

# SAMPLE CONTENT



MHT-CET

TRIUMPH

# CHEMISTRY

## MULTIPLE CHOICE QUESTIONS

BASED ON STD. XI & XII SYLLABUS OF MHT-CET

A chameleon basks in the sun. As its body temperature increases, the chemical reactions of its metabolism speed up!



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Written in accordance with the latest MHT-CET Paper Pattern which includes topics based on Std. XII Sc. and relevant chapters of Std. XI Sc. (Maharashtra State Board)

# MHT-CET TRIUMPH CHEMISTRY MULTIPLE CHOICE QUESTIONS

Based on Std. XI & XII Syllabus of MHT-CET

## Salient Features

- ☞ Includes chapters of Std. XII and relevant chapters of Std. XI as per latest MHT-CET Syllabus
- ☞ Exhaustive subtopic wise coverage of MCQs
- ☞ Quick Review provided for all the chapters
- ☞ Important Formulae and Shortcuts provided for relevant chapters
- ☞ Exhaustive coverage of various competitive exam questions
- ☞ Includes MCQs from JEE (Main), NEET (UG) 2015, 2016 and 2017
- ☞ Includes MCQs upto MHT-CET 2018
- ☞ Includes MHT-CET 2019 Question paper (6<sup>th</sup> May, Afternoon) along with Answer Key.
- ☞ Evaluation Test provided at the end of each chapter
- ☞ Two Model Question Papers with answers provided at the end of the book

Scan the adjacent QR code or visit [www.targetpublications.org/tp12760](http://www.targetpublications.org/tp12760) to download Hints for relevant questions, Evaluation Test and MHT-CET 2019 Question Paper in PDF format.



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## Preface

“**Triumph Chemistry**” is a complete and thorough guide to prepare students for MHT-CET examination. The content of this book is based on the Maharashtra State Board Syllabus. This book includes chapters of Std. XII Sc. and selected chapters of Std. XI Sc. curriculum as per latest MHT-CET Paper Pattern. **Quick Review** which summarizes the important concepts of the entire chapter is provided for all the chapters. **Formulae** that form a vital part of MCQ solving are provided for relevant chapters.

MCQs in each chapter are divided into three sections:

- ☉ **Classical Thinking**: consists of straight forward questions including knowledge based questions.
- ☉ **Critical Thinking**: consists of questions that require understanding of the concept.
- ☉ **Competitive Thinking**: consists of questions from various competitive examinations like JEE, NEET (UG), MHT CET, KCET, GUJ CET, AP-EAMCET (Engineering, Medical), TS-EAMCET (Engineering, Medical), Assam CEE, BCECE, WB JEE, etc.

Additional chapter **Organic Reaction** has been provided which includes MCQs based on various organic chemistry concepts.

An **Evaluation Test** has been provided at the end of each chapter and two **Model Question Papers** (as per MHT CET pattern) to assess the level of preparation of the student on a competitive level.

**MHT-CET 2019** Question Paper (6<sup>th</sup> May, Afternoon) along with Answer Key have been included.

**Hints** have been provided in downloadable format to relevant MCQs, evaluation test and MHT-CET 2019 Question Paper.

In order to understand how chemistry plays an important role in our day to day life, we have made an attempt to illustrate the same in the form of images/visuals in the related chapters.

The journey to create a complete book is strewn with triumphs, failures and near misses. If you think we've nearly missed something or want to applaud us for our triumphs, we'd love to hear from you.

Please write to us at : [mail@targetpublications.org](mailto:mail@targetpublications.org)

*Best of luck to all the aspirants!*

Yours faithfully

Authors

**Edition:** First

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This work is purely inspired upon the course work as prescribed by the Maharashtra State Board of Secondary and Higher Secondary Education, Pune. Every care has been taken in the publication of this reference book by the Authors while creating the contents. The Authors and the Publishers shall not be responsible for any loss or damages caused to any person on account of errors or omissions which might have crept in or disagreement of any third party on the point of view expressed in the reference book.

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## MHT-CET PAPER PATTERN

- There will be three papers of Multiple Choice Questions (MCQs) in 'Mathematics', 'Physics and Chemistry' and 'Biology' of 100 marks each.
- Duration of each paper will be 90 minutes.
- Questions will be based on the syllabus prescribed by Maharashtra State Board of Secondary and Higher Secondary Education with approximately 20% weightage given to Std. XI and 80% weightage will be given to Std. XII curriculum.
- Difficulty level of questions will be at par with JEE (Main) for Mathematics, Physics, Chemistry and at par with NEET for Biology.
- There will be no negative marking.
- Questions will be mainly application based.
- Details of the papers are as given below:

Paper	Subject	Approximate No. of Multiple Choice Questions (MCQs) based on		Mark(s) Per Question	Total Marks
		Std. XI	Std. XII		
Paper I	Mathematics	10	40	2	100
Paper II	Physics	10	40	1	100
	Chemistry	10	40		
Paper III	Biology (Botany)	10	40	1	100
	Biology (Zoology)	10	40		

- Questions will be set on
  - i. the entire syllabus of Physics, Chemistry, Mathematics and Biology subjects of Std. XII, and
  - ii. chapters / units from Std. XI curriculum as mentioned below:

Sr. No.	Subject	Chapters / Units of Std. XI
1	Physics	Measurements, Scalars and Vectors, Force, Friction in solids and liquids, Refraction of Light, Ray optics, Magnetic effect of electric current, Magnetism.
2	Chemistry	Some basic concepts of chemistry, States of matter: Gases and liquids, Redox reactions, Surface chemistry, Nature of chemical bond, Hydrogen, s-Block elements (Alkali and alkaline earth metals), Basic principles and techniques in organic chemistry, Alkanes.
3	Mathematics	Trigonometric functions, Trigonometric functions of Compound Angles, Factorization Formulae, Straight Line, Circle and Conics, Sets, Relations and Functions, Probability, Sequences and series.
4	Biology	
	Section I – Botany	Diversity in organisms, Biochemistry of cell, Plant Water Relations and Mineral Nutrition, Plant Growth and Development.
	Section II – Zoology	Organization of Cell, Animal tissues, Human Nutrition, Human Respiration.

# CONTENT

Sr. No.	Textbook Chapter No.	Chapter Name	Page No.
<b>Std. XI</b>			
1	1	Some Basic Concepts of Chemistry	1
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4	7	Surface Chemistry	46
5	8	Nature of Chemical Bond	61
6	9	Hydrogen	80
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12	3	Chemical Thermodynamics and Energetics	191
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**Note:** Questions of standard XI are indicated by “\*” in each Model Question Paper.

### Subtopics

- 12.0 Introduction
- 12.1 Structure of carbonyl functional group
- 12.2 Aldehydes and ketones
- 12.3 Nomenclature of aldehydes and ketones
- 12.4 Methods of preparation of aldehydes and ketones
- 12.5 Physical properties of aldehydes and ketones
- 12.6 Chemical properties of aldehydes and ketones
- 12.7 Uses of aldehydes and ketones
- 12.8 Carboxylic acids
- 12.9 Nomenclature of carboxylic acids
- 12.10 Structure of carboxyl group
- 12.11 Methods of preparation of carboxylic acids
- 12.12 Physical properties of carboxylic acids
- 12.13 Chemical properties of carboxylic acids
- 12.14 Uses of carboxylic acids

#### How does nail polish remover work?



*Actually there is no chemical reaction in the working of a nail polish remover. The process works on the principle of like dissolves like. The nail polish remover is just the organic solvent that is used as an ingredient in the nail polish. The hardened organic nail polish is dissolved by the nail polish remover (which is also organic). Generally the remover contains acetone.*

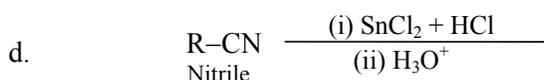
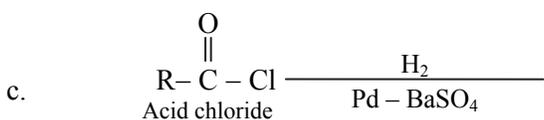
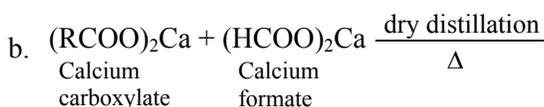
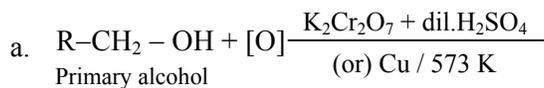


## Quick Review

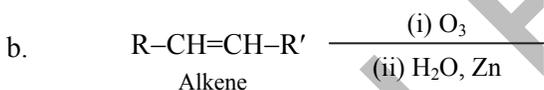
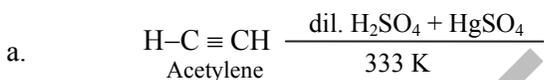
## Aldehydes

## ➤ Preparation of Aldehydes:

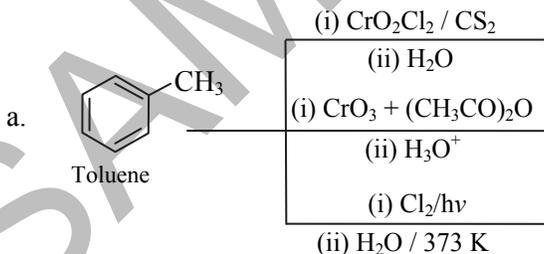
## i. For aliphatic and aromatic aldehydes:



## ii. For aliphatic aldehydes:



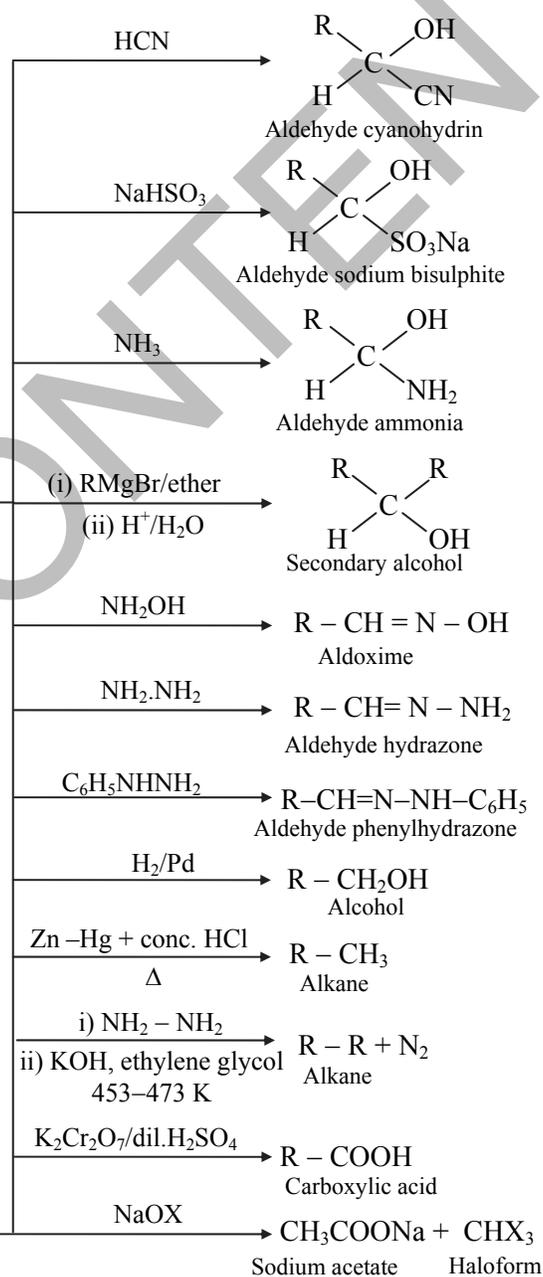
## iii. For aromatic aldehydes:



**R - CHO**  
**Aldehyde**  
where, R is alkyl  
or aryl group

**CH<sub>3</sub>CHO**  
**Acetaldehyde**

## Reactions of Aldehydes:

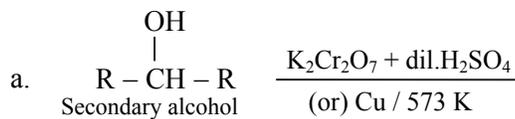




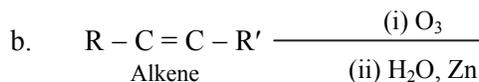
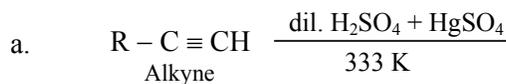
**Ketones**

➤ **Preparation of Ketones:**

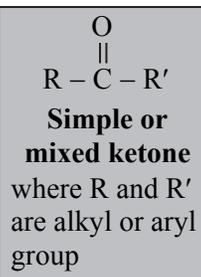
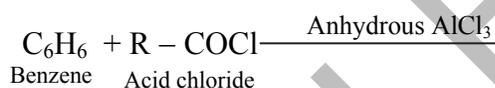
**i. For aliphatic and aromatic ketones:**



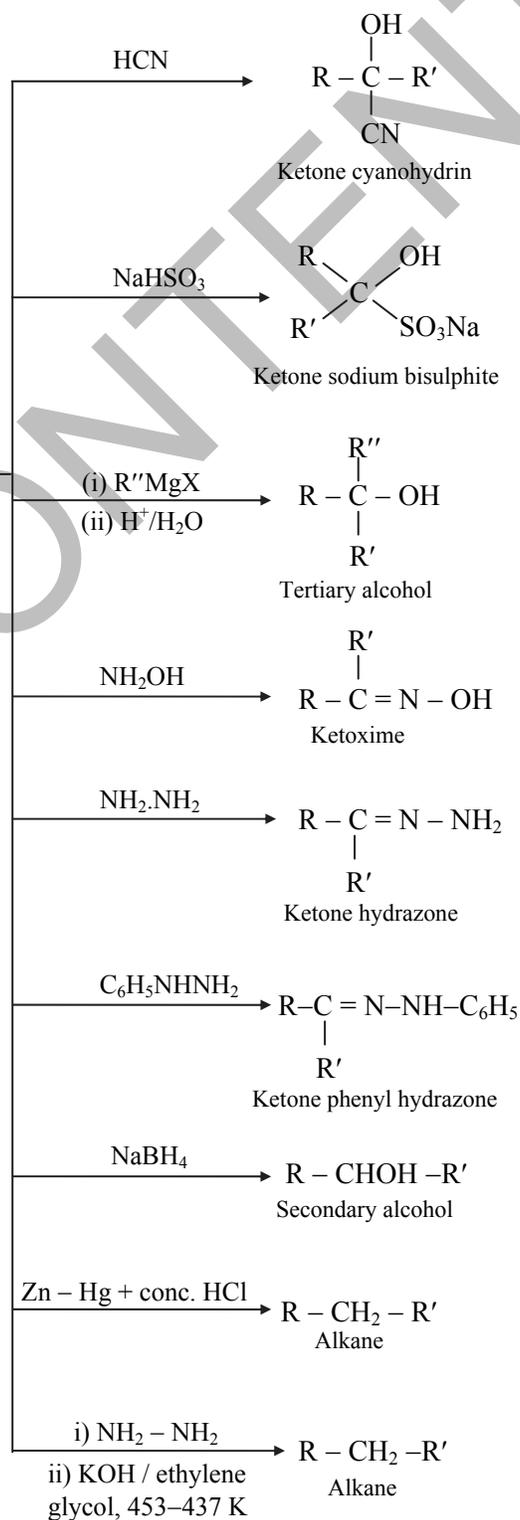
**ii. For aliphatic ketones:**



**iii. For aromatic ketones:**



**Reactions of Ketones:**

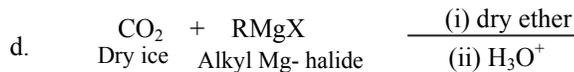
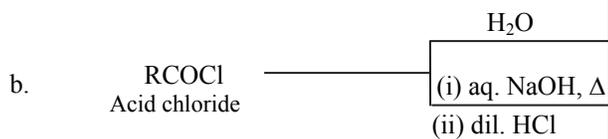
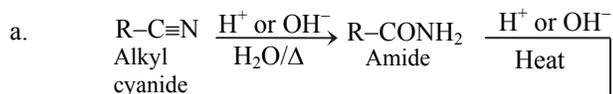




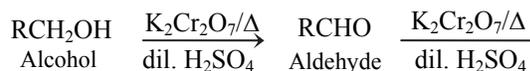
## Carboxylic acids

### ➤ Preparation of Carboxylic acids:

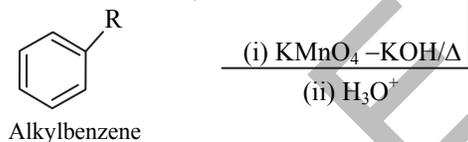
#### i. For aliphatic and aromatic carboxylic acids:



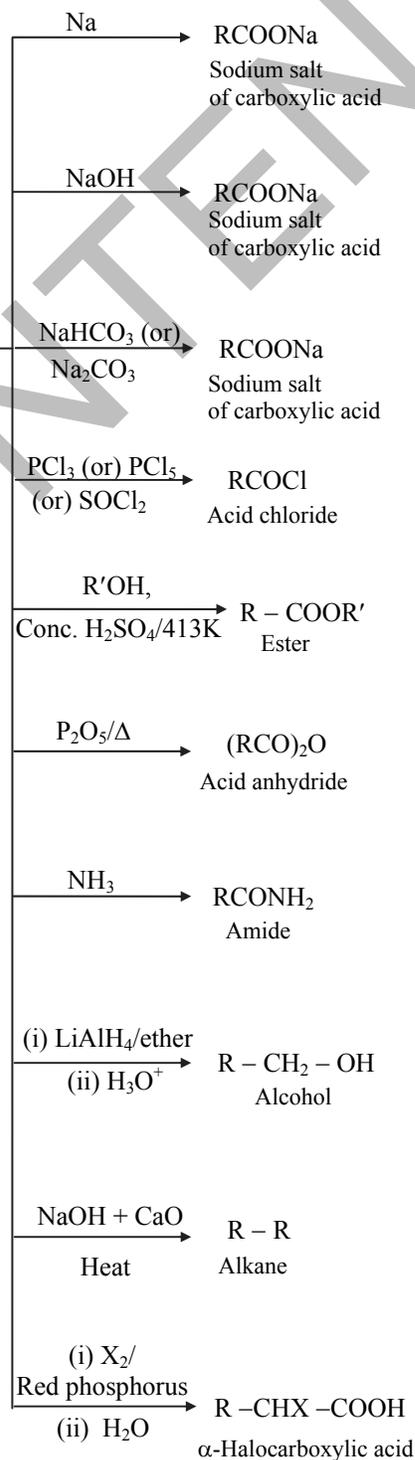
#### ii. For aliphatic carboxylic acids:



#### iii. For aromatic carboxylic acids:



### Reactions of Carboxylic acids:




**Classical Thinking**

**12.0 Introduction**

1. Which of the following functional groups is common to aldehydes, ketones and carboxylic acids?
- (A)  $-\text{CHO}$                       (B)  $\text{>CO}$   
 (C)  $-\text{COO}-$                     (D)  $-\text{CH}_2$


**12.1 Structure of carbonyl functional group**

2. Hybridization of oxygen in  $\begin{matrix} \text{R}' \\ \text{R} \end{matrix} \text{C}=\text{O}$  is \_\_\_\_\_.
- (A)  $sp$                               (B)  $sp^2$   
 (C)  $sp^3$                             (D)  $sp^3d$
3. Which of the following statements is CORRECT about carbonyl group?
- (A) The carbonyl carbon is  $sp$  hybridized.  
 (B) The carbonyl carbon is  $sp^3$  hybridized.  
 (C) The three groups attached to the carbonyl carbon lie in the same plane.  
 (D) The three groups attached to the carbonyl carbon lie in the different planes.
4. In the compound  $\begin{matrix} \text{R}' \\ \text{R} \end{matrix} \text{C}=\text{O}$  the carbonyl carbon is joined to other atoms by \_\_\_\_\_.
- (A) two sigma and one pi bonds  
 (B) three sigma and one pi bonds  
 (C) one sigma and two pi bonds  
 (D) two sigma and two pi bonds


**12.2 Aldehydes and ketones**

5. Aldehydes are the first oxidation products of \_\_\_\_\_.
- (A) any type of alcohol  
 (B) tertiary alcohols  
 (C) primary alcohols  
 (D) secondary alcohols
6. Aldehydic group can occur \_\_\_\_\_.
- (A) any where in the carbon chain  
 (B) in the middle of the carbon chain  
 (C) only at the second carbon atom of the chain  
 (D) only at the terminal carbon of the chain

7. The compound  $\text{CH}_3\text{CHO}$  is \_\_\_\_\_.
- (A) acetaldehyde              (B) acetic acid  
 (C) acetal                      (D) acetone
8.  $\text{H}_3\text{C}-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_2-\text{CH}_3$  is a/an \_\_\_\_\_.
- (A) symmetrical ketone  
 (B) unsymmetrical ketone  
 (C) ester  
 (D) aldehyde


**12.3 Nomenclature of aldehydes and ketones**

9.  $\alpha$ -carbon is that carbon atom \_\_\_\_\_.
- (A) which has functional group  
 (B) which is attached to functional carbon atom  
 (C) which has 2 alkyl groups  
 (D) which is attached to four different groups
10. Number of  $\alpha$ -H atoms in propionaldehyde is/are \_\_\_\_\_.
- (A) one                              (B) two  
 (C) three                            (D) four
11. Common name of  $\text{CH}_3-\text{CH}_2-\text{CO}-\text{CH}(\text{CH}_3)_2$  is \_\_\_\_\_.
- (A) ethyl isopropyl ketone  
 (B) isopentyl ketone  
 (C) ethyl propyl ketone  
 (D) propyl ethyl ketone
12. According to IUPAC system, acetaldehyde is called as \_\_\_\_\_.
- (A) methanal                      (B) ethanone  
 (C) propanal                      (D) ethanal
13. According to IUPAC system, dimethyl ketone is known as \_\_\_\_\_.
- (A) acetone                      (B) ethanone  
 (C) ethanal                      (D) propanone
14. IUPAC name of the compound  $\text{CH}_3-\overset{\text{CH}_3}{\underset{\text{H}}{\text{C}}}-\overset{\text{O}}{\parallel}{\text{C}}-\text{H}$  is \_\_\_\_\_.
- (A) 2-methylpropan-2-al  
 (B) 2-methylpropan-2-one  
 (C) 2-methylpropanal  
 (D) 1-methylpropan-1-al
15. IUPAC name of  $\text{CH}_3\text{CH}_2\text{COCH}_3$  is \_\_\_\_\_.
- (A) butan-2-al  
 (B) butan-1-al  
 (C) butan-1-one  
 (D) butan-2-one

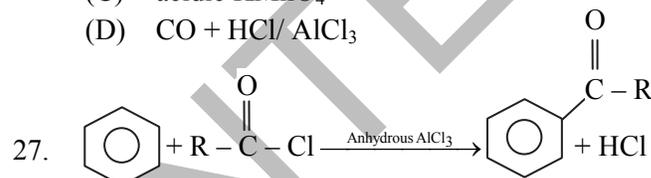


16. The IUPAC name of diethyl ketone is \_\_\_\_\_.  
 (A) butanone (B) pentan-2-one  
 (C) pentan-3-one (D) butan-2-one
17. Methyl n-propyl ketone has IUPAC nomenclature as \_\_\_\_\_.  
 (A) pentan-2-one (B) butan-2-one  
 (C) pentan-3-one (D) butan-3-one
18. The IUPAC name of  $\alpha$ -methyl butyraldehyde is \_\_\_\_\_.  
 (A) pentanal  
 (B) 3-methylbutanal  
 (C) 2-methylbutanal  
 (D) methylbutanal

### 12.4 Methods of preparation of aldehydes and ketones

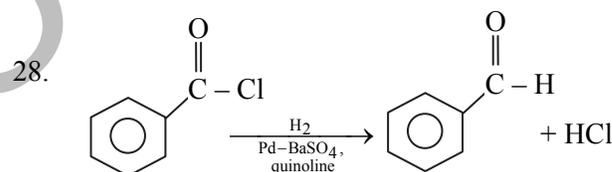
19. Formaldehyde is obtained on a commercial scale by the oxidation of \_\_\_\_\_.  
 (A) methanol (B) ethanol  
 (C) ethylene (D) formic acid
20. Which of the following compounds on alkaline hydrolysis gives ketone?  
 (A) Vicinal dihalide  
 (B) Terminal geminal dihalide  
 (C) Non-terminal geminal dihalide  
 (D) Non-terminal vicinal dihalide
21. The compound that yields only ketonic compound/s on ozonolysis is \_\_\_\_\_.  
 (A) but-2-ene  
 (B) pent-2-ene  
 (C) 2,3-dimethylbut-2-ene  
 (D) 2-methylbut-2-ene
22. Acetaldehyde is formed by the hydration of \_\_\_\_\_.  
 (A) methanol (B) methyl cyanide  
 (C) acetylene (D) ethylene
23. Propyne on hydration with dilute  $H_2SO_4$  in presence of  $HgSO_4$  gives \_\_\_\_\_.  
 (A) propanal  
 (B) ethyl hydrogen sulphate  
 (C) acetone  
 (D) acetaldehyde
24.  $(HCOO)_2Ca \xrightarrow{\Delta} A+B$ . Compounds A and B are \_\_\_\_\_ respectively.  
 (A) acetaldehyde and calcium carbonate  
 (B) formaldehyde and calcium carbonate  
 (C) acetaldehyde and calcium hydroxide  
 (D) formaldehyde and carbon dioxide

25. A reagent that is required to convert methyl cyanide into acetaldehyde is \_\_\_\_\_.  
 (A) ethyl magnesium chloride  
 (B) methyl magnesium chloride  
 (C) acetyl chloride  
 (D)  $SnCl_2/HCl$
26. The reagent used in Gatterman-Koch aldehyde synthesis is \_\_\_\_\_.  
 (A)  $Pd/BaSO_4$ , quinoline  
 (B) alkaline  $KMnO_4$   
 (C) acidic  $KMnO_4$   
 (D)  $CO + HCl/AlCl_3$



is an example of \_\_\_\_\_.

- (A) Friedel-Craft's alkylation  
 (B) Friedel-Craft's acylation  
 (C) Cannizzaro reaction  
 (D) Claisen condensation

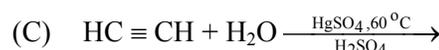
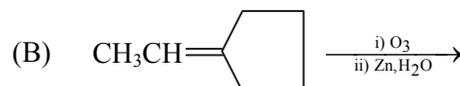
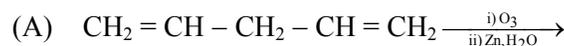


is an example of \_\_\_\_\_.

- (A) Clemmensen reduction  
 (B) Rosenmund reduction  
 (C) Wolff-Kishner reduction  
 (D) Wurtz reduction

29. The product of the reaction between diethylcadmium and acetyl chloride is \_\_\_\_\_.  
 (A)  $CH_3COCH_3$  (B)  $C_2H_5COC_2H_5$   
 (C)  $C_2H_5COCH_3$  (D)  $CH_3COC_2H_5$

30. Acetaldehyde is NOT obtained in which of the following reactions?





12.5 Physical properties of aldehydes and ketones

31. Which of the following will be in gaseous state, if room temperature is 25 °C?  
(A) Formaldehyde (B) Butanone  
(C) Acetone (D) Formalin
32. Formalin is \_\_\_\_\_.  
(A) 40% formic acid  
(B) 40% formaldehyde  
(C) 10% formic acid  
(D) 10% formaldehyde
33. Which aldehyde is insoluble in H<sub>2</sub>O?  
(A) Propanal (B) Ethanal  
(C) Butanal (D) Heptanal

12.6 Chemical properties of aldehydes and ketones

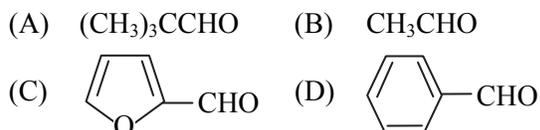
34. Which of the following is the mechanism of representative reactions of carbonyl compounds?  
(A) Nucleophilic substitution  
(B) Electrophilic substitution  
(C) Nucleophilic addition  
(D) Electrophilic addition
35. Acetaldehyde and acetone react with HCN to form corresponding \_\_\_\_\_.  
(A) cyanides (B) nitriles  
(C) cyanohydrins (D) hydrides
36. Which of the following will give the addition product with NaHSO<sub>3</sub>?  
(A) CH<sub>3</sub>OH (B) CH<sub>3</sub>COOH  
(C) CH<sub>3</sub>COCH<sub>3</sub> (D) CH<sub>3</sub>CH<sub>2</sub>Cl
37. Compounds of general formula,  $\begin{matrix} R & & OR'' \\ & \diagdown & / \\ & C & \\ & / & \diagdown \\ R' & & OR'' \end{matrix}$  are called \_\_\_\_\_.  
(A) diesters (B) acid anhydrides  
(C) hemiacetals (D) ketals
38. When acetone reacts with ammonia at room temperature, it gives \_\_\_\_\_.  
(A) triacetone amine (B) diacetone amine  
(C) methyl tetramine (D) acetaldehyde
39. The main product formed when acetaldehyde is treated with phenylhydrazine is \_\_\_\_\_.  
(A) CH<sub>3</sub>CH<sub>2</sub>NHC<sub>6</sub>H<sub>4</sub>NH<sub>2</sub>  
(B) CH<sub>3</sub>CH = N - NH - C<sub>6</sub>H<sub>5</sub>  
(C) H<sub>2</sub>NCH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>C<sub>6</sub>H<sub>4</sub>NH<sub>2</sub>  
(D) CH<sub>3</sub>CH = N - CH<sub>2</sub> - C<sub>6</sub>H<sub>5</sub>

40. Ethane can be obtained from acetaldehyde in one step by \_\_\_\_\_.  
(A) Na - Hg + water  
(B) Zn - Hg + conc. HCl  
(C) acidified K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>  
(D) LiAlH<sub>4</sub> + ether
41. Ethyl methyl ketone can be reduced to n-butane by \_\_\_\_\_.  
(A) Etard reaction  
(B) Wolff-Kishner reduction  
(C) Stephen reaction  
(D) Friedel-Craft acylation
42. Conversion of acetone into 2,3-dimethylbutane-2,3-diol can be achieved by \_\_\_\_\_.  
(A) Zn-Hg/HCl  
(B) Wolff-Kishner reduction  
(C) Fe/Hg/H<sub>2</sub>O  
(D) Mg/C<sub>6</sub>H<sub>6</sub>/dil. HCl
43. Which of the following compounds will NOT give the positive test for Tollen's reagent?  
(A) Propanone  
(B) Propanal  
(C) Ethanal  
(D) Both (B) and (C)
44. Acetaldehyde on warming with Fehling solution gives a red precipitate of \_\_\_\_\_.  
(A) elemental copper  
(B) cuprous oxide  
(C) cupric oxide  
(D) mixture of all of the above
45. Which of the following does NOT turn Schiff reagent to pink?  
(A) Formaldehyde  
(B) Propanal  
(C) Acetone  
(D) Acetaldehyde
46. Which of the following can be used to differentiate between ethanal and propanal?  
(A) Ammoniacal AgNO<sub>3</sub>  
(B) Fehling solution  
(C) I<sub>2</sub> in presence of base  
(D) Schiff reagent
47. In the formation of an aldol, α-carbon atom of one aldehyde molecule attaches to \_\_\_\_\_ of another aldehyde molecule.  
(A) α-hydrogen atom  
(B) α-carbon atom  
(C) carbonyl carbon atom  
(D) β-carbon atom



48. Formaldehyde on heating with strong solution of KOH gives potassium formate and methyl alcohol, the reaction is called as \_\_\_\_\_.
- (A) Cannizzaro reaction  
(B) Wurtz's reaction  
(C) Wolff-Kishner reaction  
(D) Clemmensen's reduction

49. Cannizzaro reaction does NOT take place with \_\_\_\_\_.



50. Acetals are \_\_\_\_\_.
- (A) ketones  
(B) diethers  
(C) aldehyde  
(D) hydroxy aldehydes

### 12.7 Uses of aldehydes and ketones

51. Which of the following is used for silvering mirrors?
- (A) Benzaldehyde      (B) Benzoic acid  
(C) Formaldehyde      (D) Formic acid
52. Which of the following is used in perfumery and dye industry?
- (A) Benzyl alcohol      (B) Benzylamine  
(C) Benzoic acid      (D) Benzaldehyde

### 12.8 Carboxylic acids

53. A carboxyl group can be considered as combination of \_\_\_\_\_.
- (A) a carbonyl group and ether group  
(B) a keto group and an ester group  
(C) a carbonyl group and hydroxyl group  
(D) an aldehyde group and alkyl group

### 12.9 Nomenclature of carboxylic acids

54. The common name of carboxylic fatty acids is derived from \_\_\_\_\_.
- (A) the name of parent alkanes  
(B) the name of corresponding aldehydes  
(C) the name of their original sources  
(D) the name of alkyl group present in it
55. IUPAC name of valeric acid is \_\_\_\_\_.
- (A) pentanoic acid      (B) pentenoic acid  
(C) propanoic acid      (D) ethanoic acid

56. Hexanoic acid is \_\_\_\_\_.
- (A) n-caproic acid  
(B) valeric acid  
(C) stearic acid  
(D) palmitic acid

57. IUPAC name for isobutyric acid is \_\_\_\_\_.
- (A) 2-methylpropanoic acid  
(B) butanoic acid  
(C) butanol  
(D) dimethylethanoic acid

58. IUPAC name of  $\text{CH}_3-\text{CH}_2-\underset{\text{NH}_2}{\text{CH}}-\text{COOH}$  is \_\_\_\_\_.
- (A) 2-amino-2-ethylethanoic acid  
(B) 3-aminobutanoic acid  
(C) 2-aminobutanoic acid  
(D)  $\alpha$ -aminopropanoic acid

59. IUPAC name of  $\text{H}_3\text{C}-\underset{\text{CH}_3}{\text{CH}}-\underset{\text{CH}_3}{\text{CH}}-\text{CH}_2-\text{COOH}$  is \_\_\_\_\_.
- (A) 3,4-dimethylpentanoic acid  
(B) 2,3-dimethylpentanoic acid  
(C) dimethylpentanoic acid  
(D) 1,1-dimethyl-2-methylbutanoic acid

### 12.10 Structure of carboxyl group

60. The  $\text{C}-\text{C}=\text{O}$  and  $\text{O}=\text{C}-\text{O}$  bond angle in carboxylic acid is \_\_\_\_\_.
- (A)  $120^\circ$       (B)  $90^\circ$   
(C)  $150^\circ$       (D)  $100^\circ$

### 12.11 Methods of preparation of carboxylic acids

61. 2-Methylbutanoic acid can be prepared in a single step from \_\_\_\_\_.
- (A)  $\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3-\text{C}-\text{OH} \\ | \\ \text{CH}_3 \end{array}$   
(B)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CHO}$   
(C)  $\text{CH}_3\text{CH}_2-\underset{\text{CH}_3}{\text{C}}=\text{O}$   
(D)  $\text{CH}_3\text{CH}_2\text{CH}(\text{CH}_3)\text{CHO}$

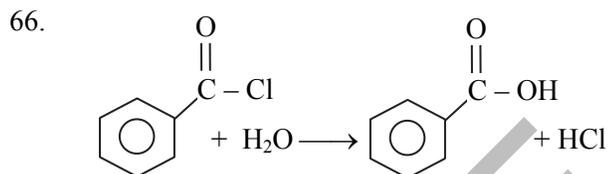


62. Which of the following compounds on boiling with alkaline  $\text{KMnO}_4$  and subsequent acidification will NOT give benzoic acid?  
 (A) Benzyl alcohol (B) Acetophenone  
 (C) Anisole (D) Toluene

63. Hydrolysis of  $\text{R}-\text{C}\equiv\text{N}$  will give \_\_\_\_\_.  
 (A)  $\text{R}-\overset{\text{O}}{\parallel}{\text{C}}-\text{OH}$  (B)  $\text{R}-\overset{\text{O}}{\parallel}{\text{C}}-\text{H}$   
 (C)  $\text{R}-\overset{\text{O}}{\parallel}{\text{C}}-\text{R}'$  (D)  $\text{R}-\overset{\text{O}}{\parallel}{\text{C}}-\text{O}-\text{R}'$

64. Hydrolysis of acetamide gives \_\_\_\_\_.  
 (A) acetone (B) acetaldehyde  
 (C) acetic acid (D) ethylamine

65. Carbon dioxide can be converted into acetic acid by the action of \_\_\_\_\_.  
 (A)  $\text{CH}_3\text{CHO} / \text{LiAlH}_4$   
 (B)  $\text{C}_2\text{H}_5\text{MgBr} / \text{H}_3\text{O}^+$   
 (C)  $\text{CH}_3\text{MgBr} / \text{H}_3\text{O}^+$   
 (D) sodium formate



The above reaction is carried out in the presence of \_\_\_\_\_.

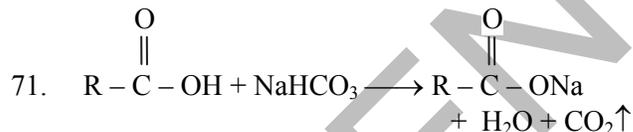
- (A) pyridine (B) benzene  
 (C) dextrine (D) quinoline
67.  $\text{Ph}-\text{COOC}_2\text{H}_5$  on heating with dil.  $\text{H}_2\text{SO}_4$  produces \_\_\_\_\_.  
 (A) benzoic acid and ethyl alcohol  
 (B) benzene and ethyl alcohol  
 (C) benzenediazonium chloride and ethyl alcohol  
 (D) benzoic acid and methyl alcohol

### 12.12 Physical properties of carboxylic acids

68. Lower aliphatic carboxylic acids are \_\_\_\_\_.  
 (A) coloured liquids (B) colourless liquids  
 (C) wax like solids (D) gases
69. Lower carboxylic acids are soluble in water due to \_\_\_\_\_.  
 (A) low molecular weight  
 (B) hydrogen bonding  
 (C) dissociation into ions  
 (D) easy hydrolysis

70. Which class of compounds shows H-bonding even more than in alcohols?  
 (A) Phenols  
 (B) Carboxylic acids  
 (C) Ethers  
 (D) Aldehydes

### 12.13 Chemical properties of carboxylic acids

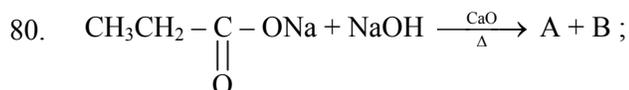


The above reaction is showing the \_\_\_\_\_ property of carboxylic acid.

- (A) acidic (B) basic  
 (C) oxidizing (D) reducing
72. In  $\text{CH}_3\text{COOH}$  and  $\text{HCOOH}$ ,  $\text{HCOOH}$  will be \_\_\_\_\_.  
 (A) less acidic (B) equally acidic  
 (C) more acidic (D) basic
73. In the formation of ester from carboxylic acid, the bond broken is \_\_\_\_\_.  
 (A)  $\text{C}-\text{OH}$   
 (B)  $\text{C}=\text{O}$   
 (C)  $\text{O}-\text{H}$   
 (D) Both (A) and (B)
74. Acetic acid reacts with  $\text{PCl}_5$  to give \_\_\_\_\_.  
 (A) acetyl chloride (B) acetyl amide  
 (C) acetic anhydride (D) acetal
75. Acetyl chloride CANNOT be obtained by treating acetic acid with \_\_\_\_\_.  
 (A)  $\text{CHCl}_3$  (B)  $\text{SOCl}_2$   
 (C)  $\text{PCl}_3$  (D)  $\text{PCl}_5$
76. Reaction between an acid and alcohol will give a/an \_\_\_\_\_.  
 (A) higher C containing acid  
 (B) secondary alcohol  
 (C) alkane  
 (D) ester
77. When acetic acid is heated with  $\text{P}_2\text{O}_5$  it gives \_\_\_\_\_.  
 (A) acetyl oxide  
 (B) acetic anhydride  
 (C) acetyl oxime  
 (D) acetyl amide
78. Carboxylic acid reacts with ammonia resulting in the formation of \_\_\_\_\_.  
 (A) amine (B) imine  
 (C) oxime (D) amide



79. Reduction of carboxylic acid gives \_\_\_\_\_.
- (A) secondary alcohol with hydrogen in presence of palladium  
 (B) primary alcohol with  $\text{LiAlH}_4$   
 (C) aldehyde with  $\text{LiAlH}_4$   
 (D) primary alcohol with  $\text{K}_2\text{Cr}_2\text{O}_7$



A and B are respectively \_\_\_\_\_.

- (A) ethane and sodium carbonate  
 (B) methane and sodium carbonate  
 (C) n-propane and sodium carbonate  
 (D) n-butane and sodium carbonate
81. The reaction  

$$\text{CH}_3\text{COOH} + \text{Cl}_2 \xrightarrow{\text{Red P}} \text{ClCH}_2\text{COOH} + \text{HCl}$$
 is called \_\_\_\_\_.
- (A) Hell-Volhard-Zelinsky reaction  
 (B) Fischer reaction  
 (C) Rosenmund reaction  
 (D) Friedel Craft's reaction

82. Nitration of benzoic acid gives \_\_\_\_\_.
- (A) 3-nitrobenzoic acid  
 (B) 2-nitrobenzoic acid  
 (C) 2,3-dinitrobenzoic acid  
 (D) 2,4-dinitrobenzoic acid

### 12.14 Uses of carboxylic acids

83. Formic acid is used in \_\_\_\_\_.
- (A) rubber industries  
 (B) the manufacture of leather  
 (C) textile industries  
 (D) all of these

### Miscellaneous

84. Urotropine is a \_\_\_\_\_.
- (A) primary amine  
 (B) secondary amine  
 (C) tertiary amine  
 (D) quaternary ammonium salt
85. Diacetone alcohol on heating gives \_\_\_\_\_.
- (A) acetone (B) mesityl oxide  
 (C) diacetone amine (D) acetoxime
86. If acetaldehyde is treated with Benedict or Fehling solution, the change that occurs in the system is \_\_\_\_\_.
- (A)  $\text{Ag}^+ \longrightarrow \text{Ag}$  (B)  $\text{Cu}^{+2} \longrightarrow \text{Cu}$   
 (C)  $\text{Cu}^{+2} \longrightarrow \text{Cu}^+$  (D)  $\text{Na}^+ \longrightarrow \text{Na}$



## Critical Thinking



### 12.0 Introduction

1. General formula of simple aliphatic saturated aldehydes and ketones is \_\_\_\_\_.
- (A)  $\text{C}_n\text{H}_{2n+2}\text{O}$  (B)  $\text{C}_n\text{H}_{2n}\text{O}$   
 (C)  $\text{C}_n\text{H}_{2n+1}\text{O}$  (D)  $\text{C}_n\text{H}_{2n}\text{O}_2$
2. Which of the following are carbonyl compounds?
- (A) Aldehydes and ketones  
 (B) Carboxylic acids and esters  
 (C) Acid anhydrides  
 (D) All of these
3. Acetone is the first member of the homologous series of ketone, whereas pentan-2-one is \_\_\_\_\_ member of the homologous series of ketone.
- (A) 5<sup>th</sup> (B) 2<sup>nd</sup>  
 (C) 3<sup>rd</sup> (D) 4<sup>th</sup>



### 12.1 Structure of carbonyl functional group

4. Ethanal has \_\_\_\_\_.
- (A) 6σ bonds and 1π bond  
 (B) 6σ bonds and 2π bonds  
 (C) 5σ bonds and 1π bond  
 (D) 5σ bonds and 2π bonds



### 12.2 Aldehydes and ketones

5. Which of the following is a mixed ketone?
- (A) Acetone  
 (B) Benzophenone  
 (C) Diethyl ketone  
 (D) Ethyl n-propyl ketone



### 12.3 Nomenclature of aldehydes and ketones

6. The IUPAC name of ethyl isopropyl ketone is \_\_\_\_\_.
- (A) 4-methylpentan-3-one  
 (B) 1,1-dimethylbutan-2-one  
 (C) 2-methylpentan-3-one  
 (D) 4,4-dimethylbutan-3-one
7. The IUPAC name of  

$$\text{CH}_3 - \underset{\text{CH}_3}{\underset{|}{\text{CH}}} - \text{CO} - \underset{\text{CH}_3}{\underset{|}{\text{CH}}} - \text{CH}_2\text{CH}_3$$
 is \_\_\_\_\_.
- (A) 1,4-dimethylpentanone  
 (B) 2,4-dimethylpentan-3-one  
 (C) 3,5-dimethylhexan-4-one  
 (D) 2,4-dimethylhexan-3-one



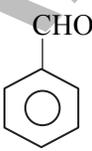
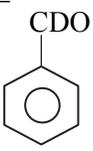
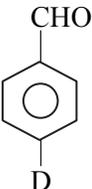
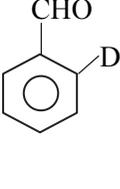
8. IUPAC name of  $\text{H}_3\text{C}_2-\text{CH}-\text{CH}-\text{C}_2\text{H}_5$   
 $\begin{array}{c} | \quad | \\ \text{CHO} \quad \text{CH}_3 \end{array}$   
 is \_\_\_\_\_.
- (A) 2-ethyl-3-methylpentanal  
 (B) 4-methylhexanal  
 (C) 3-ethyl-2-methylpentanal  
 (D) 3,3-diethylpropanal
9. The IUPAC name of  $(\text{CH}_3)_2\text{C}(\text{OH})\text{CH}_2\text{COCH}_3$  is \_\_\_\_\_.
- (A) 4-hydroxy-4-methylpentan-2-one  
 (B) 2-hydroxy-2-methylpentan-4-one  
 (C) diacetone alcohol  
 (D) 4-hydroxy-4-methyl-2-oxopentane

**12.4 Methods of preparation of aldehydes and ketones**

10. A ketone can be prepared by which of the following processes?  
 (A) Hydration of alkene  
 (B) Oxidation of secondary alcohol.  
 (C) Reduction of acid.  
 (D) Hydrolysis of a cyanide.
11. Slow and partial oxidation of pentan-1-ol gives \_\_\_\_\_.
- (A) n-butyraldehyde (B) n-glyceraldehyde  
 (C) n-valeraldehyde (D) n-crotonaldehyde
12. Choose the pair in which both the members give acetone in one step only:  
 (A)  $(\text{CH}_3\text{COO})_2\text{Ca}$ ,  $\text{CH}_3\text{C}\equiv\text{CH}$   
 (B)  $(\text{C}_2\text{H}_5\text{COO})_2\text{Ca}$ ,  $(\text{CH}_3)_2\text{C}=\text{CH}_2$   
 (C)  $\text{CH}_3\text{C}\equiv\text{CH}$ ,  $(\text{CH}_3)_2\text{CHCl}$   
 (D)  $(\text{CH}_3)_2\text{CHCl}$ ,  $(\text{CH}_3)_2\text{C}=\text{CH}_2$
13. To synthesize acetone from Grignard reagent  $(\text{CH}_3\text{MgI})$ , which of the following is used?  
 (A) Benzotrile (B) Pent-3-enitrile  
 (C) Formonitrile (D) Acetonitrile
14. In Gattermann-Koch reaction;



The product formed is \_\_\_\_\_.

- (A)  (B) 
- (C)  (D) 

15. Formaldehyde CANNOT be prepared by \_\_\_\_\_.
- (A) oxidation of methanol  
 (B) Rosenmund's method  
 (C) dehydrogenation of methanol  
 (D) ozonolysis of ethylene
16. The reagent one would choose to transform  $\text{CH}_3\text{CH}_2\text{COCl}$  into  $\text{CH}_3\text{CH}_2\text{COCH}_3$  is \_\_\_\_\_.
- (A)  $\text{CH}_3\text{MgI}$  (B)  $(\text{CH}_3)_2\text{Cd}$   
 (C)  $(\text{CH}_3\text{O})_2\text{Mg}$  (D)  $\text{CH}_3\text{Cl}$
17. The reagent used to prepare benzaldehyde by Stephen reaction is \_\_\_\_\_.
- (A)  $\text{CO} + \text{HCl}/\text{AlCl}_3$   
 (B)  $\text{SnCl}_2/\text{dil.HCl}$   
 (C)  $\text{CrO}_2\text{Cl}_2/\text{CS}_2$   
 (D)  $\text{Pd}/\text{BaSO}_4/\text{quinoline}$

**12.5 Physical properties of aldehydes and ketones**

18. Which of the following forces explain the boiling point of aldehydes and ketones?  
 (A) Hydrogen bonding  
 (B) van der Waal's  
 (C) Dipole-dipole attraction  
 (D) Dipole-dipole repulsion
19. Which of the following statements is WRONG?  
 (A) The polar character of the  $\text{C}=\text{O}$  group gives rise to intermolecular attraction called dipole-dipole attractions.  
 (B) The lower aldehydes and ketones are soluble in water.  
 (C) The boiling points of aldehydes and ketones are lower than those of nonpolar alkanes of comparable molecular weight.  
 (D) Aldehydes and ketones are incapable of forming intermolecular hydrogen bonding with themselves.

**12.6 Chemical properties of aldehydes and ketones**

20. Least reactive towards nucleophilic addition is \_\_\_\_\_.
- (A)  $\text{CH}_2=\text{O}$  (B)  $\text{H}-\overset{\text{O}}{\parallel}{\text{C}}-\text{C}_2\text{H}_5$   
 (C)  $\text{CH}_3-\overset{\text{O}}{\parallel}{\text{C}}-\text{C}_2\text{H}_5$  (D)  $\text{CH}_3-\overset{\text{O}}{\parallel}{\text{C}}-\text{H}$

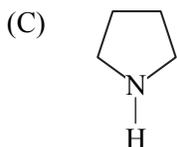


21. The general order of reactivity of carbonyl compounds for nucleophilic addition reactions is \_\_\_\_\_.

- (A)  $\text{H}_2\text{C}=\text{O} > \text{RCHO} > \text{ArCHO} > \text{R}_2\text{C}=\text{O} > \text{Ar}_2\text{C}=\text{O}$   
 (B)  $\text{ArCHO} > \text{Ar}_2\text{C}=\text{O} > \text{RCHO} > \text{R}_2\text{C}=\text{O} > \text{H}_2\text{C}=\text{O}$   
 (C)  $\text{Ar}_2\text{C}=\text{O} > \text{R}_2\text{C}=\text{O} > \text{ArCHO} > \text{RCHO} > \text{H}_2\text{C}=\text{O}$   
 (D)  $\text{H}_2\text{C}=\text{O} > \text{R}_2\text{C}=\text{O} > \text{Ar}_2\text{C}=\text{O} > \text{RCHO} > \text{ArCHO}$

22. Among the following compounds, which one will react with acetone to give a product that contains carbon-nitrogen double bond?

- (A)  $\text{C}_6\text{H}_5\text{NHC}_6\text{H}_5$   
 (B)  $(\text{CH}_3)_3\text{N}$



- (D)  $\text{C}_6\text{H}_5\text{NHNH}_2$

23. Pentan-2-one differs from pentan-3-one, in that \_\_\_\_\_.

- (A) pentan-3-one does not react with  $\text{NaHSO}_3$   
 (B) pentan-2-one gives iodoform test  
 (C) pentan-3-one gives iodoform test  
 (D) pentan-2-one does not react with  $\text{NaHSO}_3$

24. The reagent that can be used to distinguish acetophenone and benzophenone is \_\_\_\_\_.

- (A) 2,4-dinitrophenylhydrazine  
 (B) aqueous  $\text{NaHSO}_3$   
 (C) Benedict's reagent  
 (D)  $\text{I}_2$  and  $\text{NaOH}$

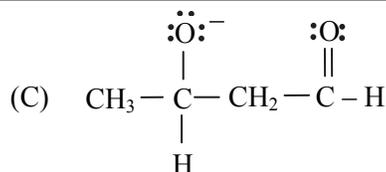
25. The compound formed when propionaldehyde reacts with dil.  $\text{NaOH}$  solution is \_\_\_\_\_.

- (A)  $\text{CH}_3\text{CH}_2\text{COOCH}_2\text{CH}_2\text{CH}_3$   
 (B)  $\text{CH}_3\text{CH}_2\text{CHOHCH}(\text{CH}_3)\text{CHO}$   
 (C)  $\text{CH}_3\text{CH}_2\text{CHOHCH}_2\text{CH}_2\text{CHO}$   
 (D)  $\text{CH}_3\text{CH}_2\text{COCH}_2\text{CH}_2\text{CHO}$

26.  $\text{CH}_3-\text{CHO} \xrightarrow{\text{OH}^-} \text{CH}_3\text{CH}(\text{OH})\text{CH}_2\text{CHO}$

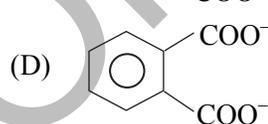
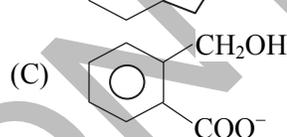
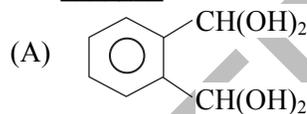
In the aldol condensation of acetaldehyde represented above, which of the following intermediate species are obtained?

- (A)
- (B)



- (D) All of these

27. P is \_\_\_\_\_.



28. Which of the following statements is WRONG?

- (A) Acetone gives iodoform reaction.  
 (B) Acetone gives diacetone amine on treatment with ammonia.  
 (C) Acetone gives crotonaldehyde on aldol condensation.  
 (D) All of these.



## 12.8 Carboxylic acids

29. Monocarboxylic acids are generally known as fatty acids because \_\_\_\_\_.

- (A) they are solids at room temperature  
 (B) they are immiscible in water  
 (C) their esters are widely present in animal and vegetable fats and were previously obtained from their esters  
 (D) they are derived from monohydric alcohols



## 12.9 Nomenclature of carboxylic acids

30.  $\text{CH}_3(\text{CH}_2)_4\text{COOH}$  is commonly known as \_\_\_\_\_.

- (A) n-caproic acid (B) palmitic acid  
 (C) valeric acid (D) mellitic acid

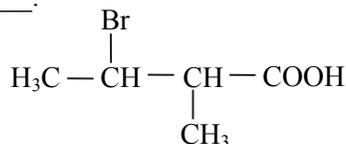
31. The IUPAC name of  $\alpha$ -methylpropionic acid is \_\_\_\_\_.

- (A) 2-propanoic acid  
 (B) 2-butanoic acid  
 (C) 2-methylpropanoic acid  
 (D) 2-methylbutanoic acid



32. IUPAC name of dimethylacetic acid is \_\_\_\_\_.
- (A) 1,1-dimethylethanoic acid  
(B) 2,2-dimethylethanoic acid  
(C) 2-methylpropanoic acid  
(D) 2,2-dimethylpropanoic acid

33. The IUPAC name of the following compound is \_\_\_\_\_.



- (A) 2-bromo-3-methylbutanoic acid  
(B) 2-methyl-3-bromopropanoic acid  
(C) 3-bromo-2-methylbutanoic acid  
(D) 1-bromo-2-methylbutanoic acid

34. IUPAC name of  CH<sub>2</sub>CH<sub>2</sub>COOH is \_\_\_\_\_.

- (A) propylbenzoic acid  
(B) 3-benzenepropanoic acid  
(C) 3-phenylpropanoic acid  
(D) 3-phenylbutanoic acid

**12.11 Methods of preparation of carboxylic acids**

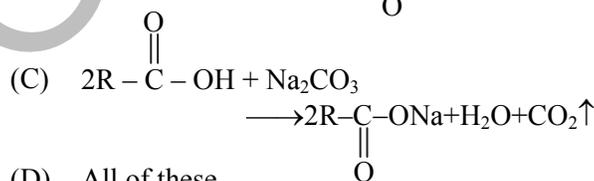
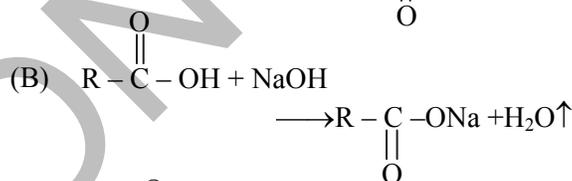
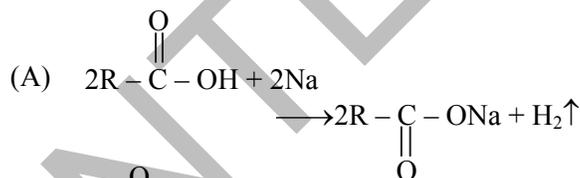
35. Which of the following methods will NOT yield a carboxylic acid?
- (A) Hydrolysis of a nitrile by boiling with dilute acid.  
(B) Oxidation of an aldehyde with acidified K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>.  
(C) Oxidation of primary alcohol with acidified K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>.  
(D) Heating a tertiary alcohol with aqueous KMnO<sub>4</sub> solution.
36. When benzyl alcohol is oxidised with acidified KMnO<sub>4</sub>, the product obtained is \_\_\_\_\_.
- (A) benzaldehyde (B) benzoic acid  
(C) benzophenone (D) benzidine
37. Which of the following undergoes hydrolysis when dissolved in water to give carboxylic acid?
- (A) CH<sub>3</sub>COONa (B) CH<sub>3</sub>CONH<sub>2</sub>  
(C) Both (A) and (B) (D) C<sub>6</sub>H<sub>5</sub>CH<sub>3</sub>
38. Dry ice + A → 2,3-Dimethylbutanoic acid. In this reaction 'A' is \_\_\_\_\_.
- (A) CH<sub>3</sub>C(CH<sub>3</sub>)CH<sub>2</sub>MgBr  
(B) CH<sub>3</sub>CH(CH<sub>3</sub>)CH(CH<sub>3</sub>)MgBr  
(C) CH<sub>3</sub>CH(C<sub>2</sub>H<sub>5</sub>)CH<sub>2</sub>MgBr  
(D) C<sub>2</sub>H<sub>5</sub>CH<sub>2</sub>MgBr

**12.12 Physical properties of carboxylic acids**

39. When acetic acid is dissolved in benzene, its molecular mass \_\_\_\_\_.
- (A) decreases  
(B) increases  
(C) either increases or decreases  
(D) suffers no change

**12.13 Chemical properties of carboxylic acids**

40. Which of the following reactions is showing the acidic property of carboxylic acid?

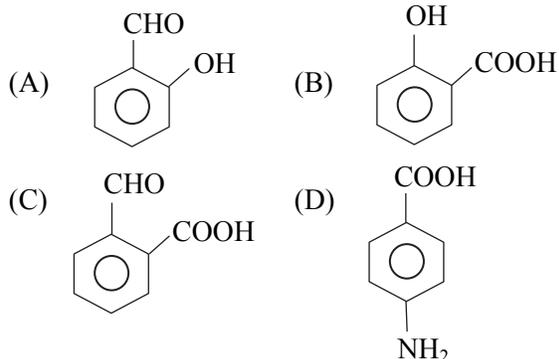


- (D) All of these

41. Which of the following acids has the smallest dissociation constant?
- (A) CH<sub>3</sub>CHF<sub>2</sub>COOH  
(B) FCH<sub>2</sub>CH<sub>2</sub>COOH  
(C) BrCH<sub>2</sub>CH<sub>2</sub>COOH  
(D) CH<sub>3</sub>CHBrCOOH
42. Which of the following is the CORRECT order of increasing strengths of carboxylic acids?
- (A) CH<sub>2</sub>F<sub>2</sub>COOH < CH<sub>3</sub>COOH < CH<sub>2</sub>ClCOOH < CCl<sub>3</sub>COOH  
(B) CH<sub>3</sub>COOH < CH<sub>2</sub>ClCOOH < CH<sub>2</sub>F<sub>2</sub>COOH < CCl<sub>3</sub>COOH  
(C) CH<sub>2</sub>ClCOOH < CH<sub>2</sub>F<sub>2</sub>COOH < CCl<sub>3</sub>COOH < CH<sub>3</sub>COOH  
(D) CCl<sub>3</sub>COOH < CH<sub>2</sub>ClCOOH < CH<sub>2</sub>F<sub>2</sub>COOH < CH<sub>3</sub>COOH
43. The compound formed when 3,5-dinitrobenzoic acid reacts with thionyl chloride is \_\_\_\_\_.
- (A) 3,5-dinitrobenzene  
(B) 3,5-dinitrobenzene chloride  
(C) 3,5-dinitrobenzene thionyl chloride  
(D) 3,5-dinitrobenzoyl chloride



44. Which of the following compounds gives Aspirin on reacting with acetic anhydride in presence of  $\text{H}_2\text{SO}_4$ ?



45. Treatment of benzoic acid with  $\text{Cl}_2/\text{FeCl}_3$  will give \_\_\_\_\_.
- (A) p-chlorobenzoic acid  
 (B) o-chlorobenzoic acid  
 (C) 2,4-dichlorobenzoic acid  
 (D) m-chlorobenzoic acid



### Miscellaneous

46. Benzyl phenyl ketone is \_\_\_\_\_.
- (A)  $\text{C}_6\text{H}_5\text{COC}_6\text{H}_5$   
 (B)  $\text{C}_6\text{H}_5-\text{CO}-\text{CO}-\text{C}_6\text{H}_5$   
 (C)  $\text{C}_6\text{H}_5\text{CH}_2-\text{CO}-\text{C}_6\text{H}_5$   
 (D)  $\text{C}_6\text{H}_5\text{CH}_2-\text{CO}-\text{CH}_2-\text{C}_6\text{H}_5$
47.  $\text{C}_6\text{H}_6 \xrightarrow[\text{AlCl}_3]{\text{CH}_3\text{CH}_2\text{COCl}}$  ketone  $\xrightarrow[\text{base, } \Delta]{\text{NH}_2\text{NH}_2}$  product.  
 Here the product is \_\_\_\_\_.
- (A)  $\text{Ph}-\underset{\text{OH}}{\text{CH}}\text{CH}_2\text{CH}_3$   
 (B)  $\text{Ph}-\text{CH}_2\text{CH}_2\text{CH}_3$   
 (C)  $\text{Ph}-\text{COCH}_2\text{CH}_3$   
 (D)  $\text{Ph}-\text{COOCH}_2\text{CH}_3$
48. Which of the following compounds neither forms semicarbazone nor oxime?
- (A)  $\text{H}-\underset{\text{O}}{\text{C}}-\text{H}$   
 (B)  $\text{CH}_3-\underset{\text{O}}{\text{C}}-\text{NH}-\text{CH}_3$   
 (C)  $\text{CH}_3-\underset{\text{O}}{\text{C}}-\text{CH}_2\text{Cl}$   
 (D)  $\text{CH}_3-\underset{\text{CH}_3}{\text{CH}}-\text{CHO}$
49. Acetic acid dissolved in benzene shows a molecular mass of \_\_\_\_\_.
- (A) 30 (B) 60 (C) 120 (D) 240

50.  $\text{CH}_2 = \text{CH} - (\text{CH}_2)_5\text{COOH} \xrightarrow[\text{HBr}]{\text{Peroxide}} \text{Z}$

where Z is \_\_\_\_\_.

- (A)  $\text{CH}_3-\text{CH}(\text{Br})-(\text{CH}_2)_5\text{COOH}$   
 (B)  $\text{BrCH}_2-(\text{CH}_2)_6\text{COOH}$   
 (C)  $\text{CH}_2 = \text{CH} - (\text{CH}_2)_5 - \text{CH}_2\text{OH}$   
 (D)  $\text{C}_6\text{H}_5\text{COOH}$
51. Mesityl oxide is an example of \_\_\_\_\_.
- (A) polymer  
 (B)  $\alpha, \beta$ -unsaturated alcohol  
 (C)  $\alpha, \beta$ -unsaturated ketone  
 (D)  $\alpha, \beta$ -unsaturated acid
52. The product obtained by dry distillation of calcium formate reacts with ammonia to yield \_\_\_\_\_.
- (A) formamide  
 (B) acetamide  
 (C) acetaldehyde ammonia  
 (D) urotropine
53. End product in the following reaction
- $$(\text{CH}_3)_3\text{C}-\text{CHO} + \text{CH}_3\text{CH}_2\text{CHO} \xrightarrow{\text{OH}^-} \text{A} \xrightarrow[-\text{H}_2\text{O}]{\text{H}^+} \text{B} \xrightarrow{\text{NaBH}_4} \text{C}$$
- is \_\_\_\_\_.
- (A)  $(\text{CH}_3)_3\text{C}-\underset{\text{CH}_3}{\text{C}} = \text{CHCH}_2\text{CH}_2\text{OH}$   
 (B)  $(\text{CH}_3)_3\text{C}-\text{CH}_2-\text{CH}_2\text{OH}$   
 (C)  $(\text{CH}_3)_3\text{C}-\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$   
 (D)  $(\text{CH}_3)_3\text{C}-\underset{\text{CH}_3}{\text{CH}} = \text{C}-\text{CH}_2\text{OH}$
54. Which of the following is INCORRECT?
- (A)  $\text{FeCl}_3$  is used to detect phenols.  
 (B) Fehlings solution is used in the detection of glucose.  
 (C) Tollen's reagent is used in the detection of unsaturation.  
 (D) Iodoform reaction is used in the detection of methyl ketones.
55. Addition of alcohols to aldehydes in presence of anhydrous acids yield \_\_\_\_\_.
- (A) carboxylic acids (B) ethers  
 (C) cyclic ethers (D) acetals
56. An organic compound X on treatment with acidified  $\text{K}_2\text{Cr}_2\text{O}_7$  gives a compound Y which reacts with  $\text{I}_2$  and sodium carbonate to form tri-iodomethane. The compound X is \_\_\_\_\_.
- (A)  $\text{CH}_3\text{OH}$  (B)  $\text{CH}_3-\text{CO}-\text{CH}_3$   
 (C)  $\text{CH}_3\text{CHO}$  (D)  $\text{CH}_3\text{CH}(\text{OH})\text{CH}_3$


**Competitive Thinking**

**12.0 Introduction**

- Which of the following compounds does NOT contain an -OH group? [CPMT 1982]  
 (A) Phenol  
 (B) Carboxylic acid  
 (C) Aldehydes  
 (D) Alcohols
- What is the compound called if remaining two valencies of a carbonyl group are satisfied by two alkyl groups? [CPMT 1990]  
 (A) Aldehyde (B) Ketone  
 (C) Acid (D) Acid chloride


**12.1 Structure of carbonyl functional group**

- In aldehydes and ketones, carbon of carbonyl group is \_\_\_\_\_. [MP PMT 1995; RPET 1999, 2000]  
 (A)  $sp^3$  hybridized  
 (B)  $sp^2$  hybridized  
 (C)  $sp$  hybridized  
 (D) unhybridized
- The enolic form of acetone contains \_\_\_\_\_. [IIT 1990]  
 (A) 9 sigma bonds, 1 pi bond and 2 lone pairs  
 (B) 8 sigma bonds, 2 pi bonds and 2 lone pairs  
 (C) 10 sigma bonds, 1 pi bond and 1 lone pair  
 (D) 9 sigma bonds, 2 pi bonds and 1 lone pair


**12.2 Aldehydes and ketones**

- Which is a mixed ketone? [BCECE 2015]  
 (A) Propanone  
 (B) Butanone  
 (C) Pentan-3-one  
 (D) None of these


**12.3 Nomenclature of aldehydes and ketones**

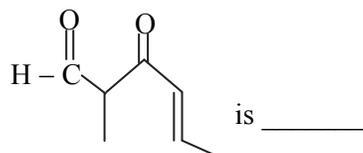
- IUPAC name of  $CH_3COCH_3$  is \_\_\_\_\_. [MP PET 1991]  
 (A) acetone (B) propan-2-one  
 (C) dimethyl ketone (D) propanal
- The IUPAC name of crotonaldehyde is \_\_\_\_\_. [MH CET 2009]  
 (A) 3-hydroxybutanal (B) but-2-enal  
 (C) but-1-enal (D) but-3-enal

- Name the compound  $CH_3CH(C_2H_5)CH(CHO)CH_3$ . [MH CET 2010]  
 (A) 2-Ethylbutan-3-ol  
 (B) 2,3-Dimethylpentanal  
 (C) 3-Ethylbutan-2-al  
 (D) 2-Ethylbutanal

- The IUPAC name of the following compound is \_\_\_\_\_.

[TS EAMCET (Med.) 2015]

- (A) 4-hydroxy-5-methylhexan-2-one  
 (B) 2-oxo-5-methylhexan-4-ol  
 (C) 3-hydroxy-2-methylhexan-5-one  
 (D) 5-oxo-2-methylhexan-5-one
- The IUPAC name of  $CH_3 - CO - (CH_2)_2 - CH_3$  is \_\_\_\_\_. [MH CET 2013]  
 (A) pentan-2-one  
 (B) pentan-3-one  
 (C) 3-methylbutan-2-one  
 (D) 3-methylpentanal
- The IUPAC name of the compound [NEET(UG) 2017]



- (A) 5-formylhex-2-en-3-one  
 (B) 5-methyl-4-oxohex-2-en-5-al  
 (C) 3-keto-2-methylhex-5-enal  
 (D) 3-keto-2-methylhex-4-enal

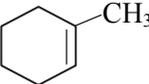

**12.4 Methods of preparation of aldehydes and ketones**

- Isopropyl alcohol on oxidation gives \_\_\_\_\_. [RPMT 1997; BHU 1997]  
 (A) acetone (B) acetaldehyde  
 (C) ether (D) ethylene
- Oxidation of this gives ethyl methyl ketone: [BCECE 2014]

**OR**

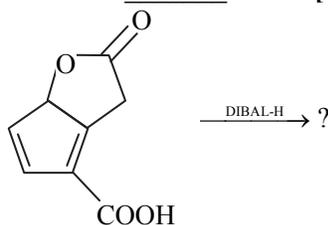
- This is oxidised to prepare ethyl methyl ketone: [BCECE 2015]
- (A) Propan-2-ol (B) Butan-1-ol  
 (C) Butan-2-ol (D) t-Butyl alcohol



14. Treating ethylidene dichloride with aqueous KOH, we get \_\_\_\_\_. [MP PMT 1986]
- (A)  $\text{CH}_3 - \text{CHO}$  (B)  $\begin{array}{c} \text{CH}_2 - \text{CH}_2 \\ | \quad | \\ \text{OH} \quad \text{OH} \end{array}$
- (C)  $\text{HCHO}$  (D)  $\begin{array}{c} \text{CHO} \\ | \\ \text{CHO} \end{array}$
15.  $\text{O}_3$  reacts with  $\text{CH}_2 = \text{CH}_2$  to form ozonide. On hydrolysis it forms \_\_\_\_\_. [MP PET 1986, 90]
- (A) ethylene oxide  
(B)  $\text{HCHO}$   
(C) ethylene glycol  
(D) ethyl alcohol
16.  on reductive ozonolysis yields \_\_\_\_\_. [Orissa JEE 2005]
- (A) 6-oxoheptanal  
(B) 6-oxoheptanoic acid  
(C) 6-hydroxyheptanal  
(D) 3-hydroxypentanal
17. Which of the following gases, when passed through a warm dilute solution of  $\text{H}_2\text{SO}_4$  in presence of  $\text{HgSO}_4$ , gives acetaldehyde? [MH CET 1999]
- (A)  $\text{CH}_4$  (B)  $\text{C}_2\text{H}_2$   
(C)  $\text{C}_2\text{H}_4$  (D)  $\text{C}_2\text{H}_6$
18. When but-1-yne is treated with aqueous  $\text{H}_2\text{SO}_4$  in presence of  $\text{HgSO}_4$ , the major product is \_\_\_\_\_. [Assam CEE 2015]
- (A)  $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CHO}$   
(B)  $\text{CH}_3 - \text{CH}_2 - \text{CO} - \text{CH}_3$   
(C)  $\text{CH}_3 - \text{CH}_2 - \text{CH} = \text{CH}_2$   
(D)  $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CH}_2 - \text{OH}$
19. Dry distillation of  $(\text{CH}_3\text{COO})_2\text{Ca}$  produces \_\_\_\_\_. [BCECE 2015]
- (A)  $\text{CH}_3\text{COOH}$  (B)  $\text{CH}_3\text{CHO}$   
(C)  $(\text{CH}_3)_2\text{CO}$  (D)  $\text{CH}_3\text{COOCH}_3$
20. On heating calcium acetate and calcium formate, the product formed is \_\_\_\_\_. [DPMT 1984; EAMCET 1985; MP PMT 1996, 92; KCET 1990; CPMT 1979, 82, 84; BIT 1992; RPET 2000]
- OR
- $(\text{CH}_3\text{COO})_2\text{Ca} + (\text{HCOO})_2\text{Ca}$  mixture upon heating gives \_\_\_\_\_. [BCECE 2014]
- (A)  $\text{CH}_3\text{COCH}_3$   
(B)  $\text{CH}_3\text{CHO}$   
(C)  $\text{HCHO} + \text{CaCO}_3$   
(D)  $\text{CH}_3\text{CHO} + \text{CaCO}_3$
21. Pentan-3-one can be obtained by dry distillation of \_\_\_\_\_. [MH CET 2013]
- (A) calcium acetate and calcium formate  
(B) calcium propionate  
(C) calcium acetate  
(D) calcium propionate and calcium formate
22. When calcium formate and calcium propionate are dry distilled, \_\_\_\_\_ is obtained. [MH CET 2004]
- (A) acetone (B) propionaldehyde  
(C) crotonaldehyde (D) acetaldehyde
23. By combining the two calcium salts of carboxylic acids, we are preparing butan-2-one. Find the CORRECT pair from the following: [MH CET 2005]
- (A) Calcium formate + Calcium propanoate  
(B) Calcium acetate + Calcium propanoate  
(C) Calcium acetate + Calcium acetate  
(D) Calcium formate + Calcium acetate
24. What is the product obtained when calcium acetate reacts with calcium propionate? [MH CET 2008]
- (A) formaldehyde  
(B) acetaldehyde  
(C) acetone  
(D) ethyl methyl ketone
25.  $\text{R}-\text{C}\equiv\text{N} + 2(\text{H}) \xrightarrow[\text{(ii) } \text{H}_3\text{O}^+]{\text{(i) } \text{SnCl}_2 / \text{dilHCl}} \text{RCHO} + \text{NH}_4\text{Cl}$   
this reaction is known as \_\_\_\_\_. [MH CET 2015]
- (A) Etard reaction  
(B) Stephen reaction  
(C) Hell-Vohland-Zelinsky reaction  
(D) Balz-Schiemann reaction
26. Which of the following compound gives a ketone with Grignard reagent? [CPMT 1988; MP PET 1997]
- (A) Formaldehyde  
(B) Ethyl alcohol  
(C) Methyl cyanide  
(D) Methyl iodide



27. The major product obtained in the following reaction is \_\_\_\_\_ . [JEE (Main) 2017]



- (A) (B)
- (C) (D)

28. What is the reagent used in Etard reaction? [MHT CET 2016]

- (A) Chromyl chloride  
(B) Ethanoyl chloride  
(C) SnCl<sub>2</sub> and HCl  
(D) Cadmium chloride

29. C<sub>6</sub>H<sub>6</sub> + CO + HCl  $\xrightarrow{\text{Anhydrous AlCl}_3}$  X ;  
Compound X is \_\_\_\_\_ . [DPMT 1979, 83]

- (A) C<sub>6</sub>H<sub>5</sub>CH<sub>3</sub> (B) C<sub>6</sub>H<sub>5</sub>CH<sub>2</sub>Cl  
(C) C<sub>6</sub>H<sub>5</sub>CHO (D) C<sub>6</sub>H<sub>5</sub>COOH

30. Acetophenone is prepared from \_\_\_\_\_ . [CPMT 2003]

- (A) Rosenmund reaction  
(B) Sandmeyer reaction  
(C) Wurtz reaction  
(D) Friedel Craft reaction

31. Which one of the following compounds is prepared in the laboratory from benzene by a substitution reaction? [EAMCET 2003]

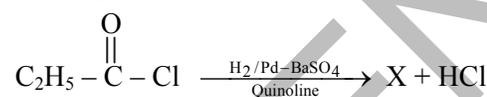
- (A) Glyoxal  
(B) Cyclohexane  
(C) Acetophenone  
(D) Hexabromocyclohexane

32. Benzene can be conveniently converted into n-propylbenzene by \_\_\_\_\_ . [MH CET 2014]

- (A) Friedel – Craft alkylation with n-propyl chloride  
(B) Friedel – Craft acylation with propionyl chloride followed by Wolff-Kishner reduction

- (C) Friedel – Craft acylation with propionyl chloride followed by catalytic hydrogenation  
(D) Friedel – Craft acylation with propionyl chloride followed by reduction with LiAlH<sub>4</sub>

33. What is the product (X) of the following reaction?



[Assam CEE 2015]

- (A) C<sub>2</sub>H<sub>5</sub>OH (B) CH<sub>3</sub>COOH  
(C) C<sub>2</sub>H<sub>5</sub>CHO (D) CH<sub>3</sub>COCH<sub>3</sub>

34. Which of the following compounds when treated with dibenzylcadmium yields benzyl methyl ketone? [MHT CET 2016]

- (A) Acetone  
(B) Acetaldehyde  
(C) Acetic acid  
(D) Acetyl chloride

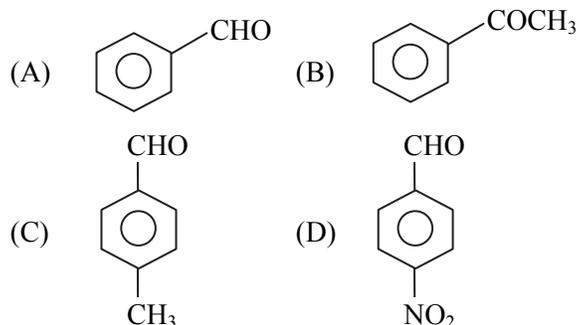
### 12.5 Physical properties of aldehydes and ketones

35. Which compound is soluble in H<sub>2</sub>O? [RPMT 1997]

- (A) HCHO (B) CH<sub>3</sub>CHO  
(C) CH<sub>3</sub>COCH<sub>3</sub> (D) All

### 12.6 Chemical properties of aldehydes and ketones

36. Which one is most reactive towards nucleophilic addition reaction? [AIPMT 2014]



37. Which of the followings is the most reactive towards addition reaction of hydrogen cyanide to form corresponding cyanohydrin?

[MHT CET 2018]

- (A) Acetone (B) Formaldehyde  
(C) Acetaldehyde (D) Diethylketone



38. The CORRECT order of reactivity of aldehydes and ketones towards hydrogen cyanide is \_\_\_\_\_. [MH CET 2015]  
 (A)  $\text{CH}_3\text{COCH}_3 > \text{CH}_3\text{CHO} > \text{HCHO}$   
 (B)  $\text{CH}_3\text{COCH}_3 > \text{HCHO} > \text{CH}_3\text{CHO}$   
 (C)  $\text{CH}_3\text{CHO} > \text{CH}_3\text{COCH}_3 > \text{HCHO}$   
 (D)  $\text{HCHO} > \text{CH}_3\text{CHO} > \text{CH}_3\text{COCH}_3$
39. From which of the following, tertiary butyl alcohol is obtained by the action of methyl magnesium iodide? [MP CET 2000]  
 (A) HCHO (B)  $\text{CH}_3\text{CHO}$   
 (C)  $\text{CH}_3\text{COCH}_3$  (D)  $\text{CO}_2$
40. Which one of the following is an acetal? [TS EAMCET (Engg.) 2015]
- (A)  $\begin{array}{c} \text{OR}' \\ | \\ \text{R}-\text{CH} \\ | \\ \text{OR}' \end{array}$  (B)  $\begin{array}{c} \text{OH} \\ | \\ \text{R}-\text{CH} \\ | \\ \text{OR}' \end{array}$
- (C)  $\begin{array}{c} \text{OH} \\ | \\ \text{R}-\text{C} \\ | \\ \text{R} \end{array}$  (D)  $\begin{array}{c} \text{OR}' \\ | \\ \text{R}-\text{C} \\ | \\ \text{OR}' \end{array}$
41. When ethanal reacts with  $\text{CH}_3\text{MgBr}$  and  $\text{C}_2\text{H}_5\text{OH}$  /dry HCl, the products formed are \_\_\_\_\_. [DCE 2003]  
 (A) ethyl alcohol and propan-2-ol  
 (B) ethane and hemi-acetal  
 (C) propan-2-ol and acetal  
 (D) propane and methyl acetate
42. Formaldehyde reacts with ammonia to give \_\_\_\_\_. [AIIMS 1982; NCERT 1987; MP PET 1990, 91, 2000; CPMT 1978, 82, 86, 97; MP PMT 1989, 96]  
 (A) hexamethylene tetramine  
 (B) formaldehyde ammonia  
 (C) formalin  
 (D) methylamine
43.  $\text{A} \xrightarrow{[\text{O}]} \text{B} \xrightarrow{\text{NH}_2\text{OH}} (\text{CH}_3)_2\text{C} = \text{NOH}$   
 Identify A. [MH CET 2002]
- (A)  $\text{CH}_3-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_3$  (B)  $\text{CH}_3\text{OH}$
- (C)  $\text{CH}_3-\overset{\text{OH}}{\text{C}}-\text{CH}_3$  (D)  $\text{C}_2\text{H}_5\text{OH}$
44. Acetaldehyde reacts with phenyl hydrazine, the type is \_\_\_\_\_. [MH CET 2004]  
 (A) elimination (B) condensation  
 (C) hydrolysis (D) addition
45. Aldehydes or ketones when treated with  $\text{C}_6\text{H}_5-\text{NH}-\text{NH}_2$ , the product formed is \_\_\_\_\_. [MHT CET 2017]  
 (A) semicarbazone (B) phenylhydrazone  
 (C) hydrazone (D) oxime
46. Aldehydes and ketones can be reduced to corresponding hydrocarbons by \_\_\_\_\_. [Roorkee 1995; Kerala PMT 2004]  
 (A) refluxing with water  
 (B) refluxing with strong acid  
 (C) refluxing with soda amalgam and water  
 (D) refluxing with zinc amalgam and conc. HCl
47. During Clemmensen's reduction, the  $\text{C}=\text{O}$  group is converted into \_\_\_\_\_ group. [MH CET 2006]  
 (A) carboxyl (B) aldehydic  
 (C) methylene (D) alcoholic
48. The reagent used in Wolff-Kishner reduction is \_\_\_\_\_. [MHT CET 2016]  
 (A)  $\text{NH}_2-\text{NH}_2$  and KOH in ethylene glycol  
 (B)  $\text{Zn}-\text{Hg}/\text{conc. HCl}$   
 (C)  $\text{NaBH}_4$   
 (D)  $\text{Na}-\text{Hg}/\text{H}_2\text{O}$
49.  $2\text{CH}_3-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_3 \xrightarrow[\text{H}^+]{\text{Mg}/\text{Hg}} \text{Product}$ .  
 Product in the reaction is \_\_\_\_\_. [RPMT 2003]
- (A)  $\begin{array}{c} \text{CH}_3 \quad \text{CH}_3 \\ | \quad | \\ \text{H}_3\text{C}-\text{C}-\text{C}-\text{CH}_3 \\ | \quad | \\ \text{OH} \quad \text{OH} \end{array}$
- (B)  $\begin{array}{c} \text{CH}_3-\text{C}-\text{O}-\text{C}-\text{CH}_3 \\ || \quad || \\ \text{O} \quad \text{O} \end{array}$
- (C)  $\begin{array}{c} \text{CH}_3-\text{CH}-\text{CH}-\text{CH}_3 \\ | \quad | \\ \text{OH} \quad \text{OH} \end{array}$
- (D)  $\begin{array}{c} \text{OH} \quad \text{OH} \\ | \quad | \\ \text{CH}_3-\text{C}-\text{C}-\text{CH}_3 \\ | \quad | \\ \text{OH} \quad \text{OH} \end{array}$
50. Which of the following reagents distinguishes between aldehyde and ketone? [KCET 1993; CPMT 1994, 97; MP PET 1995; MP PMT 1996; RPMT 1997, 99]  
 (A) Fehling solution (B)  $\text{H}_2\text{SO}_4$  solution  
 (C)  $\text{NaHSO}_3$  (D)  $\text{NH}_3$



51. The solution of Fehling B contains \_\_\_\_\_.  
[GUJ CET 2014]

- (A) alkaline sodium potassium citrate  
(B) acidified Rochelle salt  
(C) alkaline sodium potassium tartarate  
(D) acidified sodium potassium citrate

52. Tollen's reagent is \_\_\_\_\_.  
[MP PET 1995; MP PMT 2002; KCET 2002]

- (A) ammoniacal cuprous chloride  
(B) ammoniacal cuprous oxide  
(C) ammoniacal silver bromide  
(D) ammoniacal silver nitrate

53. When acetaldehyde is heated with Tollen's reagent which of the following is obtained?  
[CPMT 1989; MP PET/PMT 1988; DPMT 1983; CBSE PMT 1988]

- (A) Methyl alcohol (B) Silver acetate  
(C) Silver mirror (D) Formaldehyde

54. Which of the following compounds will give positive test with Tollen's reagent?  
[CBSE 1994; Kurukshetra CEE 1998; AFMC 2002; CPMT 1997]

- (A) Acetamide (B) Acetaldehyde  
(C) Acetic acid (D) Acetone

55. Schiff's reagent is \_\_\_\_\_. [MH CET 2001]

(A) ammoniacal silver nitrate  
(B) resorcinol solution in dilute HCl  
(C) alkaline  $\text{CuSO}_4$  stabilised by Roschelle salt  
(D) rosaaniline solution in water decolourised by  $\text{SO}_2$

56. Schiff reagent loses its colour by passing \_\_\_\_\_. [MH CET 2007]

(A)  $\text{SO}_2$  (B)  $\text{N}_2$  (C)  $\text{O}_2$  (D)  $\text{SO}_3$

57. Schiff reagent gives pink colour with \_\_\_\_\_.  
[EAMCET 1980; DPMT 1981; CPMT 1989; Bihar MEE 1997; MP PMT 2000]

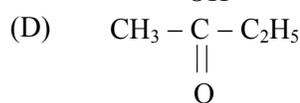
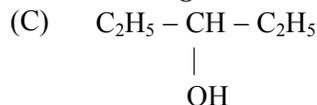
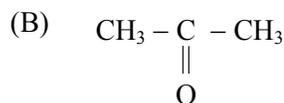
- (A) aldehydes (B) ethers  
(C) ketones (D) carboxylic acid

58. Which of the following will give yellow precipitate with  $\text{I}_2/\text{NaOH}$ ? [IIT 1997]

- (A)  $\text{ICH}_2\text{COCH}_2\text{CH}_3$   
(B)  $\text{CH}_3\text{COOCOCH}_3$   
(C)  $\text{CH}_3\text{CONH}_2$   
(D)  $\text{CH}_3\text{CH}(\text{OH})\text{CH}_2\text{CH}_3$

59. Which of the following compounds does NOT undergo haloform reaction? [MHT CET 2018]

- (A)  $\text{CH}_3 - \underset{\text{OH}}{\text{CH}} - \text{CH}_3$



60. Which of the following compounds will give positive iodoform test? [MHT CET 2017]

- (A) Isopropyl alcohol  
(B) Propionaldehyde  
(C) Ethylphenyl ketone  
(D) Benzyl alcohol

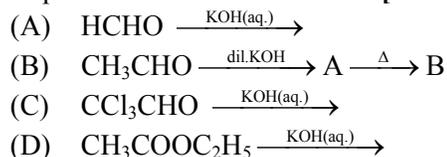
61. Which of the reagent is used to convert 2-butanone into propanoic acid? [IIT 2005]

- (A)  $\text{NaOH}, \text{I}_2/\text{H}^+$  (B) Tollen's reagent  
(C) Fehling solution (D)  $\text{NaOH}, \text{NaI}/\text{H}^+$

62. When acetaldehyde is reacted with very dilute sodium hydroxide, \_\_\_\_\_ is obtained. [MH CET 2003]

- (A) aldol (B) ethyl alcohol  
(C) ketol (D) glyoxal

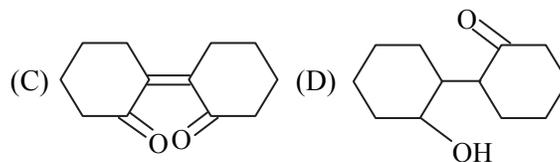
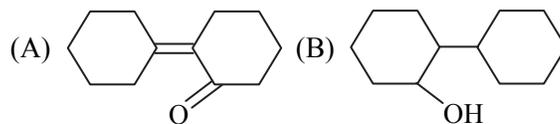
63.  $\alpha, \beta$ -Unsaturated aldehyde is formed in the sequence: [RPMT 2003]



64. Which of the following gives condensation product with  $\text{NH}_2\text{OH}$ , but does NOT undergo aldol condensation? [MH CET 2011]

- (A) Methanal (B) Acetaldehyde  
(C) Methanol (D) Acetone

65. Of the following, which is the product formed when cyclohexanone undergoes aldol condensation followed by heating? [NEET (UG) 2017]







78. Some carboxylic acids and their IUPAC names are given below. Which of the following is NOT CORRECTLY matched? [PMT(Kerala) 2010]

Carboxylic acids	IUPAC names
(A) Formic acid	Methanoic acid
(B) Acetic acid	Ethanoic acid
(C) Isobutyric acid	2-Methylbutanoic acid
(D) n-Butyric acid	Butanoic acid

79.  $\text{CH}_3 - \underset{\substack{| \\ \text{C}_2\text{H}_5}}{\text{CH}} - \text{CH}_2 - \underset{\substack{| \\ \text{CH}_3}}{\text{CH}} - \text{COOH}$   
IUPAC name of the compound is \_\_\_\_\_. [MH CET 2005]

- (A) 2,2-diethylpentanoic acid  
(B) 2-methyl,4-ethylpentanoic acid  
(C) 2,4-dimethylhexanoic acid  
(D) 4-ethyl-2-methylpentanoic acid

80. IUPAC name of  $\text{CH}_3\text{COOC}_2\text{H}_5$  is \_\_\_\_\_. [MH CET 2002]
- (A) ethyl acetate (B) ethyl ethanoate  
(C) ethoxyethane (D) ethyl methyl ester



### 12.11 Methods of preparation of carboxylic acids

81. Acetic acid is obtained when \_\_\_\_\_. [NCERT 1975; CPMT 1977]
- (A) methyl alcohol is oxidised with potassium permanganate  
(B) calcium acetate is distilled in the presence of calcium formate  
(C) acetaldehyde is oxidised with potassium dichromate and sulphuric acid  
(D) glycerol is heated with sulphuric acid
82. Acetic acid will be obtained on oxidation of \_\_\_\_\_. [J & K CET 2005]
- (A) ethanol (B) propanal  
(C) methanal (D) glyoxal

83. Tertiary alcohols ( $3^\circ$ ) having atleast four carbon atoms upon drastic oxidation yield carboxylic acid with \_\_\_\_\_. [MH CET 2004]
- (A) one carbon atom less  
(B) two carbon atoms less  
(C) three carbon atoms less  
(D) the same carbon atom

84. Aryl aldehyde on oxidation gives \_\_\_\_\_. [DPMT 2004]
- (A) esters (B) carboxylic acid  
(C) ketones (D) alcohols

85. Toluene is oxidised to benzoic acid by \_\_\_\_\_. [BHU 2004; CPMT 1985]

- (A) acidified  $\text{KMnO}_4$   
(B) acidified  $\text{K}_2\text{Cr}_2\text{O}_7$   
(C)  $\text{H}_2\text{SO}_4$   
(D) both (A) and (B)

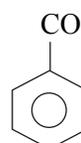
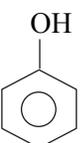
86. A compound 'D' on hydrolysis, formed acetamide which on further hydrolysis gives acetic acid and  $\text{NH}_3$ . The compound 'D' is \_\_\_\_\_. [MH CET 2000]

- (A)  $\text{CH}_3\text{C}\equiv\text{N}$  (B)  $\text{C}_2\text{H}_5\text{I}$   
(C)  $\text{C}_2\text{H}_5\text{OH}$  (D)  $\text{C}_2\text{H}_5\text{ONa}$

87. When Grignard reagent is treated with dry ice, the product obtained is \_\_\_\_\_. [MH CET 2008]

- (A) aldehyde (B) acid  
(C) ester (D) ketone

88.  $\text{C}_6\text{H}_5\text{MgBr} \xrightarrow[\text{(ii) H}_2\text{O}]{\text{(i) CO}_2} \text{P}$ . In the reaction, product P is \_\_\_\_\_. [CBSE PMT 2002]

- (A)  (B)   
(C)  (D)  $\text{C}_6\text{H}_5 - \overset{\text{O}}{\parallel}{\text{C}} - \text{C}_6\text{H}_5$

89. The acid formed when n-propyl magnesium bromide is treated with carbon dioxide is \_\_\_\_\_. [CPMT 1982, 84, 86; Pb. PMT 1998]

- (A)  $\text{C}_3\text{H}_7\text{COOH}$  (B)  $\text{C}_2\text{H}_5\text{COOH}$   
(C)  $\text{C}_3\text{H}_8\text{COOH}$  (D)  $\text{C}_2\text{H}_8\text{COOH}$

90. Which of the following carboxylic acids CANNOT be prepared using Grignard reagent? [MH CET 2004]

- (A) Methanoic acid (B) Ethanoic acid  
(C) Propanoic acid (D) Butyric acid

91. Alkaline hydrolysis of an ester is called \_\_\_\_\_. [BCECE 2015]

- (A) neutralization (B) esterification  
(C) polymerization (D) saponification



### 12.12 Physical properties of carboxylic acids

92. What is the % of acetic acid present in vinegar? [CPMT 1974, 75; MH CET 2003; AFMC 2004]
- (A) 6 – 8 % (B) 70 – 80 %  
(C) 10 – 15 % (D) 90 – 100 %



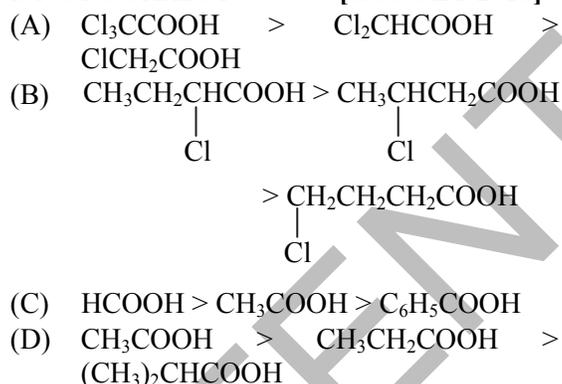
93. Glacial acetic acid is obtained by \_\_\_\_\_.  
[KCET 2002]
- (A) distilling vinegar  
(B) crystallizing, separating and melting acetic acid  
(C) treating vinegar with dehydrating agent  
(D) chemically separating acetic acid



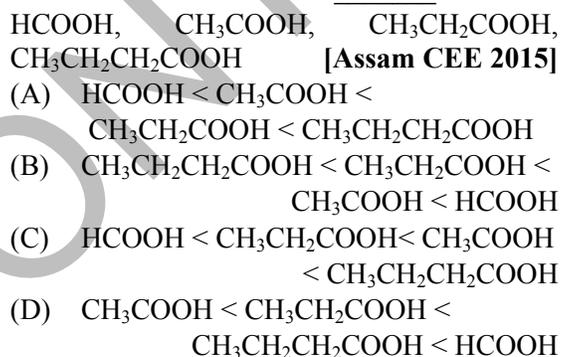
### 12.13 Chemical properties of carboxylic acids

94. Which of the following compounds will react with  $\text{NaHCO}_3$  solution to give sodium salt and carbon dioxide?  
[CBSE PMT 1999; BHU 1983, 2002]
- (A) Phenol (B) n-Hexanol  
(C) Acetic acid (D) Acetic anhydride
95. When propionic acid is treated with aqueous sodium bicarbonate,  $\text{CO}_2$  is liberated. The C of  $\text{CO}_2$  comes from \_\_\_\_\_. [Assam CEE 2015]
- (A) methyl group  
(B) methylene group  
(C) carboxylic acid group  
(D) bicarbonate
96. What is the main reason for the fact that carboxylic acids can undergo ionization?  
[MNR 1993; Pb. PMT 2004]
- (A) Absence of  $\alpha$ -hydrogen  
(B) Resonance stabilization of the carboxylate ion  
(C) High reactivity of  $\alpha$ -hydrogen  
(D) Hydrogen bonding
97. Acetic acid is weak acid than sulphuric acid because \_\_\_\_\_. [CPMT 2003]
- (A) it decompose on increasing temperature  
(B) it has less degree of ionisation  
(C) it has  $-\text{COOH}$  group  
(D) it has less number of  $\text{H}^+$  ion
98. Which of the following compounds is most acidic in nature? [MH CET 2015]
- (A) 4-Chlorobutanoic acid  
(B) 3-Chlorobutanoic acid  
(C) 2-Chlorobutanoic acid  
(D) Butanoic acid
99. Which of the following is the CORRECT order of acidic strength? [GUJ CET 2014]
- (A)  $\text{CH}_3\text{COOH} > \text{ClCH}_2\text{COOH} > \text{Cl}_2\text{CHCOOH} > \text{Cl}_3\text{CCOOH}$   
(B)  $\text{Cl}_3\text{CCOOH} > \text{Cl}_2\text{CHCOOH} > \text{ClCH}_2\text{COOH} > \text{CH}_3\text{COOH}$   
(C)  $\text{CH}_3\text{COOH} > \text{Cl}_3\text{CCOOH} > \text{Cl}_2\text{CHCOOH} > \text{ClCH}_2\text{COOH}$   
(D)  $\text{CH}_3\text{COOH} > \text{ClCH}_2\text{COOH} > \text{Cl}_3\text{CCOOH} > \text{Cl}_2\text{CHCOOH}$

100. Which of the following order of acidic strength is NOT CORRECT? [GUJ CET 2015]



101. The acid strength of the following carboxylic acids increases in the order \_\_\_\_\_.



102. Consider the acidity of the carboxylic acids

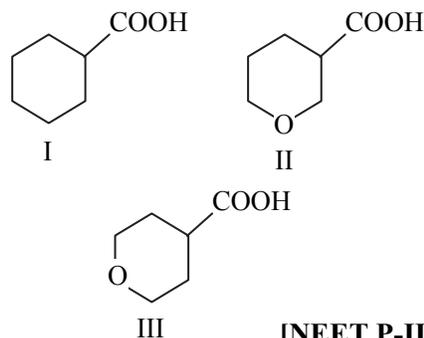
- i.  $\text{PhCOOH}$   
ii.  $o\text{-NO}_2\text{C}_6\text{H}_4\text{COOH}$   
iii.  $p\text{-NO}_2\text{C}_6\text{H}_4\text{COOH}$   
iv.  $m\text{-NO}_2\text{C}_6\text{H}_4\text{COOH}$

Which of the following order is CORRECT?

[AIEEE 2004]

- (A)  $\text{ii} > \text{iv} > \text{i} > \text{iii}$  (B)  $\text{ii} > \text{iv} > \text{iii} > \text{i}$   
(C)  $\text{i} > \text{ii} > \text{iii} > \text{iv}$  (D)  $\text{ii} > \text{iii} > \text{iv} > \text{i}$

103. The CORRECT order of acidic strengths for the following carboxylic acids is \_\_\_\_\_.



[NEET P-II 2016]

- (A)  $\text{II} > \text{I} > \text{III}$  (B)  $\text{I} > \text{II} > \text{III}$   
(C)  $\text{II} > \text{III} > \text{I}$  (D)  $\text{III} > \text{II} > \text{I}$



104. Laboratory method for the preparation of acetyl chloride is \_\_\_\_\_. [RPMT 2003]  
(A)  $\text{CH}_3\text{COOH} + \text{SOCl}_2 \longrightarrow \text{CH}_3\text{COCl}$   
(B)  $\text{CH}_3\text{COOH} + \text{PCl}_3 \longrightarrow \text{CH}_3\text{COCl}$   
(C)  $\text{CH}_3\text{COONa} + \text{PCl}_3 \longrightarrow \text{CH}_3\text{COCl}$   
(D)  $\text{CH}_3\text{COCH}_3 + \text{PCl}_3 \longrightarrow \text{CH}_3\text{COCl}$
105. When formic acid reacts with  $\text{PCl}_5$ , it forms \_\_\_\_\_. [MNR 1982]  
(A) formyl chloride  
(B) acetyl chloride  
(C) methyl chloride  
(D) propionyl chloride
106. Heating a mixture of ethyl alcohol and acetic acid in the presence of conc.  $\text{H}_2\text{SO}_4$  produces a fruity smelling compound. This reaction is called \_\_\_\_\_. [AIIMS 1996]  
(A) neutralization  
(B) ester hydrolysis  
(C) esterification  
(D) Williamson's synthesis
107. Which reagent will bring about the conversion of carboxylic acids into esters? [CBSE PMT 2000]  
(A)  $\text{C}_2\text{H}_5\text{OH}$   
(B) Dry  $\text{HCl} + \text{C}_2\text{H}_5\text{OH}$   
(C)  $\text{LiAlH}_4$   
(D)  $\text{Al}(\text{OC}_2\text{H}_5)_3$
108. Methyl acetate can be formed from ethanoic acid and \_\_\_\_\_. [MH CET 2010]  
(A) ethyl alcohol (B) acetic anhydride  
(C) methanol (D) acetyl chloride
109. Which of the following carboxylic acids is the most reactive towards esterification? [MHT CET 2018]  
(A)  $(\text{CH}_3)_3\text{CCOOH}$   
(B)  $(\text{CH}_3)_2\text{CHCOOH}$   
(C)  $\text{CH}_3\text{CH}_2\text{COOH}$   
(D)  $(\text{C}_2\text{H}_5)_2\text{CHCOOH}$
110. Esterification is studied by \_\_\_\_\_. [MH CET 2007]  
(A) chemical analysis  
(B) tracers  
(C) thermodynamic method  
(D) none of these
111. Acetic anhydride is obtained from acetyl chloride by the reaction of \_\_\_\_\_. [CPMT 1985, 93]  
(A)  $\text{P}_2\text{O}_5$  (B)  $\text{H}_2\text{SO}_4$   
(C)  $\text{CH}_3\text{COONa}$  (D)  $\text{CH}_3\text{COOH}$

112.  $\text{CH}_3\text{COOH} \xrightarrow{\text{P}_2\text{O}_5/\Delta} ?$   
 $\xrightarrow{\text{C}_2\text{H}_5\text{OH}} \text{A} + \text{CH}_3\text{COOH}$ . A is \_\_\_\_\_. [MH CET 2008]  
(A) ethyl formate (B) methyl acetate  
(C) methyl formate (D) ethyl acetate
113. Acetic acid reacts with ammonia at  $110^\circ\text{C}$  to form \_\_\_\_\_. [MP PET 1991]  
(A) acetamide  
(B) formamide  
(C) ammonium cyanate  
(D) urea
114. Hydrolysis of an ester gives a carboxylic acid which on Kolbe's electrolysis yields ethane. The ester is \_\_\_\_\_. [EAMCET 1997; Manipal PMT 2001]  
(A) ethyl methanoate  
(B) methyl ethanoate  
(C) propylamine  
(D) ethylamine
115. Which reaction is used for the preparation of  $\alpha$ -Bromoacetic acid? [MP PET/PMT 1998; MP PET 2004]  
(A) Kolbe's Reaction  
(B) Reimer-Tiemann Reaction  
(C) Hell-Volhard-Zelinsky Reaction  
(D) Perkin's Reaction



### 12.14 Uses of carboxylic acids

116. Vinegar obtained from cane sugar contains \_\_\_\_\_. [CPMT 1980; DPMT 1982; KCET 1992; MP PMT 1994; AIIMS 1999]  
(A) citric acid (B) lactic acid  
(C) acetic acid (D) palmitic acid

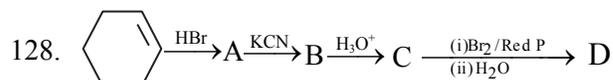


### Miscellaneous

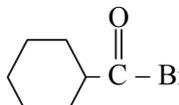
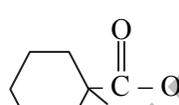
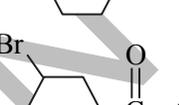
117. The fatty acid which shows reducing property is \_\_\_\_\_. [Kerala CET 2000]  
(A) acetic acid (B) ethanoic acid  
(C) oxalic acid (D) formic acid
118. Predict the product 'B' in the sequence of reaction,  $\text{HC} \equiv \text{CH} \xrightarrow[\text{HgSO}_4]{30\% \text{H}_2\text{SO}_4} \text{A} \xrightarrow{\text{NaOH}} \text{B}$ . [CBSE PMT 2001]  
(A)  $\text{CH}_3\text{COONa}$   
(B)  $\text{CH}_3\text{COOH}$   
(C)  $\text{CH}_3\text{CHO}$   
(D)  $\text{CH}_3 - \underset{\text{OH}}{\text{CH}} - \text{CH}_2\text{CHO}$



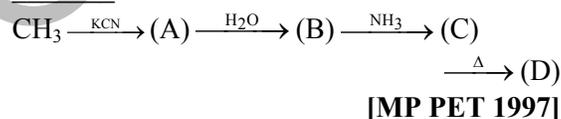
119. In which of the following reactions, propanone gives propane? [MH CET 2003]  
 (A) Williamson's synthesis  
 (B) Clemmensen's synthesis  
 (C) Cannizzaro reaction  
 (D) Wurtz reaction
120. Among the given compounds, the most susceptible to nucleophilic attack at the carbonyl group is \_\_\_\_\_. [IIT 1997]  
 (A) MeCOCl (B) MeCHO  
 (C) MeCOOMe (D) MeCOOCOMe
121. Which of the following has the most acidic hydrogen? [IIT 2000]  
 (A) 3-Hexanone (B) 2,4-Hexanedione  
 (C) 2,5-Hexanedione (D) 2,3-Hexanedione
122. Which of the following is optically active? [BHU 1997]  
 (A) Ethylene glycol (B) Oxalic acid  
 (C) Glycerol (D) Tartaric acid
123. Which of the reagent gets added across the double bond of acetaldehyde?  
 [MH CET 2011]  
 (A) Tollen's reagent  
 (B) Hydroxylamine  
 (C) Hydrogenation using Ni/H<sub>2</sub>  
 (D) Phenylhydrazine
124. Which is most reactive of the following?  
 [J & K CET 2005]  
 (A) Ethyl acetate  
 (B) Acetic anhydride  
 (C) Acetamide  
 (D) Acetyl chloride
125. Which of the following has fruity odour?  
 [MH CET 2004]  
 (A) Aniline (B) Ethyl alcohol  
 (C) Ethyl acetate (D) Acetaldehyde
126. Acetonitrile  $\xrightarrow[\text{H}_2\text{O}]{\text{H}^+}$  A  $\xrightarrow{-\text{H}_2\text{O}}$  B.  
 B is \_\_\_\_\_. [MH CET 2006]  
 (A) acetic anhydride (B) acetaldehyde  
 (C) acetic acid (D) acetanilide
127. In the reaction,  
 $\text{CH}_3\text{COOH} \xrightarrow{\text{LiAlH}_4} \text{A} \xrightarrow{\text{PCl}_5} \text{B} \xrightarrow{\text{Alc. KOH}} \text{C}$ .  
 The product C is \_\_\_\_\_. [JEE (Main) 2014]  
 (A) acetaldehyde  
 (B) acetylene  
 (C) ethylene  
 (D) acetyl chloride



Identify the compound 'D' in the above mentioned series of reactions. [MH CET 2014]

- (A) 
- (B) 
- (C) 
- (D) 

129. The product D in the following reaction is \_\_\_\_\_.



- (A) CH<sub>3</sub>CH<sub>2</sub>NH<sub>2</sub> (B) CH<sub>3</sub>CN  
 (C) HCONH<sub>2</sub> (D) CH<sub>3</sub>CONH<sub>2</sub>

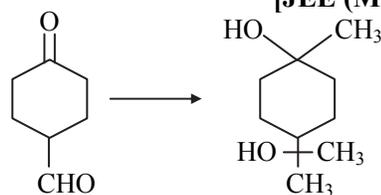
130.  $\text{CH}_3\text{CONH}_2 \xrightarrow{\text{NaNO}_2/\text{HCl}} \text{X}$ ; X is \_\_\_\_\_.

[Pb. CET 2003]

- (A) CH<sub>3</sub>COOH (B) CH<sub>3</sub>CO<sup>+</sup>NH<sub>3</sub>Cl<sup>-</sup>  
 (C) CH<sub>3</sub>NH<sub>2</sub> (D) CH<sub>3</sub>CHO

131. The CORRECT sequence of reagents for the following conversion will be \_\_\_\_\_.

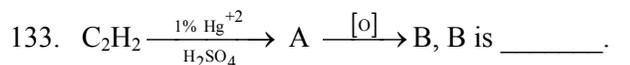
[JEE (Main) 2017]



- (A) [Ag(NH<sub>3</sub>)<sub>2</sub>]<sup>+</sup>OH<sup>-</sup>, H<sup>+</sup>/CH<sub>3</sub>OH, CH<sub>3</sub>MgBr  
 (B) CH<sub>3</sub>MgBr, H<sup>+</sup>/CH<sub>3</sub>OH, [Ag(NH<sub>3</sub>)<sub>2</sub>]<sup>+</sup>OH<sup>-</sup>  
 (C) CH<sub>3</sub>MgBr, [Ag(NH<sub>3</sub>)<sub>2</sub>]<sup>+</sup>OH<sup>-</sup>, H<sup>+</sup>/CH<sub>3</sub>OH  
 (D) [Ag(NH<sub>3</sub>)<sub>2</sub>]<sup>+</sup>OH<sup>-</sup>, CH<sub>3</sub>MgBr, H<sup>+</sup>/CH<sub>3</sub>OH

132. Acetic acid is manufactured by the fermentation of \_\_\_\_\_. [CPMT 1985]

- (A) ethanol (B) methanol  
 (C) ethanal (D) methanal



[CBSE PMT 1991; BHU 1995]

- (A) an acid (B) an aldehyde  
(C) a ketone (D) ethanol

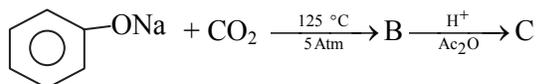
134. In the reaction,



Product C is \_\_\_\_\_. [Pb. CET 2001]

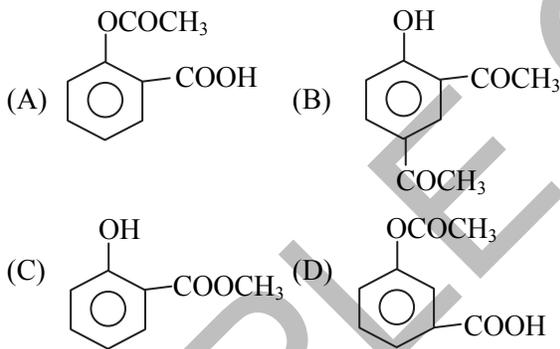
- (A) benzoic acid  
(B) salicylaldehyde  
(C) chlorobenzene  
(D) salicylic acid

135. Sodium phenoxide when heated with  $CO_2$  under pressure at  $125^\circ C$  yields a product which on acetylation produces C.



The major product C would be \_\_\_\_\_.

[JEE (Main) 2014]



136. The distinguishing test between methanoic acid and ethanoic acid is \_\_\_\_\_.

[KCET 2015]

- (A) litmus test  
(B) Tollen's test  
(C) esterification test  
(D) sodium bicarbonate test

137. Which one of the following compounds forms a red coloured solution on treatment with neutral  $FeCl_3$  solution? [EAMCET 2003]

- (A)  $CH_3COCH_3$  (B)  $CH_3OCH_3$   
(C)  $CH_3CH_2OH$  (D)  $CH_3COOH$

138. Paraldehyde is \_\_\_\_\_. [BCECE 2014]

- (A) vinegar (B) 40% HCHO  
(C)  $(CH_3CHO)_3$  (D)  $C_6H_5CHO$

139. In the following sequence of reactions



the end product C is \_\_\_\_\_.

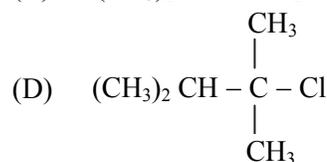
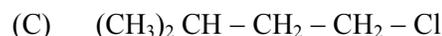
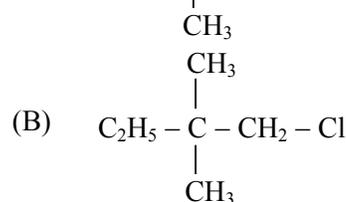
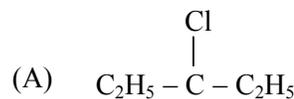
[CBSE PMT (Prelims) 2012]

- (A) acetone (B) methane  
(C) acetaldehyde (D) ethyl alcohol

140. The CORRECT statement regarding a carbonyl compound with a hydrogen atom on its alpha-carbon, is \_\_\_\_\_. [NEET P-I 2016]

- (A) A carbonyl compound with a hydrogen atom on its alpha-carbon rapidly equilibrates with its corresponding enol and this process is known as carbonylation.  
(B) A carbonyl compound with a hydrogen atom on its alpha-carbon rapidly equilibrates with its corresponding enol and this process is known as keto-enol tautomerism.  
(C) A carbonyl compound with a hydrogen atom on its alpha-carbon never equilibrates with its corresponding enol.  
(D) A carbonyl compound with a hydrogen atom on its alpha-carbon rapidly equilibrates with its corresponding enol and this process is known as aldehyde-ketone equilibration.

141. An isomer A of  $C_6H_{13}Cl$  on hydrolysis by moist silver oxide gives B. The compound B on oxidation gives C. The compound C on esterification with ethyl alcohol gives ethyl-2,2-dimethyl butanoate. Which of the following is A? [MH CET 2001]





142. Which of the following gives iodoform on heating with a solution of  $I_2$  containing  $Na_2CO_3$ ?

[CPMT 1976; DPMT 1981; MP PMT 1990]

- (A) Ethyl alcohol  
(B) Acetone  
(C) Ethyl alcohol and acetone  
(D) Methyl alcohol

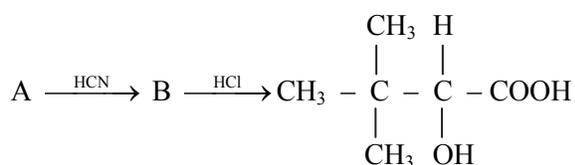
143. The end product in the following sequence of reaction is \_\_\_\_\_.



[Bihar CEE 2002]

- (A) acetic acid (B) isopropyl alcohol  
(C) acetone (D) ethanol

144.



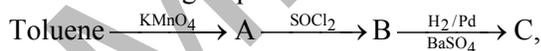
Which of the following is A in the series of reactions?  
[MH CET 2001]

- (A) 3-Methylbutanal  
(B) 2,3-Dimethylpropanal  
(C) 2,2-Diethylpropanal  
(D) 2,2-Dimethylpropanal

145. Identify the WRONG statement from the following.  
[Tamil Nadu CET 2002]

- (A) Salicylic acid is a monobasic acid.  
(B) Methyl salicylate is an ester.  
(C) Salicylic acid gives violet colour with neutral ferric chloride as well as brisk effervescence with sodium bicarbonate.  
(D) Methyl salicylate does not occur in natural oils.

146. In the following sequence of reactions :



the product C is \_\_\_\_\_. [JEE (Main) 2015]

- (A)  $C_6H_5COOH$  (B)  $C_6H_5CH_3$   
(C)  $C_6H_5CH_2OH$  (D)  $C_6H_5CHO$

147. An organic compound "X" having molecular formula  $C_5H_{10}O$  yields phenyl hydrazone and gives negative response to the iodoform test and Tollen's test. It produces n-pentane on reduction. 'X' could be \_\_\_\_\_. [AIPMT 2015]

- (A) pentanal  
(B) pentan-2-one  
(C) pentan-3-one  
(D) n-amy alcohol

148. Among the following compounds, the one(s) that gives (give) effervescence with aqueous  $NaHCO_3$  solution is (are) \_\_\_\_\_.



[WB JEEM 2014]

- (A) I and II (B) I and III  
(C) only II (D) I and IV

149. Which of the following acid does NOT have  $-COOH$  group?  
[GUJ CET 2015]

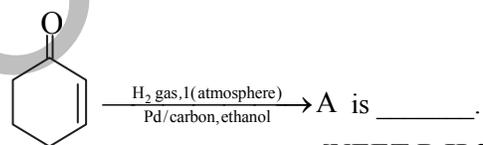
- (A) Ethanoic acid (B) Picric acid  
(C) Benzoic acid (D) Salicylic acid

150. What is the formula of Acrolein?

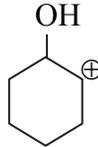
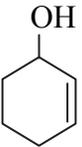
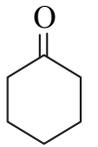
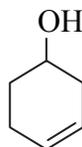
[GUJ CET 2015]

- (A)  $CH_2 = CH - CHO$   
(B)  $CH_2 = CH - CN$   
(C)  $CH_2 = CH - COOH$   
(D)  $CH_2 = CH - CONH_2$

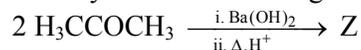
151. The CORRECT structure of the product 'A' formed in the reaction:



[NEET P-II 2016]

- (A)  (B)   
(C)  (D) 

152. Identify Z in the following reaction:



[TS EAMCET (Med.) 2015]

- (A)  $H_3CCH_2CO_2H$   
(B)  $2 H_3CCO_2H$   
(C)  $H_3CCOCH_2CO_2H$   
(D)  $H_3C - \underset{\begin{array}{c} | \\ CH_3 \end{array}}{C} = CHCOCH_3$

153.  $CH_3 - CH_2 - COOH \xrightarrow[\text{RedP}]{Cl_2} A \xrightarrow{\text{alc.KOH}} B.$

The product B is \_\_\_\_\_. [Assam CEE 2015]

- (A)  $CH_3 - CH_2 - CO - Cl$   
(B)  $CH_3 - CH_2 - CHO$   
(C)  $H_2C = CH - COOH$   
(D)  $ClCH_2 - CH_2 - COOH$



154. Iodoform can be prepared from all, EXCEPT \_\_\_\_\_.  
[KCET 2015]

- (A) propan-2-ol (B) butan-2-one  
(C) propan-1-ol (D) acetophenone

155. Acetic acid is treated with  $\text{Ca}(\text{OH})_2$  and the product so obtained is subjected to dry distillation. The final product is \_\_\_\_\_.

[KCET 2015]

- (A) ethanol (B) propanal  
(C) propanone (D) ethanal

156. The IUPAC name of lactic acid is \_\_\_\_\_.

[BCECE 2014]

- (A) 2-hydroxyethanoic acid  
(B) 2-hydroxypropanoic acid  
(C) 3-hydroxybutanoic acid  
(D) 2-hydroxybutanoic acid

157. This does NOT react with Na: [BCECE 2014]

- (A)  $\text{C}_2\text{H}_5\text{OH}$   
(B)  $\text{CH}_3-\overset{\text{OH}}{\text{C}}-\text{CH}_3$   
(C)  $\text{CH}_3-\text{O}-\text{CH}_3$   
(D)  $\text{CH}_3\text{COOH}$

158. This compound has one alcoholic and one aldehydic functional group: [BCECE 2014]

- (A) Aldol  
(B) Cyanohydrin  
(C) Grignard reagent  
(D) Acetoacetate

159. How many C-atoms are there in isopropyl propionate? [BCECE 2014]

- (A) 5 (B) 4  
(C) 6 (D) 7

160. This does NOT react with Fehling's solution:

[BCECE 2015]

- (A)  $\text{CH}_3\text{CHO}$  (B)  $(\text{CH}_3)_2\text{CO}$   
(C)  $\text{HCHO}$  (D)  $\text{HCOOH}$

161. The number of isomeric aldehydes for  $\text{C}_5\text{H}_{10}\text{O}$  is \_\_\_\_\_.

[BCECE 2015]

- (A) 2 (B) 3  
(C) 5 (D) 4

162. This does NOT convert a ketone to an alcohol:

[BCECE 2015]

- (A)  $\text{Zn}/\text{Hg} + \text{HCl}$  (B)  $\text{H}_2/\text{Raney Ni}$   
(C)  $\text{LiAlH}_4$  (D)  $\text{Na}/\text{Hg} + \text{H}_2\text{O}$

163.  $\text{H}_3\text{CCH}_2\text{CO}_2\text{H} \xrightarrow[\Delta]{\text{P}_2\text{O}_5} \text{X} \xrightarrow{\text{H}_2\text{O}} \text{Y} \xrightarrow{\text{SOCl}_2} \text{Z}$

Identify X, Y and Z.

[TS EAMCET (Engg.) 2015]

- (A) X :  $\text{H}_2\text{C} = \text{CHCO}_2\text{H}$   
Y :  $\text{HOCH}_2\text{CHOHCO}_2\text{H}$   
Z :  $\text{HOH}_2\text{CCHOHCOCI}$   
(B) X :  $(\text{H}_3\text{CCH}_2\text{CO})_2\text{O}$   
Y :  $\text{H}_3\text{CCH}_2\text{CO}_2\text{H}$   
Z :  $\text{H}_3\text{CCH}_2\text{COCl}$   
(C) X :  $(\text{H}_3\text{CCO})_2\text{O}$   
Y :  $\text{H}_3\text{CCO}_2\text{H}$   
Z :  $\text{ClCH}_2\text{COCl}$   
(D) X :  $(\text{H}_3\text{CCH}_2\text{CO})_2\text{O}$   
Y :  $\text{H}_3\text{CCO}_2\text{H}$   
Z :  $\text{H}_3\text{CCOCl}$

164. Reaction of a carbonyl compound with one of the following reagents involves nucleophilic addition followed by elimination of water. The reagent is \_\_\_\_\_.

[AIPMT RE-TEST 2015]

- (A) hydrocyanic acid  
(B) sodium hydrogen sulphite  
(C) a Grignard reagent  
(D) hydrazine in presence of feebly acidic solution

165. Nitration of which among the following compounds yields cyclonite?

[MHT CET 2017]

- (A) Formaldehyde  
(B) Benzaldehyde  
(C) Urotropine  
(D) Acetaldehyde-ammonia

166. An organic compound,  $\text{C}_3\text{H}_6\text{O}$  does NOT give a precipitate with 2,4-Dinitrophenylhydrazine reagent and does NOT react with metallic sodium. It could be \_\_\_\_\_.

[VITEEE 2005]

- (A)  $\text{CH}_3-\text{CH}_2-\text{CHO}$   
(B)  $\text{CH}_3-\text{CO}-\text{CH}_3$   
(C)  $\text{CH}_2=\text{CH}-\text{CH}_2\text{OH}$   
(D)  $\text{CH}_2=\text{CH}-\text{O}-\text{CH}_3$



## Answer Key



### Classical Thinking

1. (B) 2. (B) 3. (C) 4. (B) 5. (C) 6. (D) 7. (A) 8. (B) 9. (B) 10. (B)  
 11. (A) 12. (D) 13. (D) 14. (C) 15. (D) 16. (C) 17. (A) 18. (C) 19. (A) 20. (C)  
 21. (C) 22. (C) 23. (C) 24. (B) 25. (D) 26. (D) 27. (B) 28. (B) 29. (D) 30. (A)  
 31. (A) 32. (B) 33. (D) 34. (C) 35. (C) 36. (C) 37. (D) 38. (B) 39. (B) 40. (B)  
 41. (B) 42. (D) 43. (A) 44. (B) 45. (C) 46. (C) 47. (C) 48. (A) 49. (B) 50. (B)  
 51. (C) 52. (D) 53. (C) 54. (C) 55. (A) 56. (A) 57. (A) 58. (C) 59. (A) 60. (A)  
 61. (D) 62. (C) 63. (A) 64. (C) 65. (C) 66. (A) 67. (A) 68. (B) 69. (B) 70. (B)  
 71. (A) 72. (C) 73. (A) 74. (A) 75. (A) 76. (D) 77. (B) 78. (D) 79. (B) 80. (A)  
 81. (A) 82. (A) 83. (D) 84. (C) 85. (B) 86. (C)



### Critical Thinking

1. (B) 2. (D) 3. (C) 4. (A) 5. (D) 6. (C) 7. (D) 8. (A) 9. (A) 10. (B)  
 11. (C) 12. (A) 13. (D) 14. (B) 15. (B) 16. (B) 17. (B) 18. (C) 19. (C) 20. (C)  
 21. (A) 22. (D) 23. (B) 24. (D) 25. (B) 26. (D) 27. (C) 28. (C) 29. (C) 30. (A)  
 31. (C) 32. (C) 33. (C) 34. (C) 35. (D) 36. (B) 37. (C) 38. (B) 39. (B) 40. (D)  
 41. (C) 42. (B) 43. (D) 44. (B) 45. (D) 46. (C) 47. (B) 48. (B) 49. (C) 50. (B)  
 51. (C) 52. (D) 53. (D) 54. (C) 55. (D) 56. (D)



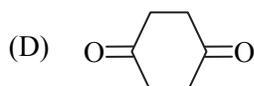
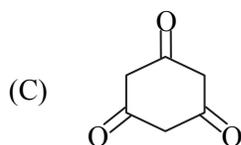
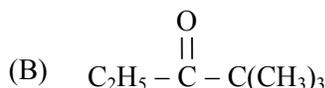
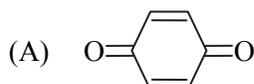
### Competitive Thinking

1. (C) 2. (B) 3. (B) 4. (A) 5. (B) 6. (B) 7. (B) 8. (B) 9. (A) 10. (A)  
 11. (D) 12. (A) 13. (C) 14. (A) 15. (B) 16. (A) 17. (B) 18. (B) 19. (C) 20. (D)  
 21. (B) 22. (B) 23. (B) 24. (D) 25. (B) 26. (C) 27. (B) 28. (A) 29. (C) 30. (D)  
 31. (C) 32. (B) 33. (C) 34. (D) 35. (D) 36. (D) 37. (B) 38. (D) 39. (C) 40. (A)  
 41. (C) 42. (A) 43. (C) 44. (B) 45. (B) 46. (D) 47. (C) 48. (A) 49. (A) 50. (A)  
 51. (C) 52. (D) 53. (C) 54. (B) 55. (D) 56. (A) 57. (A) 58. (D) 59. (C) 60. (A)  
 61. (A) 62. (A) 63. (B) 64. (A) 65. (A) 66. (B) 67. (A) 68. (C) 69. (B) 70. (D)  
 71. (A) 72. (A) 73. (B) 74. (B) 75. (D) 76. (A) 77. (A) 78. (C) 79. (C) 80. (B)  
 81. (C) 82. (A) 83. (B) 84. (B) 85. (D) 86. (A) 87. (B) 88. (B) 89. (A) 90. (A)  
 91. (D) 92. (A) 93. (B) 94. (C) 95. (D) 96. (B) 97. (B) 98. (C) 99. (B) 100. (C)  
 101. (B) 102. (D) 103. (C) 104. (A) 105. (A) 106. (C) 107. (B) 108. (C) 109. (C) 110. (B)  
 111. (C) 112. (D) 113. (A) 114. (B) 115. (C) 116. (C) 117. (D) 118. (D) 119. (B) 120. (A)  
 121. (B) 122. (D) 123. (C) 124. (D) 125. (C) 126. (A) 127. (C) 128. (B) 129. (D) 130. (A)  
 131. (A) 132. (A) 133. (A) 134. (D) 135. (A) 136. (B) 137. (D) 138. (C) 139. (D) 140. (B)  
 141. (B) 142. (C) 143. (C) 144. (D) 145. (D) 146. (D) 147. (C) 148. (A) 149. (B) 150. (A)  
 151. (C) 152. (D) 153. (C) 154. (C) 155. (C) 156. (B) 157. (C) 158. (A) 159. (C) 160. (B)  
 161. (D) 162. (A) 163. (B) 164. (D) 165. (C) 166. (D)

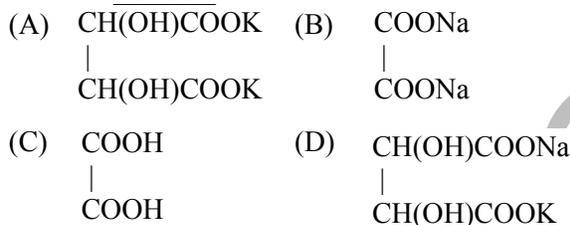


Evaluation Test

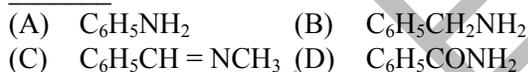
1. Tautomerism is NOT exhibited by \_\_\_\_\_.



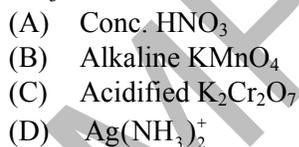
2. Fehling solution is a mixture of two solutions. While one solution contains  $\text{CuSO}_4$ , the other contains \_\_\_\_\_.



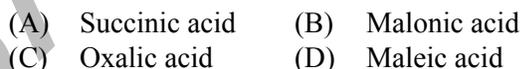
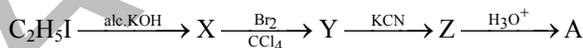
3. Benzaldehyde reacts with methylamine to give \_\_\_\_\_.



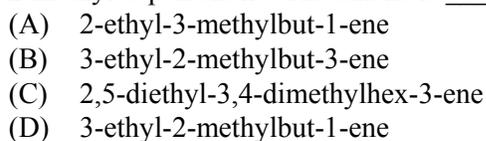
4. The best oxidising agent for oxidation of  $\text{CH}_3 - \text{CH} = \text{CH} - \text{CHO}$  to  $\text{CH}_3 - \text{CH} = \text{CH} - \text{COOH}$  is \_\_\_\_\_.



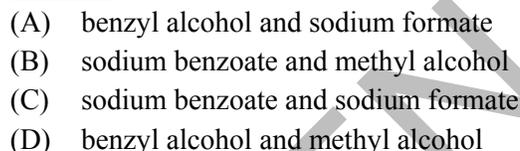
5. The acid produced (A) in the sequence given below is:



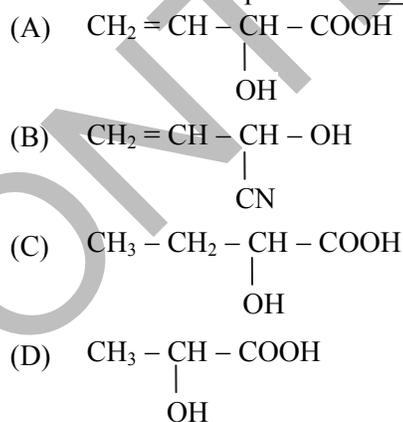
6. Ozonolysis of  $\text{C}_7\text{H}_{14}$  gave 2-methyl-3-pentanone. The alkene is \_\_\_\_\_.



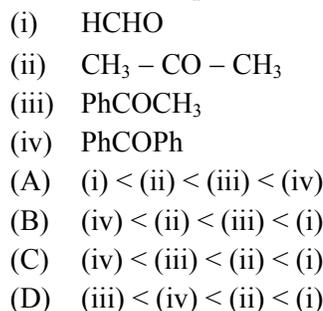
7. A mixture of benzaldehyde and formaldehyde on heating with aqueous  $\text{NaOH}$  solution gives \_\_\_\_\_.



8.  $\text{CH}_3 - \text{CHO} + \text{H} - \text{CHO} \xrightarrow[\text{Heat}]{\text{dil. NaOH}} \text{A} \xrightarrow[\text{H}_3\text{O}^+]{\text{HCN}} \text{B}$ , the structure of compound B is \_\_\_\_\_.



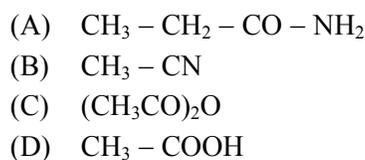
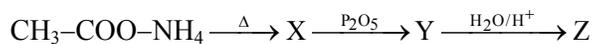
9. The increasing order of the rate of  $\text{HCN}$  addition to compounds (i) – (iv) is \_\_\_\_\_.

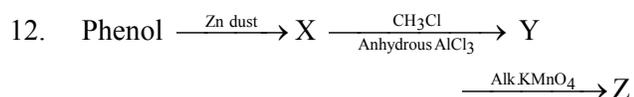


10. In a reaction, involving ring substitution of  $\text{C}_6\text{H}_5\text{Y}$ , the major product is meta isomer. The group Y can be \_\_\_\_\_.



11. Identify Z.





The product Z is \_\_\_\_\_.

- (A) benzaldehyde (B) benzoic acid  
(C) benzene (D) toluene
13. When  $\text{CH}_2 = \text{CH} - \text{COOH}$  is reduced with  $\text{LiAlH}_4$ , the compound obtained will be \_\_\_\_\_.
- (A)  $\text{CH}_3 - \text{CH}_2 - \text{COOH}$   
(B)  $\text{CH}_2 = \text{CH} - \text{CH}_2 - \text{OH}$   
(C)  $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{OH}$   
(D)  $\text{CH}_3 - \text{CH}_2 - \text{CHO}$
14. Among the following acids which has the lowest  $\text{pK}_a$  value?
- (A)  $\text{CH}_3 - \text{COOH}$   
(B)  $\text{H} - \text{COOH}$   
(C)  $(\text{CH}_3)_2\text{CH} - \text{COOH}$   
(D)  $\text{CH}_3 - \text{CH}_2 - \text{COOH}$
15. Which of the following compound is resistant to nucleophilic attack by hydroxyl ion?
- (A) Methyl acetate  
(B) Acetonitrile  
(C) Acetamide  
(D) Diethyl ether
16. Saponification of ethyl benzoate with caustic soda as alkali, gives \_\_\_\_\_.
- (A) benzyl alcohol, ethanoic acid  
(B) sodium benzoate, ethanol  
(C) benzoic acid, sodium ethoxide  
(D) phenol, ethanoic acid
17. The smallest ketone and its next homologue are reacted with  $\text{NH}_2\text{OH}$  to form oxime, \_\_\_\_\_.
- (A) two different oximes are formed  
(B) three different oximes are formed  
(C) two oximes are optically active  
(D) all oximes are optically active
18. Which of the following combination of aldehydes gives cross Cannizzaro reaction?
- (A)  $\text{CH}_3\text{CHO}$ ,  $\text{HCHO}$   
(B)  $\text{C}_6\text{H}_5\text{CHO}$ ,  $\text{CH}_3\text{CHO}$   
(C)  $\text{C}_6\text{H}_5\text{CHO}$ ,  $\text{HCHO}$   
(D) All of the these

19. Which of the following reagents react differently with  $\text{HCHO}$ ,  $\text{CH}_3\text{CHO}$  and  $\text{CH}_3\text{COCH}_3$ ?

- (A)  $\text{HCN}$  (B)  $\text{NH}_2\text{NH}_2$   
(C)  $\text{NH}_2\text{OH}$  (D)  $\text{NH}_3$



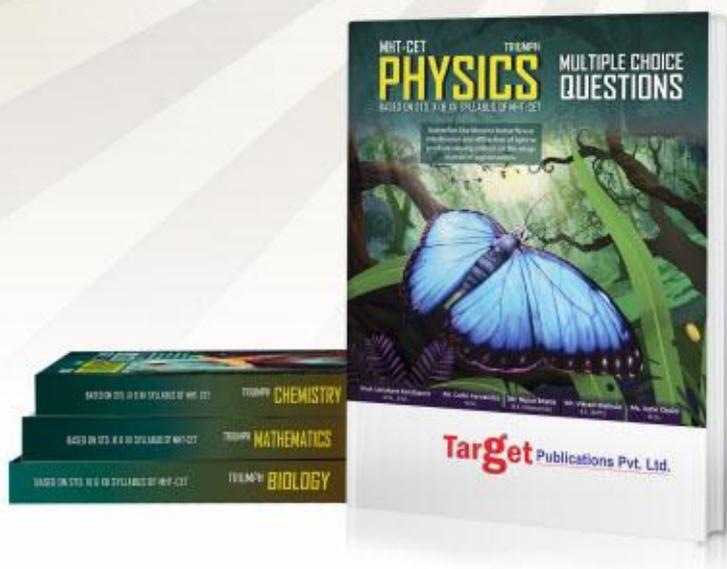
### Answers to Evaluation Test

1. (A) 2. (D) 3. (C) 4. (D)  
5. (A) 6. (A) 7. (A) 8. (A)  
9. (C) 10. (B) 11. (D) 12. (B)  
13. (B) 14. (B) 15. (D) 16. (B)  
17. (B) 18. (C) 19. (D)



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