol is treated with excess of bromine water, it gives:

A. m-bromophenol

B. o-and p-bromophenol

C. 2, 4-dibromophenol

D. 2, 4, 6-tribromophenol

Answer: D

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23. Which of the following statements are correct?

(i) A secondary alcohol on oxidation gives a ketone.

(ii) Ethanol reacts with conc. H_2SO_4 at $180^\circ C$ to yield ethylene.

(iii) Hydrogen gas is liberated when sodium is added to alcohol.

(iv)Methanol reacts with iodine and sodium hydroxide to give a yellow precipitate of iodoform.

A. (i) and (ii) are correct

B. (i) and (iii) are correct

C. (ii) and (iv) are correct

D. (i), (ii), and (iii) are correct

Answer: D

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24. Which of the following is not true in case of reaction with heated copper at $300^{\circ} C$?

A. Primary alcohol $\rightarrow$ Aldehyde

B. Secondary alcohol $\rightarrow$ Ketone

C. Tertiary alcohol $\rightarrow$ Olefin

D. Phenol $\rightarrow$ Benzyl alcohol

Answer: D

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25. In cold countries, ethylene glycol is added to water in the radiators to:

A. Lower the viscosity

B. Reduce the viscosity

C. Make water a better lubricant

D. Bring down the specific heat of water

Answer: D

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26. Boiling point of ethyl alcohol is greater than diethyl ether due to:

A. Vander Waals forces

B. London forces

C. Polarity

D. Hydrogen bonding

Answer: D

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27. Reaction between acetone and methyl magnesium chloride, followed by hydrolysis will give:

A. tert-butyl alcohol

B. iso-butyl alcohol

C. iso-propyl alcohol

D. sec-butyl alcohol

Answer: A

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28. The optically active compound is:

A. Butan-1-ol

B. Butan-2-ol

C. Propan-1-ol

D. 2-methyl-propan-1-ol

Answer: B

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29. The reaction: Sodium alkoxide + alkyl halide $\rightarrow$ Ether + Sodium halide is called:

A. Wurtz reaction

B. Kolbe's reaction

C. Perkin's reaction

D. Williamson's synthesis

Answer: D

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30. Benzene diazonium chloride on hydrolysis gives:

A. Benzene

B. Phenol

C. Chlorobenzene

D. Benzyl alcohol

Answer: B

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31. A liquid is mixed with ethanol and few drops of conc. H_2SO_4 is added. A compound with a fruity smell is formed. The liquid is:

A. HCHO

B. CH_3CHO

C. CH_3COOH

D. CH_3COCH_3

Answer: C

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32. The gas evolved when sodium metal reacts with ethanol:

A. Carbon dioxide

B. Hydrogen

C. Phosgene

D. Hydrogen sulphide

Answer: B

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Fill In The Blanks

1. During acid catalysed dehydration of alcohols, the intermediate species involved are ..... In case of ..... alcohols, the cloudiness appears immediately while performing Lucas test:

A. Carboanion, primary

B. Carbocation, tertiary

C. Radical anion, secondary

D. Radical cation, tertiary

Answer: B

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2. ..... is an example of trihydric alcohol and ..... is an example of dihydric alcohol. Ethyl bromide on reaction with moist silver oxide gives ..... as the main product.

A. iso-propanol, methanol, ethanol

B. Glycol, ethanol, methanol

C. Ethanol, glycol, propanol

D. Glycerol, glycol, ethanol

Answer: D

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3. The common name of 1, 2, 3-trihydroxy-benzene is ..... Phenol reacts with sodium liberating ..... gas.

A. TNT, nitrogen

B. Butyrophenone, Oxygen

C. Pyrogallol, hydrogen

D. Benzophenone, carbon dioxide

Answer: C

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4. Phenol is .. .. reactive than chlorobenzene towards electrophilic

substitution reactions. IUPAC name of picric acid is.

A. More, 2,3-dihydroxybutanedioic acid

B. More, 2, 4, 6-Trinitrophenol

C. Less, 2-hydroxypropane-1,2,3-tricarboxylic acid

D. Less, 2-hydroxypropanoic acid

Answer: B

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5. A mixture of conc. HCl and anhydrous $ZnCl_2$ is called ..... which shows maximum reactivity with ..... alcohol.

A. Lucas reagent, tertiary

B. Grignard reagent, primary

C. Fehling's reagent, secondary

D. Tollen's reagent, primary

Answer: A

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6. Ethers behave as weakly ..... substances because of the presence of ..... electrons on the oxygen atom. IUPAC name of cumene is .....

A. Basic, unpaired, 4-oxopentanal

B. Acidic, unpaired, 3-hydroxybutan-2-one

C. Acidic, extra electrons in Valence shell, 3-methylphenol

D. Basic, lone pair, 2-Phenylpropane

Answer: D

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7. Alcohols act as ..... due to the presence of unshared electron pairs on oxygen atom. Ethers are.... ..... in nature.

A. Bronsted bases, basic

B. Bronsted acids, acidic

C. Bronsted acid, neutral

D. Bronsted bases, amphoteric

Answer: A

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8. Acetone reacts with Grignard reagent to form..... When Phenol is distilled with zinc dust, it gives .....

A. Ether, benzoic acid

B. 3° alcohol, Benzene

C. 2° alcohol, toluene

D. No reaction, benzaldehyde

Answer: B

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Match The Following

1. Match column I and column II and choose the correct combination from the given

options.

	Column I		Column II
1	Antifreeze used in car engine	(p)	Methanol
2	Solvent used in perfumes	(q)	Phenol
3	Starting material for picric acid	(r)	Ethylene glycol
4	Wood spirit	(s)	Ethanol

A. 1-(s),2-(q),3-(r) , 4-(p)

B. 1-(s) , 2-(q) , 3-(p) , 4-(r)

C. 1-(p) , 2-(r) , 3-(q) , 4-(s)

D. 1-(r) , 2-(s) , 3-(q) , 4-(p)

Answer: D

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2. Match column I and column II and choose the correct combination from the given options.

	Column I		Column II
1	Anhydrous $ZnCl_2$ + conc.HCl	(p)	Ethyl alcohol
2	Phenol	(q)	Invertase
3	Fermentation	(r)	Tertiary alcohol
4	Dynamite	(s)	Lucas reagent
5	Enzyme	(t)	Reimer-Tie-mann reaction
6	Lucas test	(u)	Nitro glycerine

A. 1-(s), 2-(t) , 3-(p) , 4-(u) , 5-(q) , 6-(r)

B. 1-(r) ,2-(u) , 3-(q) , 4-(t) , 5-(p) , 6-(s)

C. 1-(t) , 2-(s) ,3-(q) , 4-(r) , 5-(p) , 6-(u)

D. 1-(p) , 2-(q) , 3-(s) , 4-(r) , 5-(t) , 6-(u)

Answer: A

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3. Please put coupling reaction instead of test

in the column below at number 1

	Column I		Column II
1	Coupling test	(p)	100 % Ethyl alcohol
2	Methylated spirit	(q)	Polar
3	Power alcohol	(r)	propane-1,2,3-triol
4	Glycerine	(s)	Mixture of petrol and ethyl alcohol
5	O–H Bond	(t)	Methyl alcohol
6	Absolute alcohol	(u)	Phenol

A. 1-(s) , 2-(t) , 3-(p) , 4-(u) , 5-(q) , 6-(r)

B. 1-(r) , 2-(u) , 3-(q) , 4-(t) , 5-(p) , 6-(s)

C. 1-(t) , 2-(s) , 3-(q) , 4-(r) , 5-(p), 6-(u)

D. 1-(u) , 2-(t) , 3-(s) , 4-(r) , 5-(q) , 6-(p)

Answer: D

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Reaction Based Questions

1. In the following reaction , reactant A is :

$$A \xrightarrow[\text{dil. } H_2SO_4]{K_2Cr_2O_7} B \xrightarrow[H_2O]{CH_3MgI} CH_3 - \underset{\displaystyle OH}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{C}}}} - CH_3$$

A. C_2H_5OH

B. CH_3COOH

C. CH_3COCH_3

D. $CH_3CHOHCH_3$

Answer: D

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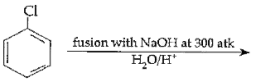
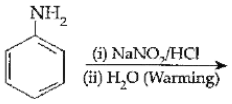
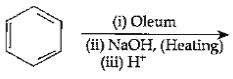
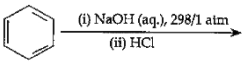
2. Which of the following reactions will yield phenol ?

A. 

B. 

C. 

D. 

Answer: A::B::C

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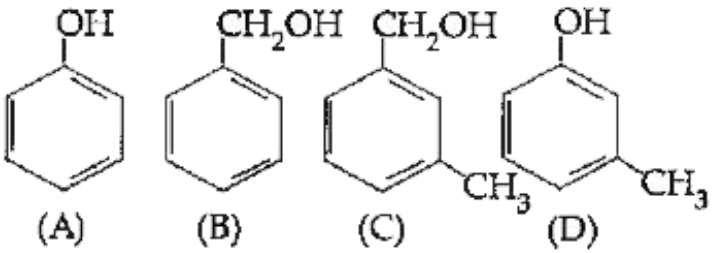
3. Which of the following compounds is aromatic alcohol ?



A. A,B,C,D

B. A,D

C. B,C

D. A

Answer: B::C

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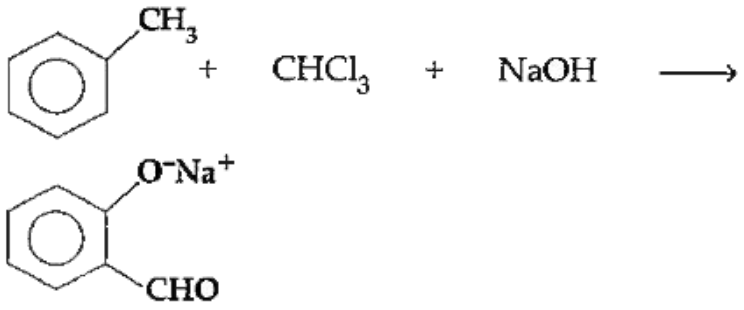
4.



The electrophile involved in the above reaction

is :

A. Dichloromethyl cation $(CHCl_2)$

B. Dichlorocarbene (CCl_2)

C. Trichloromethyl anion (CCl_3)

D. Formylcation (CHO)

Answer: B

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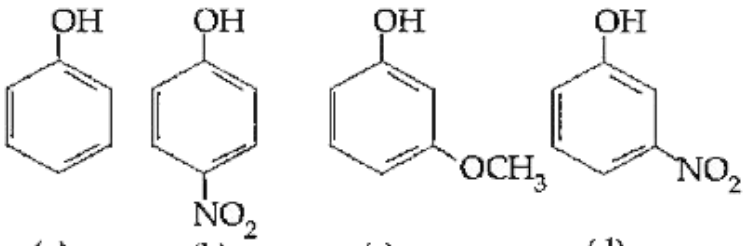
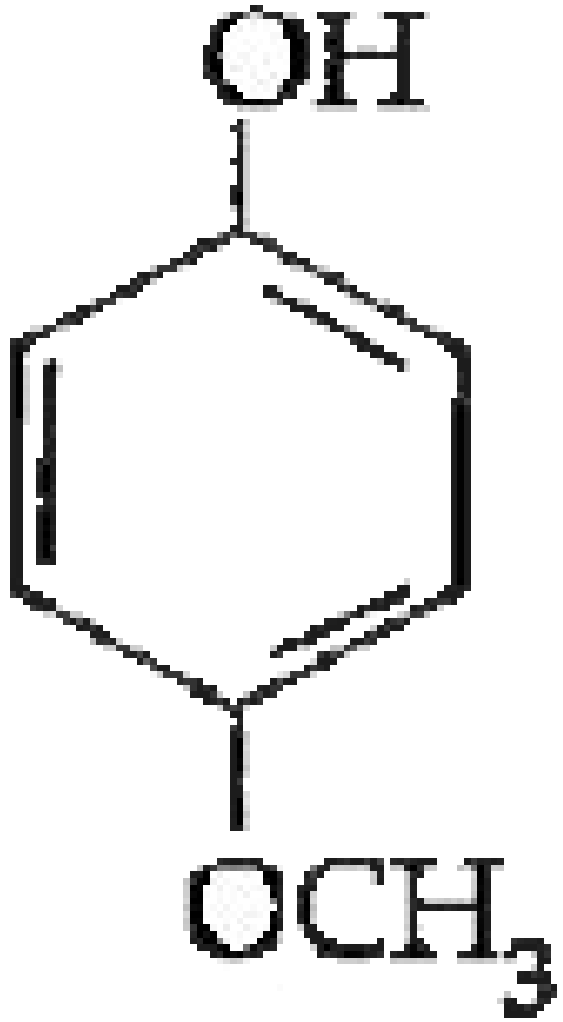
5. Mark the correct order of decreasing acid strength of the following compounds.



(a) (b) (c) (d)



A. $e > d > b > a > c$

B. $b > d > a > c > e$

C. $d > e > c > b > a$

D. $e > d > c > b > a$

Answer: B

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6. $C_6H_5Cl \xrightarrow[624K,300atm]{NaOH(aq)} A$. Here, A is :

A. Phenol

B. Sodium phenoxide

C. Benzene

D. Cyclohexyl chloride

Answer: B

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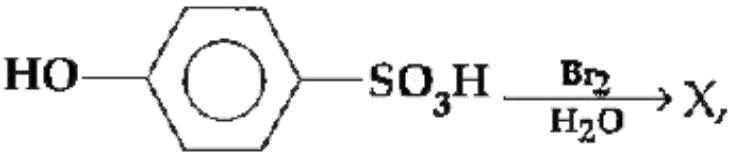
7. In the sequence



is :

A. 2-Bromo-4-hydroxybenzene sulphonic acid

B. 3,5-Dibromo-4-hydroxybenzene sulphonic acid

C. 2-Bromophenol

D. 2, 4, 6-Tribromophenol

Answer: B

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8. Phenol is heated with alcoholic KOH and chloroform: What is the name of the reaction?

A. Cannizzaro reaction

B. Gattermann reaction

C. Reimer -Tiemann reaction

D. Kolbe reaction

Answer: C

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9. Phenol is heated with alcoholic KOH and chloroform: What is the main product formed in this reaction?

A. Salicylaldehyde

B. Salicylic acid

C. Aniline

D. Phenyl isocyanide

Answer: A

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10. Conversion of Chlorobenzene into phenol.

Which of the following statements is correct for the above conversion?

A. Heating it with alc. KOH at room temperature

B. Heating it with aqueous NaOH at 623 K under pressure followed by acidification with dilute HCl

C. Heating it with CuCN followed by acidification with dilute HCl

D. Heating it with sodium metal in the presence of dry ether

Answer: B

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11. Conversion of Chlorobenzene into phenol.

What is the name of the above reaction?

A. Dow process

B. Wurtz reaction

C. Sandmeyer's reaction

D. Kolbe's reaction

Answer: A

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12. An unknown alcohol is treated with Lucas reagent to determine whether the alchol is primary, secondary or tertiary.

A. Tertiary alcohol by S_N^2

B. Secondary alcohol by S_N^1

C. Tertiary alcohol by S_N^1

D. Secondary alcohol by S_N^2

Answer: C

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Assertion And Reason

1. Assertion: $(CH_3)_3 - CONa$ and CH_3CH_2Br react to form

$(CH_3)_3C - O - CH_2CH_3$

Reason: Good yields of ethers are obtained when tert-alkyl halides are treated with alkoxides.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true, but reason is not the correct explanation of assertion.

C. If assertion is true, but reason is false.

D. If both assertion and reason are false

Answer: C

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2. Assertion: Ortho and para-nitro phenols can be separated by steam distillation.

Reason: Ortho isomer associates through intermolecular hydrogen bonding while Para isomer associates through intramolecular hydrogen bonding.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true, but reason is not the correct explanation of assertion.

C. If assertion is true, but reason is false.

D. If both assertion and reason are false

Answer: C

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3. Assertion: In Lucas test, 3° alcohols react immediately.

Reason: An equimolar mixture of anhyd. $ZnCl_2$ and conc. HCl is called Lucas reagent.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true, but reason is not the correct

explanation of assertion.

C. If assertion is true, but reason is false.

D. If both assertion and reason are false

Answer: B

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4. Assertion: The water solubility of the alcohols follow the order: tert-butyl alcohol $>$ sec-butyl alcohol $>$ n-butyl alcohol.

Reason: Alcohols form H-bonding with water to show soluble nature.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true, but reason is not the correct explanation of assertion.

C. If assertion is true, but reason is false.

D. If both assertion and reason are false

Answer: B

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5. Assertion: Tert-butyl alcohol undergoes acid catalysed dehydration readily than propanol.

Reason: 3° Alcohols do not give Victor-Meyer's test.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true, but reason is not the correct explanation of assertion.

C. If assertion is true, but reason is false.

D. If both assertion and reason are false

Answer: B

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6. Assertion: Phenol is less acidic than p-nitrophenol.

Reason: Phenolate ion is more stable than p-nitrophenolate ion.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true, but reason is not the correct explanation of assertion.

C. If assertion is true, but reason is false.

D. If both assertion and reason are false

Answer: C

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7. Assertion: Reimer-Tiemann reaction of phenol with CCI_4 in NaOH at 340 K gives salicylic acid as the major product.

Reason: The reaction occurs through intermediate formation of dichlorocarbene.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true, but reason is not the correct explanation of assertion.

C. If assertion is true, but reason is false.

D. If both assertion and reason are false

Answer: C

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8. Assertion: The C-O-C bond angle in ethers is slightly less than tetrahedral angle.

Reason: Due to the repulsive interaction between the two alkyl groups in ethers.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true, but reason is not the correct

explanation of assertion.

C. If assertion is true, but reason is false.

D. If both assertion and reason are false

Answer: D

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9. Assertion: Phenol undergo Kolbe reaction, ethanol does not

Reason: Phenoxideion is more basic than ethoxide ion.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true, but reason is not the correct explanation of assertion.

C. If assertion is true, but reason is false.

D. If both assertion and reason are false

Answer: C

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10. Assertion: Etherates are coordination complexes of ethers with Lewis acids.

Reason: Ethers are easily cleaved by mineral acids such as HCl and H_2SO_4 at 373 K.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true, but reason is not the correct

explanation of assertion.

C. If assertion is true, but reason is false.

D. If both assertion and reason are false

Answer: C

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11. Assertion: Boiling points of alcohols are higher than that of ethers of comparable molecular mass.

Reason: Alcohols can form intermolecular hydrogen bonding while ethers can not.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true, but reason is not the correct explanation of assertion.

C. If assertion is true, but reason is false.

D. If both assertion and reason are false

Answer: A

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Source Based Questions

1. Read the passages given below and answer the following questions: Ether protecting groups are in many respects complimentary to the acetals. Like the acetals they are stable to basic condition and most ethers are also much more acid stable. The most commonly used

ethers for protecting purposes, the benzyl ethers, are in addition removable by catalytic hydrogenolysis under very mild, PH neutral, conditions. However, the strongly basic conditions most commonly used for the introduction of an ether protecting group and the lack of regioselectivity put certain restrictions on their use. The triphenylmethyl (trityl) ether group has also found use, especially in carbohydrate chemistry. The bulk of this group gives it a strong preference for the primary hydroxyl group.

Assertion: The formation of ether from alcohol

in acidic medium is a bimolecular reaction.

Reason: A protonated alcohol molecule is attacked by another alcohol molecule while ether formation in acidic medium.

A. Assertion and reason both are correct statements and reason is correct explanation for assertion

B. Assertion and reason both are correct statements but reason is not correct explanation for assertion.

C. Assertion is correct statement but reason is wrong statement.

D. Both assertion and reason are wrong.

Answer: A

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2. Read the passages given below and answer the following questions: Ether protecting groups are in many respects complimentary to the acetals. Like the acetals they are stable to

basic condition and most ethers are also much more acid stable. The most commonly used ethers for protecting purposes, the benzyl ethers, are in addition removable by catalytic hydrogenolysis under very mild, PH neutral, conditions. However, the strongly basic conditions most commonly used for the introduction of an ether protecting group and the lack of regioselectivity put certain restrictions on their use. The triphenylmethyl (trityl) ether group has also found use, especially in carbohydrate chemistry. The bulk of this group gives it a strong preference for

the primary hydroxyl group.

Assertion: Dehydration of secondary and tertiary alcohols to give corresponding ethers is not a productive reaction.

Reason: Elimination does not compete with ether formation reaction.

A. Assertion and reason both are correct statements and reason is correct explanation for assertion

B. Assertion and reason both are correct statements but reason is not correct

explanation for assertion.

C. Assertion is correct statement but reason is wrong statement.

D. Both assertion and reason are wrong.

Answer: C

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3. Read the passages given below and answer the following questions: Ether protecting groups are in many respects complimentary to

the acetals. Like the acetals they are stable to basic condition and most ethers are also much more acid stable. The most commonly used ethers for protecting purposes, the benzyl ethers, are in addition removable by catalytic hydrogenolysis under very mild, PH neutral, conditions. However, the strongly basic conditions most commonly used for the introduction of an ether protecting group and the lack of regioselectivity put certain restrictions on their use. The triphenylmethyl (trityl) ether group has also found use, especially in carbohydrate chemistry. The bulk

of this group gives it a strong preference for the primary hydroxyl group.

(iii) Assertion: Alkyl aryl ethers are cleaved at the alkyl-oxygen bond when reacted with hydrogen halides.

Reason: Aryl oxygen bond are more stable.

A. Assertion and reason both are correct statements and reason is correct explanation for assertion

B. Assertion and reason both are correct statements but reason is not correct

explanation for assertion.

C. Assertion is correct statement but reason is wrong statement.

D. Both assertion and reason are wrong.

Answer: A

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4. Read the passages given below and answer the following questions: Ether protecting groups are in many respects complimentary to

the acetals. Like the acetals they are stable to basic condition and most ethers are also much more acid stable. The most commonly used ethers for protecting purposes, the benzyl ethers, are in addition removable by catalytic hydrogenolysis under very mild, PH neutral, conditions. However, the strongly basic conditions most commonly used for the introduction of an ether protecting group and the lack of regioselectivity put certain restrictions on their use. The triphenylmethyl (trityl) ether group has also found use, especially in carbohydrate chemistry. The bulk

of this group gives it a strong preference for the primary hydroxyl group.

Assertion: Anisole undergoes bromination with bromine in absence of iron (III) bromide.

Reason: Iron (III) bromide is used to catalyse halogenation reaction of phenylalkyl ethers.

A. Assertion and reason both are correct statements and reason is correct explanation for assertion

B. Assertion and reason both are correct statements but reason is not correct

explanation for assertion.

C. Assertion is correct statement but reason is wrong statement.

D. Both assertion and reason are wrong.

Answer: B

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