31. Carboxylic Acids - Multiple Choice Questions

1. Preparation of Carboxylic acids and their Derivatives

1. $(CH_3)_2CO \xrightarrow[(HCl)]{NaCN} A \xrightarrow[\Delta]{H_3O^+} B$ In the above sequence of reactions, A and B are

(a) $(CH_3)_2C(OH)CN, (CH_3)_2C(OH)COOH$

(b) $(CH_3)_2C(OH)CN, (CH_3)_2C(OH)_2$

(c) $(CH_3)_2C(OH)CN, (CH_3)_2CHCOOH$

(d) $(CH_3)_2C(OH)CN, (CH_3)_2C=O$

2. The acid formed when propyl magnesium bromide is treated with carbon dioxide is

(a) C_3H_7COOH (b) C_2H_5COOH

(c) Both (a) and (b) (d) None of the above

3. Washing soap can be prepared by saponification with alkali of the oil

(a) Rose oil (b) Paraffin oil

(c) Groundnut oil (d) Kerosene

4. Identify the method by which Me_3CCO_2H can be prepared

(a) Treating 1 mol of $MeCOMe$ with 2 moles of $MeMgI$

(b) Treating 1 mol of $MeCO_2Me$ with 3 moles of $MeMgI$

(c) Treating 1 mol of $MeCHO$ with 3 moles of $MeMgI$

(d) Treating 1 mol of dry ice with 1 mol of Me_3CMgI

5. Urea is

(a) Monoacidic base (b) Diacidic base

(c) Neutral (d) Amphoteric

6. Rearrangement of an oxime to an amide in the presence of strong acid is called

(a) Curtius rearrangement (b) Fries rearrangement

(c) Beckmann rearrangement (d) Sandmeyer reaction

7. The silver salt of a fatty acid on refluxing with an alkyl halide gives an

(a) Acid (b) Ester

(c) Ether (d) Amine

8. In the preparation of an ester, the commonly used dehydrating agent is

(a) Phosphorus pentaoxide

(b) Anhydrous calcium carbide

(c) Anhydrous aluminium chloride

(d) Concentrated sulphuric acid

9. The reagent which does not give acid chloride on treating with a carboxylic acid is

(a) PCl_5 (b) Cl_2

(c) $SOCl_2$ (d) PCl_3

10. One of the products of the following reaction is

$$KCNO + (NH_4)_2SO_4 \xrightarrow{\Delta}$$

(a) NH_4NO_3 (b) NH_2CONH_2

(c) N_2 (d) NO_2

11. Tischenko reaction yields ester in the presence of catalyst which is

(a) $LiAlH_4$ (b) N-bromosuccinamide

(c) $Al(OC_2H_5)_3$ (d) $Zn-Hg/HCl$

12. Carboxylic acids react with diazomethane to form

(a) Amine (b) Alcohol

(c) Ester (d) Amide

13. The product D of the reaction

$$CH_3Cl \xrightarrow{KCN} (A) \xrightarrow{H_2O} (B) \xrightarrow{NH_3} (C) \xrightarrow{\Delta} (D)$$ is

(a) $CH_3CH_2NH_2$ (b) CH_3CN

(c) $HCONH_2$ (d) CH_3CONH_2

14. The reaction

$$RCOOH + N_3H \xrightarrow{conc.H_2SO_4} RNH_2 + CO_2 + N_2$$ is called

(a) Lossen reaction (b) Schmidt reaction

(c) Curtius reaction (d) Ullmann reaction

15. Compound $Ph-O-\overset{\overset{O}{\|}}{C}-Ph$ can be prepared by the reaction of .....

(a) Phenol and benzoic acid in the presence of $NaOH$

(b) Phenol and benzoyl chloride in the presence of pyridine

(c) Phenol and benzoyl chloride in the presence of $ZnCl_2$

(d) Phenol and benzaldehyde in the presence of palladium

16. Ethyl acetate is obtained when methyl magnesium iodide reacts with

(a) Ethyl formate (b) Ethyl chloroformate

(c) Acetyl chloride (d) Carbon dioxide

17. The major product in the following reaction at $25^{\circ}C$ is

$$CH_3COOH \xrightarrow{CH_3CH_2NH_2}$$

(a) $CH_3CONHCH_2CH_3$

(b) $CH_3CH = NCH_2CH_3$

(c) $NH_3^+CH_2CH_3.CH_3COO^-$

(d) $CH_3CON = CHCH_3$

2. Properties of Carboxylic Acids and their Derivatives

1. Which does not give silver mirror with ammonical $AgNO_3$

(a) $HCHO$ (b) CH_3CHO

(c) CH_3COOH (d) $HCOOH$

2. What is the main reason for the fact that carboxylic acids can undergo ionization

(a) Absence of α – hydrogen

(b) Resonance stabilisation of the carboxylate ion

(c) High reactivity of α – hydrogen

(d) Hydrogen bonding

3. Coconut oil upon alkaline hydrolysis gives

(a) Glycol (b) Alcohol

(c) Glycerol (d) Ethylene oxide

4. The main product of the following reaction is

$R-COOH + CH_2N_2 \rightarrow$ Product

(a) $R-CONH_2$ (b) $R-CN$

(c) $R-COOCH_3$ (d) $R-COONH_4$

5. CH_3COOH is reacted with $CH \equiv CH$ in presence of Hg^{++}, the product is

(a) $\begin{matrix} CH_3(OOCCH_3) \\ | \\ CH_2(OOCH_3) \end{matrix}$ (b) $\begin{matrix} CH_3 \\ | \\ CH_2-(OOC-CH_3) \end{matrix}$

(c) $\begin{matrix} CH_3 \\ | \\ CH(OOC-CH_3)_2 \end{matrix}$ (d) None of these

6. Hydrolysis of acetamide produces

(a) Acetic acid (b) Acetaldehyde

(c) Methylamine (d) Formic acid

7. Hydrolysis of an ester gives a carboxylic acid which on Kolbe's electrolysis yields ethane. The ester is

(a) Ethyl methonoate (b) Methyl ethanoate

(c) Propylamine (d) Ethylamine

8. On prolonged heating of ammonium cyanate or urea, we get

(a) N_2 (b) CO_2

(c) Biuret (d) Ammonium carbonate

9. The reaction

$$2CH_3-\underset{\underset{O}{||}}{C}-OC_2H_5 \xrightarrow{C_2H_5ONa}$$

$$CH_3-\underset{\underset{O}{||}}{C}-CH_2-\underset{\underset{O}{||}}{C}-OC_2H_5 + C_2H_5OH$$

is called

(a) Etard reaction (b) Perkin's reaction

(c) Claisen condensation (d) Claisen Schmidt reaction

10. Urea can be tested by

(a) Benedict test (b) Mulliken test

(c) Ninhydrin (d) Biuret test

11. Acetyl chloride is reduced with $LiAlH_4$, the product formed is

(a) Methyl alcohol (b) Ethyl alcohol

(c) Acetaldehyde (d) Acetone

12. Benedict's solution is not reduced by

(a) Formaldehyde (b) Acetaldehyde

(c) Glucose (d) Acetic anhydride

13. Acetamide is

(a) Highly acidic (b) Highly basic

(c) Neutral (d) Amphoteric

14. When acetamide is hydrolyzed by boiling with acid, the obtained product is

(a) Ethyl amine (b) Ethyl alcohol

(c) Acetic acid (d) Acetaldehyde

15. Which one of the following pairs gives effervescence with aq. $NaHCO_3$

$\underset{(I)}{CH_3COCl}$ $\underset{(II)}{CH_3COCH_3}$

$\underset{(III)}{CH_3COOCH_3}$ $\underset{(IV)}{CH_3COOCOCH_3}$

(a) I and II (b) I and IV

(c) II and III (d) I and III

16. Which of the following can reduce ester to alcohol

(a) $NaBH_4$ (b) Na / alcohol

(c) H_2 / Ni (d) $NaBH_3CN$

17. CH_3COOCH_3 + excess $PhMgBr \rightarrow$ product $\xrightarrow{H^+} X$

The product X is

(a) 1, 1-diphenylethanol (b) 1, 1-diphenylmethanol

(c) Methyl phenylethanol (d) Methyl phenylketone

18. Order of reactivity is

(a) $R-\overset{O}{\overset{\|}{C}}-X > RCONH_2 > RCOOCOR > RCOOR$

(b) $RCOX > RCOOCOR > RCOOR > RCONH_2$

(c) $RCOOR > RCONH_2 > RCOX > RCOOCOR$

(d) $RCOOCOR > RCOOR > RCOX > RCONH_2$

19. Order of hydrolysis for the following

(I) $RCOCl$ (II) $RCOOR$

(III) $RCONH_2$ (IV) $(RCO)_2O$

(a) I>IV>II>III (b) I>II>III>IV

(c) I>III>II>IV (d) IV>III>II>I

20. The reagent used for protection of amino group during the nitration of aniline is

(a) $SOCl_2$ / Pyridine (b) PCl_5

(c) Acetic acid (d) Acetic anhydride

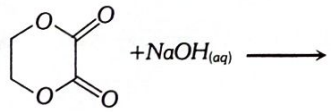
21. The order of decreasing rate of reaction with ammonia is

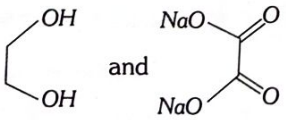
(a) Anhydrides, esters, ethers

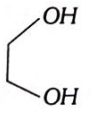
(b) Anhydrides, ethers, esters

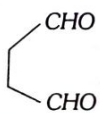
(c) Ethers, anhydrides, esters

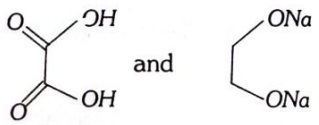
(d) Esters, ethers, anhydrides

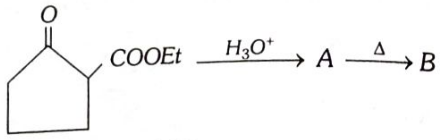
22.  $+NaOH_{(aq)} \longrightarrow$

(a) 

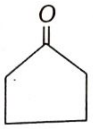
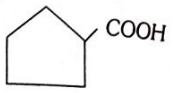
(b)  and $2CO_2$

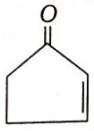
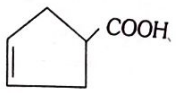
(c)  and Na_2CO_3

(d) 

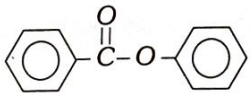
23. 

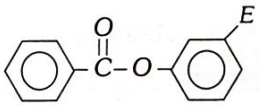
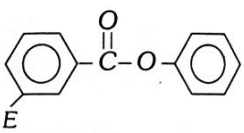
The compound B is

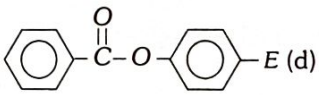
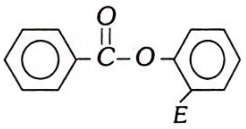
(a)  (b) 

(c)  (d) 

24. Find the major product (considering E as the electrophile) when the following substrate is subjected to electrophilic aromatic substitution



(a)  (b) 

(c)  (d) 

3. Formic Acid

1. Formaldehyde and formic acid can be distinguished using

(a) Tollen's reagent (b) Fehling solution

(c) Ferric chloride (d) Sodium bicarbonate

2. The gas evolved on heating alkali formate with sodalime is

(a) CO (b) CO_2

(c) Hydrogen (d) Water vapour

3. The reagent that can be used to distinguish between methanoic acid and ethanoic acid is

(a) Ammoniacal silver nitrate solution

(b) Neutral ferric chloride solution

(c) Sodium carbonate solution

(d) Phenolphthalein

4. Among formic acid, acetic acid, propanoic acid and phenol, the strongest acid in water is

(a) Formic acid (b) Acetic acid

(c) Propanoic acid (d) Phenol

4. Acetic Acid

1. $2CH_3COOH \xrightarrow[300^\circ C]{MnO} A$, product '$A$' in the reaction is

(a) CH_3CH_2CHO (b) CH_3-CH_2-OH

(c) CH_3COCH_3 (d) $CH_3-\overset{\overset{O}{\|}}{C}-O-\overset{\overset{O}{\|}}{C}-CH_3$

2. Acetic acid is weak acid than sulphuric acid because

(a) It decompose on increasing temperature

(b) It has less degree of ionisation

(c) It has – $COOH$ group

(d) None of these

3. Acetic acid dissolved in benzene shows a molecular mass of

(a) 30 (b) 60

(c) 120 (d) 240

4. $CH_3COOH \xrightarrow[P_2O_5]{\Delta} X$. Identify X

(a) CH_3COCH_3 (b) CH_3CHO

(c) $(CH_3CO)_2O$ (d) CH_4

5. In the reaction

$$CH_3COOH \xrightarrow{LiAlH_4} (A) \xrightarrow{I_2+NaOH} (B) \xrightarrow{Ag(dust)} (C)$$

the final product (C) is

(a) C_2H_5I (b) C_2H_5OH

(c) C_2H_2 (d) CH_3COCH_3

6. $CH_3COOH \xrightarrow{LiAlH_4} X \xrightarrow[300^\circ C]{Cu} Y \xrightarrow[NaOH]{dilute} Z$

In the above reaction Z is

(a) Aldol (b) Ketol

(c) Acetol (d) Butanol

7. What are A, B, C in the following reactions

(i) $(CH_3CO_2)_2Ca \xrightarrow{\Delta} A$

(ii) $CH_3CO_2H \xrightarrow[red\ P]{HI} B$

(iii) $2CH_3CO_2H \xrightarrow{P_4O_{10}} C$

	A	B	C
(a)	C_2H_6	CH_3COCH_3	$(CH_3CO)_2O$
(b)	$(CH_3CO)_2O$	C_2H_6	CH_3COCH_3
(c)	CH_3COCH_3	C_2H_6	$(CH_3CO)_2O$
(d)	CH_3COCH_3	$(CH_3CO)_2O$	C_2H_6

8. Reaction of 2–butene with acidic $KMnO_4$ gives

(a) CH_3CHO (b) $HCOOH$

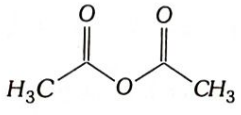
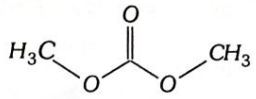
(c) CH_3CH_2OH (d) CH_3COOH

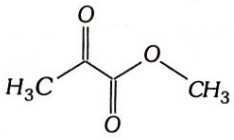
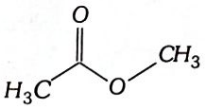
9. Acetic acid reacts with sodium metal at room temperature to produce

(a) CO_2 (b) H_2

(c) H_2O (d) CO

10. Which of the following is an anhydride

(a)  (b) 

(c)  (d) 

11. The acidity of compounds I–IV in water

I Ethanol

II Acetic acid

III Phenol

IV Acetonitrile

follows the order

(a) $IV < I < III < II$ (b) $I < II < III < IV$

(c) $IV < I < II < III$ (d) $IV < III < I < II$

5. Dicarboxylic Acids

1. Which is most soluble in water

(a) Oxalic acid (b) Ethyl chloride

(c) Ethyl bromide (d) n-Hexane

2. Oxalic acid on being heated upto $90^\circ C$ with conc. H_2SO_4 forms

(a) $HCOOH + CO_2$ (b) $CO_2 + H_2O$

(c) $CO_2 + CO + H_2O$ (d) $HCOOH + CO$

3. Sodium formate on heating gives

(a) Oxalic acid and H_2 (b) Sodium oxalate and H_2

(c) Sodium oxalate (d) CO_2 and caustic soda

4. Identify the product Y in the following reaction sequence

$$\begin{matrix} CH_2-CH_2-COO \\ | \\ CH_2-CH_2-COO \end{matrix} > Ca \xrightarrow{heat} X \xrightarrow[HCl,\ heat]{Zn-Hg} Y$$

(a) Pentane (b) Cyclobutane

(c) Cyclopentane (d) Cyclopentanone

6. Unsaturated & Cyclic acids

1. Which is the most suitable reagent for the following conversion

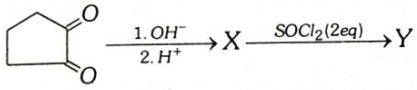
$$CH_3-CH=CH-CH_2-\overset{\overset{O}{\|}}{C}-CH_3 \rightarrow$$

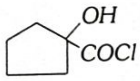
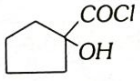
$$CH_3-CH=CH-CH_2-\overset{\overset{O}{\|}}{C}-OH$$

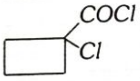
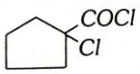
(a) Tollen's reagent (b) Benzoyl peroxide

(c) I_2 and $NaOH$ solution (d) Sn and $NaOH$ solution

2. In the following sequence of reaction find the product Y



(a)  (b) 

(c)  (d) 

7. Higher Fatty acids

1. Which one is not a glyceride

(a) Fat (b) Oil

(c) Phospholipid (d) Soaps

2. Hydrolytic reaction of fats with caustic soda is known as

(a) Esterification (b) Saponification

(c) Acetylation (d) Carboxylation

3. The reaction,

$$CH_3-\overset{\overset{O}{\|}}{C}-OCH_3+C_2H_5OH \xrightarrow{H^+ \text{ or } OH^-}$$

$CH_3-\overset{\overset{O}{\|}}{C}-OC_2H_5+CH_3OH$ is called

(a) Perkin's reaction (b) Claisen Schmidt reaction

(c) Esterification (d) Trans-esterification

4. Alkyl benzene sulphonates can be used as detergents in hard water, unlike soaps, as

(a) They are highly soluble in water

(b) Their Ca^{++}/Mg^{++} salts are water soluble

(c) They are non-ionic

(d) Their Ca^{++}/Mg^{++} salts are insoluble in water

5. Which one of the following statements is true

(a) Saponification of oil yields a diol

(b) Drying of oil involves hydrolysis

(c) Addition of antioxidation to oil minimizes rancidity

(d) Refining of oil involves hydrogenation

8. Substituted Carboxylic Acids

1. A tribasic acid is

(a) Oxalic acid (b) Tartaric acid

(c) Lactic acid (d) Citric acid

2. The reaction, $CH_3COOH+Cl_2 \xrightarrow{P} ClCH_2COOH+HCl$ is called

(a) Hell-Volhard-Zelinsky reaction

(b) Birch reaction

(c) Rosenmund reaction

(d) Hunsdiecker reaction

3. Lactic acid on heating with conc. H_2SO_4 gives

(a) Acetic acid (b) Propionic acid

(c) Acrylic acid (d) Formic acid

4. $CH_3CHO \xrightarrow{HCN} A \xrightarrow{HOH} B$. The product B is

(a) Malonic acid (b) Glycolic acid

(c) Lactic acid (d) Malic acid

5. Which reaction is used for the preparation of α-Bromoacetic acid

(a) Kolbe's reaction

(b) Reimer-Tiemann reaction

(c) Hell Volhard Zelinsky reaction

(d) Perkin's reaction

6. Lactic acid on oxidation by alkaline potassium permanganate gives

(a) Tartaric acid (b) Pyruvic acid

(c) Cinnamic acid (d) Propionic acid

7. Total number of configurational isomers of tartaric acid is

(a) 2 (b) 3

(c) 4 (d) 5

8. The correct order of increasing acidic strength is.....

(a) Phenol < ethanol < chloroacetic acid < acetic acid

(b) Ethanol < phenol < chloroacetic acid < acetic acid

(c) Ethanol < phenol < acetic acid < chloroacetic acid

(d) Chloroacetic acid < acetic acid < phenol < ethanol

9. Aromatic Carboxylic Acids

1. Which compound is known as oil of winter green

(a) Phenyl benzoate (b) Phenyl salicylate

(c) Phenyl acetate (d) Methyl salicylate

2. *o*-xylene when oxidised in presence of V_2O_5 the product is

(a) Benzoic acid (b) Phenyl acetic acid

(c) Phthalic acid (d) Acetic acid

3. Sulphonation of benzoic acid produces mainly

(a) *o*-sulphobenzoic acid

(b) *m*-sulphobenzoic acid

(c) *p*-sulphobenzoic acid

(d) *o*- and *p*-sulphobenzoic acid

4. Benzoic acid has higher molecular weight in benzene and less in water because

(a) Water has lower freezing point and higher boiling point than benzene

(b) It dissociates to a greater extent in benzene than in water

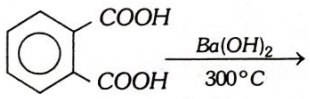
(c) It associates in water and dissociates in benzene

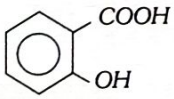
(d) It dissociates in water and associates in benzene

5. Nitration of benzoic acid gives

(a) 3-nitrobenzoic acid (b) 2-nitrobenzoic acid

(c) 2, 3-dinitrobenzoic acid (d) 2, 4-dinitrobenzoic acid

6. 

(a) 

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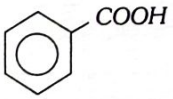
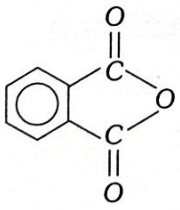
(c) 

(d) 

7. Treatment of benzoic acid with $Cl_2 / FeCl_3$ will give

(a) *p*-chlorobenzoic acid (b) *o*-chlorobenzoic acid

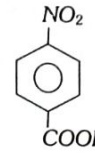
(c) 2, 4-dichlorobenzoic acid (d) *m*-chlorobenzoic acid

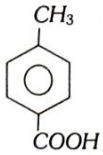
8. What happens when 2-hydroxy benzoic acid is distilled with zinc dust, it gives

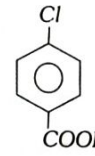
(a) Phenol (b) Benzoic acid

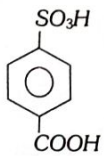
(c) Benzaldehyde (d) A polymeric compound

9. Which one among the following is weaker than benzoic acid

(a) 

(b) 

(c) 

(d) 

10. Which one is used as a food preservative

(a) Sodium acetate (b) Sodium propionate

(c) Sodium benzoate (d) Sodium oxalate

11. Which of these do not contain *–COOH* group

(a) Aspirin (b) Benzoic acid

(c) Picric acid (d) Salicylic acid

12. The carboxylic acid of least acidic strength among the following is

(a) *p*–nitrobenzoic acid (b) *p*–methylbenzoic acid

(c) *p*–chlorobenzoic acid (d) *p*–methoxybenzoic acid

13. What is IUPAC name for isophthalic acid

(a) Benzene – 1, 3 dicarboxylic acid

(b) Benzene – 1, 2 dicarboxylic acid

(c) Benzene – 1, 4 dicarboxylic acid

(d) Benzene – 1, 5 dicarboxylic acid

14. Which of the following does not give benzoic acid on hydrolysis

(a) Phenyl cyanide (b) Benzoyl chloride

(c) Benzyl chloride (d) Methyl benzoate

15. Salicylic acid is prepared from phenol by

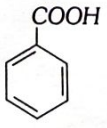
(a) Reimer Tiemann reaction

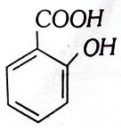
(b) Kolbe's reaction

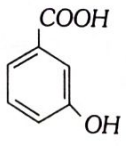
(c) Kolbe-electrolysis reaction

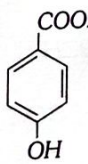
(d) None of these

16. Which of the following aromatic acids is most acidic

(a) 

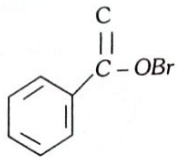
(b) 

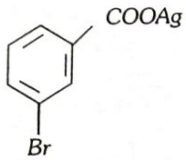
(c) 

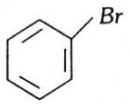
(d) 

17. Silver benzoate reacts with bromine to form

(a) 

(b) 

(c) 

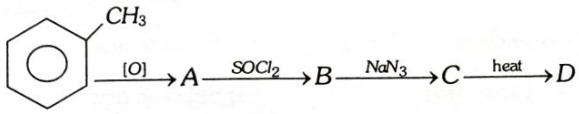
(d) 

18. $C_6H_5^{14}COOH$ on heating with Na_2CO_3 releases

(a) CO_2 (b) $^{14}CO_2$

(c) CO (d) None of these

19. In the following sequence of reactions, what is D



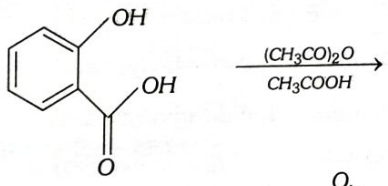
(a) Primary amine

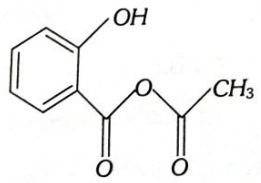
(b) An amide

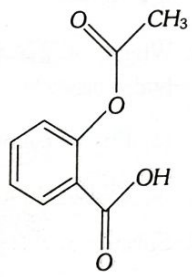
(c) Phenyl isocyanate

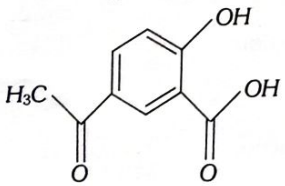
(d) A chain lengthened hydrocarbon

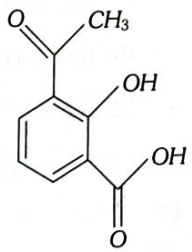
20. The major product in the following reaction is



(a) 

(b) 

(c) 

(d) 

10. Different Carboxylic Acids

1. Which decolourises the colour of acidic $KMnO_4$

(a) CH_3COOH (b) CH_3CH_2COOH

(c) $COOH.COOH$ (d) $CH_3COOC_2H_5$

2. Colouration of Br_2/CCl_4 will be discharged by

(a) Cinnamic acid (b) Benzoic acid

(c) o-phthalic acid (d) Acetophenone

3. The correct order of acidic strength of the carboxylic acids is

(a) Formic acid < benzoic acid < acetic acid

(b) Formic acid < acetic acid < benzoic acid

(c) Acetic acid < formic acid < benzoic acid

(d) Acetic acid < benzoic acid < formic acid

4. An organic compound of molecular formula $C_4H_{10}O$ does not react with sodium. With excess of HI it gives only one type of alkyl halide. The compound is

(a) Ethoxyethane (b) 2-methoxypropane

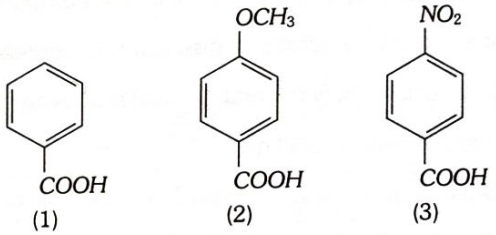
(c) 1-methoxypropane (d) 1-butanol

5. Which of the following has the most acidic proton

(a) CH_3COCH_3 (b) $(CH_3)_2C=CH_2$

(c) $CH_3COCH_2COCH_3$ (d) $(CH_3CO)_3CH$

6. The correct order of acidity of the following compounds is



(1) (2) (3)

(a) 1 > 2 > 3 (b) 1 > 3 > 2

(c) 3 > 1 > 2 (d) 3 > 2 > 1

7. The gas released when baking soda is mixed with vinegar, is

(a) CO (b) CO_2

(c) CH_4 (d) O_2

8. The major products obtained in the reaction of oxalic acid with conc. H_2SO_4 upon heating are

(a) CO, CO_2, H_2O (b) CO, SO_2, H_2O

(c) H_2S, CO, H_2O (d) $HCOOH, H_2S, CO$

11. IIT-JEE/ AIEEE

1. The general formulas $C_nH_{2n}O_2$ could be for open chain **[2003]**

(a) Diketones (b) Carboxylic acids

(c) Diols (d) Dialdehydes

2. How will you convert butan-2-one to propanoic acid **[2005]**

(a) Tollen's reagent (b) Fehling's solution

(c) $NaOH/I_2/H^+$ (d) $NaOH/NaI/H^+$

3. A liquid was mixed with ethanol and a drop of concentrated H_2SO_4 was added. A compound with a fruity smell was formed. The liquid was **[2009]**

(a) CH_3OH (b) $HCHO$

(c) CH_3COCH_3 (d) CH_3COOH

4. Among the following acids which has the lowest pKa value **[2005]**

(a) CH_3COOH (b) $HCOOH$

(c) $(CH_3)_2CH-COOH$ (d) CH_3CH_2COOH

5. When propionic acid is treated with aqueous sodium bicarbonate, CO_2 is liberated. The 'C' of CO_2 comes from **[1999]**

(a) Methyl group (b) Carboxylic acid group

(c) Methylene group (d) Bicarbonate

6. Identify the correct order of boiling points of the following compounds

$\underset{(1)}{CH_3CH_2CH_2CH_2OH}$, $\underset{(2)}{CH_3CH_2CH_2CHO}$,

$\underset{(3)}{CH_3CH_2CH_2COOH}$ **[2002]**

(a) 1>2>3 (b) 3>1>2

(c) 1>3>2 (d) 3>2>1

7. $CH_3CH_2COOH \xrightarrow{Cl_2/Fe} X \xrightarrow[KOH]{\text{Alcoholic}} Y$

Compound Y is **[2002]**

(a) CH_3CH_2OH (b) CH_3CH_2CN

(c) $CH_2=CHCOOH$ (d) $CH_3CHClCOOH$

8. Reaction of ethyl formate with excess of CH_3MgI followed by hydrolysis gives **[1992]**

(a) n-propyl alcohol (b) Ethanal

(c) Propanal (d) Isopropyl alcohol

9. What are the organic products formed in the following reaction

$C_6H_5-COO-CH_3 \xrightarrow[2.H_2O]{1.LiAlH_4}$ **[1995]**

(a) C_6H_5-COOH and CH_4

(b) $C_6H_5-CH_2-OH$ and CH_4

(c) $C_6H_5-CH_3$ and CH_3-OH

(d) $C_6H_5-CH_2-OH$ and CH_3-OH

10. On mixing ethyl acetate with aqueous sodium chloride, the composition of the resultant solution is **[2004]**

(a) $CH_3COCl+C_2H_5OH+NaOH$

(b) $CH_3COONa+C_2H_5OH$

(c) $CH_3COOC_2H_5+NaCl$

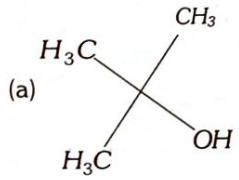
(d) $CH_3Cl+C_2H_5COONa$

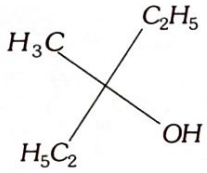
11. An organic compound A upon reacting with NH_3 gives B. On heating B gives C. C in presence of KOH reacts with Br_2 to given $CH_3CH_2NH_2$. A is **[2013]**

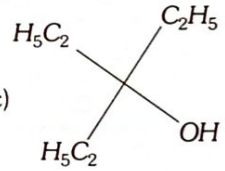
(a) CH_3COOH (b) $CH_3CH_2CH_2COOH$

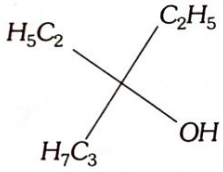
(c) $CH_3-\underset{\displaystyle CH_3}{\underset{|}{C}}H-COOH$ (d) CH_3CH_2COOH

12. Ethyl ester $\xrightarrow[\text{excess}]{CH_3MgBr} P$. The product P will be **[2003]**

(a) 

(b) 

(c) 

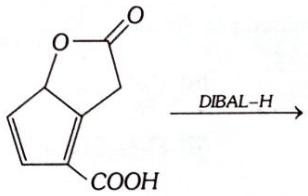
(d) 

13. Sodium ethoxide has reacted with ethanol chloride. The compound that is produced in the above reaction is **[2011]**

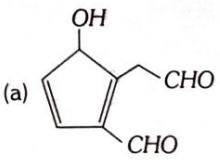
(a) Diethyl ether (b) 2-butanone

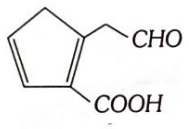
(c) Ethyl chloride (d) Ethyl ethanoate

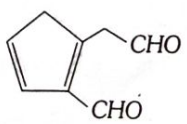
14. The major product obtained in the following reaction is

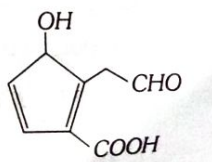


[2017]

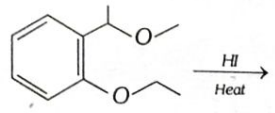
(a) 

(b) 

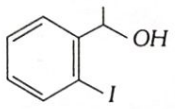
(c) 

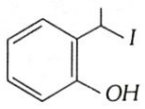
(d) 

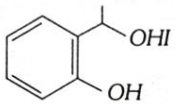
15. The major product formed in the following reaction is

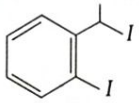


[2018]

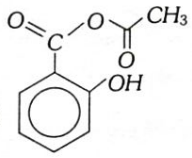
(a) 

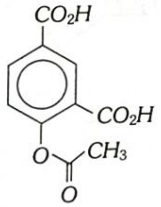
(b) 

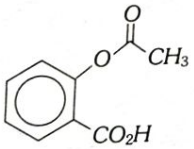
(c) 

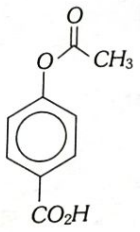
(d) 

16. Phenol on treatment with CO_2 in the presence of $NaOH$ followed by acidification produces compound X as the major product. X on treatment with $(CH_3CO)_2O$ in the presence of catalytic amount of H_2SO_4 produces **[2018]**

(a) 

(b) 

(c) 

(d) 

17. Sodium salt of an organic acid 'X' produces effervescence with conc. H_2SO_4. 'X' reacts with the acidified aqueous $CaCl_2$ solution to give a white precipitate which decolourises acidic solution of $KMnO_4$. 'X' is **[2017]**

(a) $HCOONa$ (b) CH_3COONa

(c) $Na_2C_2O_4$ (d) C_6H_5COONa

18. The compound not soluble in acetic acid is **[1986]**

(a) $CaCO_3$ (b) CaO

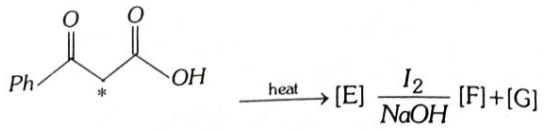
(c) CaC_2O_4 (d) $Ca(OH)_2$

19. When $CH_2 = CH - COOH$ is reduced with $LiAlH_4$, the compound obtained will be **[2003]**

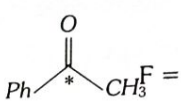
(a) $CH_3 - CH_2 - COOH$ (b) $CH_2 = CH - CH_2OH$

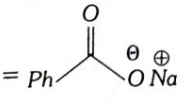
(c) $CH_3 - CH_2 - CH_2OH$ (d) $CH_3 - CH_2 - CHO$

20. In the following reaction sequence the correct structures of E, F and G are

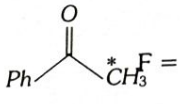


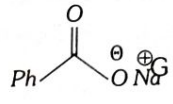
(* implies ^{13}C labelled carbon) **[2008]**

(a) E = 

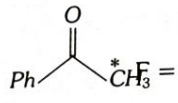
= 

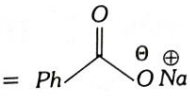
G = CHI_3

(b) E = 

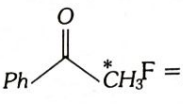
= 

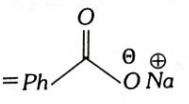
G = CHI_3

(c) E = 

= 

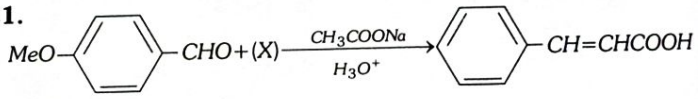
G = $\overset{*}{C}HI_3$

(d) E = 

= 

G = $\overset{*}{C}H_3I$

21.

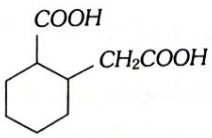


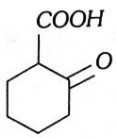
The compound (X) is **[2005]**

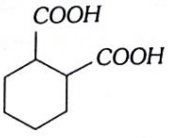
(a) CH_3COOH (b) $BrCH_2 - COOH$

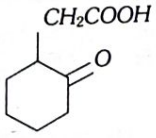
(c) $(CH_3CO)_2O$ (d) $CHO - COOH$

22. The compound that undergoes decarboxylation most readily under mild condition is **[2012]**

(a) 

(b) 

(c) 

(d) 

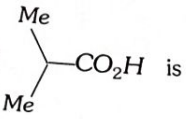
23. Which of the following acids has the smallest dissociation constant **[2002]**

(a) $CH_3CHFCOOH$ (b) FCH_2CH_2COOH

(c) $BrCH_2CH_2COOH$ (d) $CH_3CHBrCOOH$

24. The correct order of increasing acid strength of the compounds

(A) CH_3CO_2H (B) $MeOCH_2CO_2H$

(C) CF_3CO_2H (D)  is

[2006]

(a) B < D > A > C (b) D < A < C < B

(c) D < A < B < C (d) A < D < C < B

25. The strongest acid amongst the following compounds is **[2011]**

(a) CH_3COOH (b) $HCOOH$

(c) $CH_3CH_2CH(Cl)CO_2H$ (d) $ClCH_2CH_2CH_2COOH$

26. The carboxyl functional group (–*COOH*) is present in **[2012]**

(a) Picric acid (b) Barbituric acid

(c) Ascorbic acid (d) Aspirin

27. The major product obtained on interaction of phenol with sodium hydroxide and carbon dioxide is **[2009]**

(a) Benzoic acid (b) Salicylaldehyde

(c) Salicylic acid (d) Phthalic acid

28. Consider the acidity of the carboxylic acids

(1) $PhCOOH$ (2) $o-NO_2C_6H_4COOH$

(3) $p-NO_2C_6H_4COOH$ (4) $m-NO_2C_6H_4COOH$

Which of the following order is correct **[2004]**

(a) 2 > 4 > 1 > 3 (b) 2 > 4 > 3 > 1

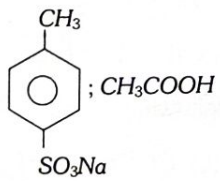
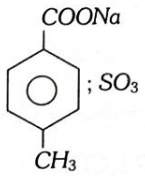
(c) 1 > 2 > 3 > 4 (d) 2 > 3 > 4 > 1

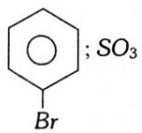
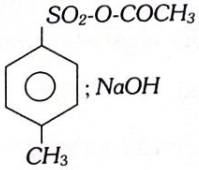
29. Benzoyl chloride is prepared from benzoic acid by **[2000]**

(a) Cl_2, $h\nu$ (b) SO_2Cl_2

(c) $SOCl_2$ (d) Cl_2, H_2O

30. 4-methyl benzene sulphonic acid reacts with sodium acetate to give **[2005]**

(a)  (b) 

(c)  (d) 

31. Among the following compounds, the most acidic is **[2011]**

(a) p-nitrophenol (b) p-hydroxybenzoic acid

(c) o-hydroxybenzoic acid (d) p-toluic acid

12. NEET/ AIPMT/ CBSE-PMT

1. $C_2H_2 \xrightarrow[H_2SO_4]{HgOH\ 1\%} A \xrightarrow{[O]} B$, B is **[1991]**

(a) An acid (b) An aldehyde

(c) A ketone (d) Ethanol

2. Which reagent will bring about the conversion of carboxylic acids into esters **[2000]**

(a) C_2H_5OH (b) Dry $HCl + C_2H_5OH$

(c) $LiAlH_4$ (d) $Al(OC_2H_5)_3$

3. An acyl halide is formed when PCl_5 reacts with an **[1994; 2002]**

(a) Acid (b) Alcohol

(c) Amide (d) Ester

4. Which of the following reactions is appropriate for converting acetamide to methanamine **[2017]**

(a) Carbylamine reaction

(b) Hoffmann hypobromamide reaction

(c) Stephens reaction

(d) Gabriels phthalimide synthesis

5. Which of the following compounds will react with $NaHCO_3$ solution to give sodium salt and carbon dioxide **[1999]**

(a) Phenol (b) *n*-hexanol

(c) Acetic acid (d) Both (a) and (b)

6. Which one of the following orders of acid strength is correct **[2003]**

(a) $RCOOH > HC \equiv CH > HOH > ROH$

(b) $RCOOH > ROH > HOH > HC \equiv CH$

(c) $RCOOH > HOH > ROH > HC \equiv CH$

(d) $RCOOH > HOH > HC \equiv CH > ROH$

7. The *OH* group of an alcohol or the –*COOH* group of a carboxylic acid can be replaced by –*Cl* using **[2004]**

(a) Chlorine

(b) Hydrochloric acid

(c) Phosphorus pentachloride

(d) Hypochlorous acid

8. $RCOOH \longrightarrow RCH_2OH$

This mode of reduction of an acid to alcohol can be affected only by **[1989]**

(a) Zn/HCl

(b) Na -alcohol

(c) Aluminium isopropoxide and isopropyl alcohol

(d) $LiAlH_4$

9. Which of the following esters cannot undergo Claisen self condensation **[1998]**

(a) $CH_3-CH_2-CH_2-CH_2-COOC_2H_5$

(b) $C_6H_5COOC_2H_5$

(c) $C_6H_5CH_2COOC_2H_5$

(d) $C_6H_{11}CH_2COOC_2H_5$

10. Self condensation of two moles of ethyl acetate in presence of sodium ethoxide yields **[2006]**

(a) Methyl acetoacetate (b) Ethyl propionate

(c) Ethyl butyrate (d) Acetoacetic ester

11. Among the given compounds, the most susceptible to nucleophilic attack at the carbonyl group is **[2010]**

(a) CH_3COCl (b) CH_3COOCH_3

(c) CH_3CONH_2 (d) $CH_3COOCOCH_3$

12. What will happen if $LiAlH_4$ is added to an ester **[2000]**

(a) Two units of alcohol are obtained

(b) One unit of alcohol and one unit of acid is obtained

(c) Two units of acids are obtained

(d) None of these

13. Which one of the following orders is wrong with respect to the property indicated **[1994]**

(a) Formic acid > acetic acid > propanoic acid (acid strength)

(b) Fluoroacetic acid > chloroacetic acid > bromoacetic acid (acid strength)

(c) Benzoic acid > phenol > cyclohexanol (acid strength)

(d) Aniline > cyclohexylamine > benzamide (basic strength)

14. In a set of reactions propionic acid yielded a compound D

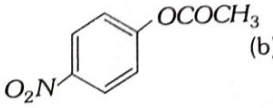
$$CH_3CH_2COOH \xrightarrow{SOCl_2} B \xrightarrow{NH_3} C \xrightarrow[Br_2]{KOH} D$$

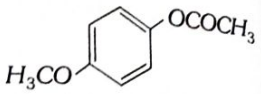
The structure of D would be **[2006]**

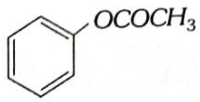
(a) $CH_3CH_2NHCH_3$ (b) $CH_3CH_2NH_2$

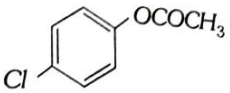
(c) $CH_3CH_2CH_2NH_2$ (d) $CH_3CH_2CONH_2$

15. Which one of the following esters gets hydrolysed most easily under alkaline conditions **[2015]**

(a) 

(b) 

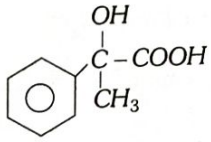
(c) 

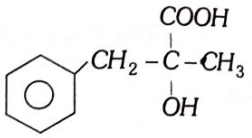
(d) 

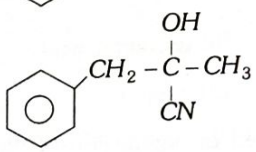
16. In a set reactions acid yielded a product D

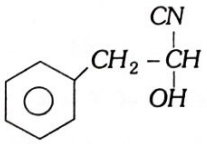
$$CH_3COOH \xrightarrow{SOCl_2} A \xrightarrow[Anhr.AlCl_3]{Benzene} B \xrightarrow{HCN} C \xrightarrow{HOH} D$$

[2005]

(a) 

(b) 

(c) 

(d) 

17. In a set of the given reactions, acetic acid yielded a product C

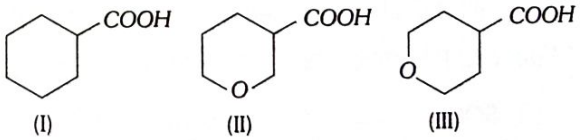
$$CH_3COOH + PCl_5 \rightarrow A \xrightarrow[anh.\,AlCl_3]{C_6H_6} B \xrightarrow[ether]{C_2H_5MgBr} C$$

Product C would be **[2003]**

(a) $CH_3-\overset{C_2H_5}{\underset{}{C}}(OH)C_6H_5$ (b) $CH_3CH(OH)C_2H_5$

(c) $CH_3COC_6H_5$ (d) $CH_3CH(OH)C_6H_5$

18. The correct order of strengths of the carboxylic acids



(I) (II) (III)

is **[2016]**

(a) II > I > III (b) I > II > III

(c) II > III > I (d) III > II > I

19. The weakest acid among the following is **[1991]**

(a) CH_3COOH (b) $Cl_2CHCOOH$

(c) $ClCH_2COOH$ (d) Cl_3CCOOH

20. Strongest acid among the following is **[1992]**

(a) CF_3COOH (b) CBr_3COOH

(c) CH_3COOH (d) CCl_3COOH

21. The correct order of decreasing acid strength of trichloroacetic acid (A), trifluoroacetic acid (B), acetic acid (C) and formic acid (D) is **[2012]**

(a) $B > A > D > C$ (b) $B > D > C > A$

(c) $A > B > C > D$ (d) $A > C > B > D$

22. Propionic acid with Br_2 / P yields a dibromo product. Its structure would be **[2009]**

(a) $CH_2Br - CHBr - COOH$

(b) $H-\underset{\underset{Br}{|}}{\overset{\overset{Br}{|}}{C}}-CH_2COOH$

(c) $CH_2Br - CH_2 - COBr$

(d) $CH_3-\underset{\underset{Br}{|}}{\overset{\overset{Br}{|}}{C}}-COOH$

23. Which compound is known as oil of winter green **[1998]**

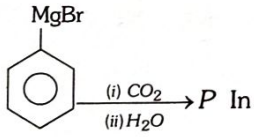
(a) Phenyl benzoate (b) Phenyl salicylate

(c) Phenyl acetate (d) Methyl salicylate

24. Benzoic acid gives benzene on being heated with X and phenol gives benzene on being heated with Y. Therefore, X and Y are respectively **[1992]**

(a) Sodalime and copper (b) Zn dust and $NaOH$

(c) Zn dust and sodalime (d) Sodalime and zinc dust

25. 

P In the reaction, product P is **[2002]**

(a) 

(b) 

(c) 

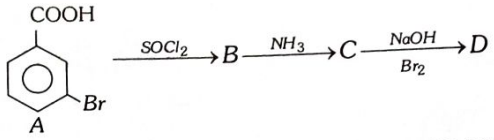
(d) $C_6H_5-\overset{\overset{O}{\|}}{C}-C_6H_5$

26. Oxidation of toluene with CrO_3 in the presence of $(CH_3CO)_2O$ gives a product 'A' which on treatment with aqueous $NaOH$ produces **[1995]**

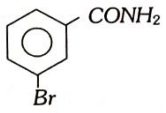
(a) C_6H_5CHO (b) $(C_6H_5CO)_2O$

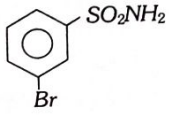
(c) C_6H_5COONa (d) 2, 4-diacetyl toluene

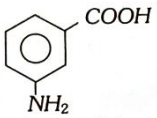
27. In a set of reactions m-bromobenzoic acid gave a product D. Identify the product D

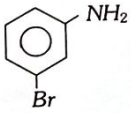


[2011]

(a) 

(b) 

(c) 

(d) 

28. Carboxylic acid has higher boiling points than aldehydes, ketones and even alcohols of comparable molecular mass. It is due to their **[2018]**

(a) Formation of intramolecular H – bonding

(b) Formation of carboxylate ion

(c) More extensive association of carboxylic acid via vander Waal's force of attraction

(d) Formation of intermolecular H – bonding

13. AIIMS

1. $R-CH_2-CH_2OH$ can be converted into RCH_2CH_2COOH. The correct sequence of the reagents is **[1997]**

(a) PBr_3, KCN, H_3O^+ (b) PBr_3, KCN, H_2

(c) HCN, PBr_3, H^+ (d) KCN, H^+

2. Acid hydrolysis of which of the following compounds yields two different organic compounds **[2008]**

(a) CH_3COOH (b) CH_3CONH_2

(c) $CH_3COOC_2H_5$ (d) $(CH_3CO)_2O$

3. Methyl acetate and ethyl acetate can be distinguished by **[2007]**

(a) Hot alkaline $KMnO_4$ (b) Neutral $FeCl_3$

(c) Iodoform test (d) None of the above

4. Melting points are normally the highest for **[2004]**

(a) Tertiary amides

(b) Secondary amides

(c) Primary amides

(d) Amines

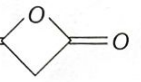
5. $C_6H_5CONHCH_3$ can be converted into $C_6H_5CH_2NHCH_3$ by **[2005]**

(a) $NaBH_4$ (b) H_2-Pd/C

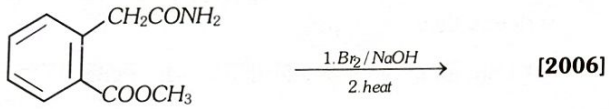
(c) $LiAlH_4$ (d) $Zn-Hg/HCl$

6. $CH_3CO_2C_2H_5$ on reaction with sodium ethoxide in ethanol gives *A*, which on heating in the presence of acid gives *B*. compound *B* is **[2005]**

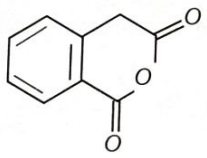
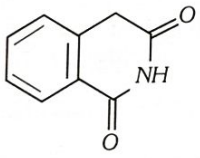
(a) CH_3COCH_2COOH (b) CH_3COCH_3

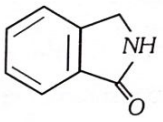
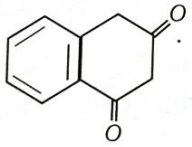
(c)  (d) $CH_2=C<^{OC_2H_5}_{OC_2H_5}$

7. The following sequence of reactions of A gives



[2006]

(a)  (b) 

(c)  (d) 

8. The reaction of *HCOOH* with conc. H_2SO_4 gives **[2000]**

(a) CO_2 (b) CO

(c) Oxalic acid (d) Acetic acid

9. The product obtained when acetic acid is treated with phosphorus trichloride is **[1998]**

(a) $CH_3COOPCl_3$ (b) CH_3COOCl

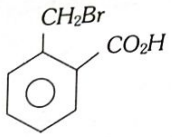
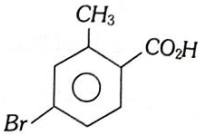
(c) CH_3COCl (d) $ClCH_2COOH$

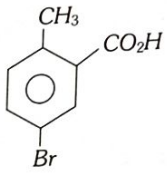
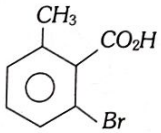
10. Which of the following would be expected to be most highly ionised in water **[1982]**

(a) $CH_2ClCH_2CH_2COOH$ (b) $CH_3CHCl.CH_2.COOH$

(c) $CH_3.CH_2.CCl_2.COOH$ (d) $CH_3.CH_2.CHCl.COOH$

11. *o*-Toluic acid on reaction with Br_2+Fe, gives **[2004]**

(a)  (b) 

(c)  (d) 

12. The *ortho/para* directing group among the following is **[2003]**

(a) $COOH$ (b) CN

(c) $COCH_3$ (d) $NHCOCH_3$

13. Which of the following does not exist as a Zwitter ion **[2007]**

(a) Glycine (b) Glutamic acid

(c) Sulphanilic acid (d) *p*–aminobenzoic acid

14. Assertion and Reason

1. Assertion : Carboxylic acids have higher boiling points than alkanes.

Reason : Carboxylic acids are resonance hybrids.

2. Assertion : Both formic acid and oxalic acid decolourize $KMnO_4$ solution.

Reason : Both are easily oxidised to CO_2 and H_2O.

3. Assertion : *cis*-3-chloroprop-2-enoic acid is less stable than its *trans*-form.

Reason : Dipole moment of *cis*-form is greater than *trans*-form. **[AIIMS 2015]**

31. Carboxylic Acids – Answers Keys

1. Preparation of Carboxylic acids and their derivatives

1	a	2	a	3	c	4	d	5	a
6	c	7	b	8	d	9	b	10	b
11	c	12	c	13	d	14	b	15	b
16	b	17	c						

2. Properties of Carboxylic acids and their derivatives

1	c	2	b	3	c	4	c	5	c
6	a	7	b	8	c	9	c	10	d
11	b	12	d	13	d	14	c	15	b
16	b	17	a	18	b	19	a	20	d
21	a	22	a	23	a	24	c		

3. Formic acid

1	d	2	c	3	a	4	a		

4. Acetic Acid

1	c	2	b	3	c	4	c	5	c
6	a	7	c	8	d	9	b	10	a
11	a								

5. Dicarboxylic Acids

1	a	2	c	3	b	4	c		

6. Unsaturated & Cyclic acids

1	c	2	c						

7. Higher Fatty acids

1	d	2	b	3	d	4	b	5	c

8. Substituted Carboxylic Acids

1	d	2	a	3	c	4	c	5	c
6	b	7	b	8	c				

9. Aromatic Carboxylic Acids

1	d	2	c	3	b	4	d	5	a
6	c	7	d	8	b	9	b	10	c
11	c	12	d	13	a	14	c	15	a
16	b	17	d	18	a	19	c	20	b

10. Different Carboxylic Acids

1	c	2	a	3	d	4	a	5	d
6	c	7	b	8	a				

11. IIT-JEE/ AIEEE

1	b	2	c	3	d	4	b	5	d
6	b	7	c	8	d	9	d	10	c
11	d	12	a	13	d	14	a	15	b
16	c	17	c	18	c	19	b	20	d
21	c	22	b	23	c	24	c	25	c
26	d	27	c	28	d	29	c	30	a
31	c								

12. NEET/ AIPMT/ CBSE-PMT

1	a	2	b	3	a	4	b	5	c
6	c	7	c	8	d	9	b	10	d
11	a	12	a	13	d	14	b	15	a
16	a	17	a	18	c	19	a	20	a
21	a	22	d	23	d	24	d	25	b
26	c	27	d	28	d				

13. AIIMS

1	a	2	c	3	c	4	c	5	d
6	c	7	c	8	b	9	c	10	c
11	c	12	d	13	d				

14. Assertion and Reason

1	b	2	a	3	b				