# Organic Chemistry Some Basic Principles & Techniques

# **Question1**

The set of meta directing functional groups from the following sets is:

[1-Feb-2024 Shift 2]

## **Options:**

A.

-CN, -NH2, -NHR, -OCH<sub>3</sub>

B.

-NO2, -NH2, -COOH, -COOR

C.

<sup>-</sup>NO<sub>2</sub>, <sup>-</sup>CHO, <sup>-</sup>SO<sub>3</sub>H, <sup>-</sup>COR

D.

-CN, -CHO, -NHCOCH<sub>3</sub>, -COOR

## Answer: C

## Solution:



All are -M, Hence meta directing groups.

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# **Question2**

Following Kjeldahl's method, 1g of organic compound released ammonia, that neutralised 10 mL of  $2MH_2SO_4$ . The percentage of nitrogen in the compound is\_\_\_\_\_%.

[1-Feb-2024 Shift 2]

## Solution:

$$\begin{split} H_2 SO_4 + 2NH_3 &\rightarrow (NH_4)_2 SO_4 \\ \text{Millimole of } H_2 SO_4 &\rightarrow 10 \times 2 \\ \text{So Millimole of } NH_3 &= 20 \times 2 = 40 \\ \text{Organic} &\rightarrow NH_3 \\ \text{Compound} & 40 \text{ Millimole} \\ \therefore \text{ Mole of } N &= \frac{40}{1000} \\ \text{wt. of } N &= \frac{40}{1000} \times 14 \\ \text{\% composition of N in organic compound} \\ &= \frac{40 \times 14}{1000 \times 1} \times 100 \\ &= 56\% \end{split}$$

# **Question3**

Increasing order of stability of the resonance structure is :

Α.





# [24-Jan-2023 Shift 1]

#### **Options:**

A. C, D, B, A

B. C, D, A, B

C. D, C, A, B

D. D, C, B, A

Answer: B

## Solution:

No option is matching the correct answer. Order should be : C < A < B < D

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# **Question4**

Given below are two statements, one is labelled as Assertion A and the other is labelled as Reason R. Assertion A : Benzene is more stable than hypothetical cyclohexatriene.

Reason R : The delocalized  $\pi$  electron cloud is attracted more strongly by nuclei of carbon atoms. In the light of the above statements, choose the correct answer from the options given below: [24-Jan-2023 Shift 2]

#### **Options:**

A. A is true but R is false.

B. A is false but R is true.

C. Both A and R are correct and R is the correct explanation of A.

D. Both A and R are correct but R is NOT the correct explanation of A.

#### Answer: C

## Solution:

Assertion - A : Benzene is more stable than cyclohexatriene (True) Reason -R : Delocalised  $\pi - e$  cloud lies B.M.O so more attracted by nuclei of carbon atom. (True & Correct Explanation)

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Which of the following conformations will be the most stable? [25-Jan-2023 Shift 1]

**Options:** 

A.











D.



#### **Answer:** A

## Solution:

Conformation



has lowest vanderwaal and torsional strain. Hence it must be most stable.

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# **Question6**

In sulphur estimation. 0.471g of an organic compound gave 1.4439g of barium sulphate.

The percentage of sulphur in the compound is \_\_\_\_\_ (Nearest Integer) (Given: Atomic mass Ba: 137u : S : 32u, O : 16u ) [25-Jan-2023 Shift 1]

#### Answer: 42

## Solution:

 $\text{\%sulphur} = \frac{32}{233} \times \frac{\text{weight of } BaSO_4 \text{ formed}}{\text{weight of organic compound}} \times 100$  $= \frac{32}{233} \times \frac{1.4439}{0.471} \times 100$ = 42.10Nearest integer 42

# **Question7**

The isomeric deuterated bromide with molecular formula  $C_4H_8$  DBr having two chiral carbon atoms is [25-Jan-2023 Shift 2]

#### **Options:**

A. 2-Bromo-1-deuterobutane

B. 2-Bromo-2-deuterobutane

C. 2-Bromo-3-deuterobutane

D. 2-Bromo-1-deutero-2-methylpropane

Answer: C

## Solution:

Н Н \*-CH, H<sub>i</sub>C-C Br D

# **Question8**

## Match List I with List II.

List I	List II
Isomeric pairs	Type of isomers
A. Propanamine and N-Methylethanamine	I. Metamers
B. Hexan-2-one and Hexan-3-one	II. Positional isomers
C. Ethanamide andHydroxyethanimine	III. Functional isomers
D. o-nitrophenol and pnitrophenol	IV. Tautomers

## Choose the correct answer from the options given below :-[25-Jan-2023 Shift 2]

#### **Options:**

A. A-III, B-IV, C-I, D-II

B. A-IV, B-III, C-I, D-II

C. A-II, B-III, C-I, D-IV

D. A-III, B-I, C-IV, D-II

#### Answer: D

## Solution:



Identify the correct order for the given property for following compounds

(A) Boiling Point: 
$$\bigcirc C < \bigcirc C$$

## Choose the correct answer from the option given below :-[29-Jan-2023 Shift 1]

#### **Options:**

A. (B), (C) and (D) only

B. (A), (C) and (E) only

C. (A), (C) and (D) only

D. (A), (B) and (E) only

Answer: B

## Solution:

Boiling point of alkyl halide increases with increase in size, mass of halogen atom and size of alkyl group Boiling point of isomeric alkyl halide decreases with increase in branching Density increases with increase in atomic mass of halogen atom

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# **Question10**

Compound that will give positive Lassaigne's test for both nitrogen and halogen is [29-Jan-2023 Shift 1]

#### **Options:**

A.  $\mathrm{N_2H_4}\cdot\mathrm{HCl}$ 

B.  $\text{CH}_3\text{NH}_2\cdot\text{HCl}$ 

C. NH<sub>4</sub>Cl

D.  $\mathrm{NH}_2\,\mathrm{OH}$  . HCl

#### Answer: B

## Solution:

 $CH_3NH_2 \cdot HCl \xrightarrow{Na}_{fusion}$  NaCN and NaCl NaCN gives +ve test for nitrogen and NaCl gives +ve test for halogen

Following chromatogram was developed by adsorption of compound 'A' on a 6 cm TLC glass plate. Retardation factor of the compound 'A' is  $\times 10^{-1}$ .



## [29-Jan-2023 Shift 1]

#### Answer: 6

## Solution:

 $R_{f} = \frac{\text{Distance moved by the substance from base line}}{\text{Distance move dby the solvent from base line}}$  $= \frac{3.0 \text{ cm}}{5.0 \text{ cm}} = 0.6 \text{ or } 6 \times 10^{-1}$ 

\_\_\_\_\_

# **Question12**

The most stable carbocation for the following is:



[30-Jan-2023 Shift 2]

## **Options:**

- A. c
- B. d

C. b

D. a

Answer: A

## Solution:



# **Question13**

# Match items of column I and II

Column I (Mixture of compounds)	Column II (Separation Technique)
A. $H_2O/CH_2Cl_2$	i. Crystallization
$B. \underbrace{\bigcirc}_{NO_2}^{O} / \underbrace{\bigcirc}_{NO_2}^{OH}$	ii. Differential solvent extraction
C. Kerosene/Naphthalene	iii. Column chromatography
D. C <sub>6</sub> H <sub>12</sub> O <sub>6</sub> /NaCl	iv. Fractional Distillation

## Correct match is: [31-Jan-2023 Shift 1]

#### **Options:**

A. A-(iii), B-(iv), C-(ii), D-(i)

B. A-(i), B-(iii), C-(ii), D-(iv)

C. A-(ii), B-(iii), C-(iv), D-(i)

D. A-(ii), B-(iv), C-(i), D-(iii)

## Answer: C

## Solution:

A.  $H_2O / CH_2Cl_2 \rightarrow ii$ ,  $CH_2Cl_2 > H_2O$  (density) so they can be separated by differential solvent extraction. B.



iii. column chromatography Due to H-bonding in



it can be separated from



by column chromatography. C. Kerosene / Naphthalene  $\rightarrow$  iv. Fractional distillation. Due to different B.P. of kerosene and Naphthalene it can be separated by fractional distillation. D.  $C_6H_{12}O_6$  / NaCl $\rightarrow$  i. Crystallization. NaCl (ionic compound) can be crystallized.

# **Question14**

Consider the following reaction Propanal + Methanal = (i) (i)

# The correct statement for product B is. It is [31-Jan-2023 Shift 1]

#### **Options:**

A. optically active and adds one mole of bromine

B. racemic mixture and is neutral

C. racemic mixture and gives a gas with saturated  $NaHCO_3$  solution

D. optically active alcohol and is neutrall

#### Answer: C

## Solution:

 $CH_3 - CH_2 - CHO + HCHO \xrightarrow{OH^-}_{\Delta}$ 



An organic compound [A]( $C_4H_{11}N$ ), shows optical activity and gives  $N_2$ gas on treatment with  $HNO_2$ . The compound [A] reacts with  $PhSO_2Cl$ producing a compound which is soluble in KOH. The structure of A is: [31-Jan-2023 Shift 2]

**Options:** 

A.

 $-NH_2$ 

B.



C.



D.







 $\rm C_4H_{11}N$  releases  $\rm N_2$  with  $\rm HNO_2$  i.e. it is primary amine. After reacting with Hinsberg reagent it forms a compound which is soluble in KOH, Hence, the amine is primary.

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# **Question16**

# In Dumas method for the estimation of $N_2$ , the sample is heated with copper oxide and the gas evolved is passed over: [31-Jan-2023 Shift 2]

#### **Options:**

A. Ni

B. Copper gauze

C. Pd

D. Copper oxide

Answer: B

## Solution:

Duma's method.

The nitrogen containing organic compound, when heated with CuO in a atmosphere of  $CO_2$ , yields free  $N_2$  in addition to  $CO_2$  and  $H_2O$ .

 $C_{x}H_{y}N_{z} + \left(2x + \frac{y}{2}\right)CuO \rightarrow$ 

$$xCO_2 + \frac{y}{2}H_2O + \frac{z}{2}N_2 + \left(2x + \frac{y}{2}\right)Cu$$

Traces of nitrogen oxides formed, if any, are reduced to nitrogen by passing the gaseous mixture over heated copper gauze.

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# **Question17**

In the following halogenated organic compounds the one with maximum number of chlorine atoms in its structure is : [31-Jan-2023 Shift 2]

#### **Options:**

- A. Chloral
- B. Gammaxene
- C. Chloropicrin
- D. Freon -12

Answer: B

# Solution:



Resonance in carbonate ion ( $CO_3^{2-}$ ) is



Which of the following is true? [1-Feb-2023 Shift 1]

## **Options:**

- A. It is possible to identify each structure individually by some physical or chemical method.
- B. All these structures are in dynamic equilibrium with each other.
- C. Each structure exists for equal amount of time.
- D.  ${\rm CO_3}^{2-}$  has a single structure i.e., resonance hybrid of the above three structures.

## Answer: D

# Solution:

Resonating structure are hypothetical and resonance hybrid is real structure which is weighted average of all the resonating structures.

The total number of chiral compound/s from the following is \_\_\_\_\_.



[1-Feb-2023 Shift 1]

Answer: 2

Solution:





All structures given below are of vitamin C. Most stable of them is : [1-Feb-2023 Shift 2]

**Options:** 

A.



Β.



C.



D.



#### Answer: A

## Solution:

H-bonding stabilised vitamin C



# **Question21**

Given below are two statements:

Statement I : Sulphanilic acid gives esterification test for carboxyl group.

Statement II : Sulphanilic acid gives red colour in Lassigne's test for extra element detection.

In the light of the above statements, choose the most appropriate answer from the options given below : [1-Feb-2023 Shift 2]

#### **Options:**

A. Statement I is correct but Statement II is incorrect.

B. Both Statement I and Statement II are incorrect.

C. Both Statement I and Statement II are correct.

D. Statement I is incorrect but Statement II is correct.

#### Answer: D

## Solution:

0 - OH H<sub>2</sub>N

Sulphanilic acid O Does not show esterification test. Presence of both sulphur and nitrogen give red colour in Lassigne's test.

#### \_\_\_\_\_

# **Question22**

Testosterone, which is a steroidal hormone, has the following structure.



## The total number of asymmetric carbon atom / s in testosterone is

#### \_\_\_\_\_. [1-Feb-2023 Shift 2]

#### **Answer: None**

## Solution:



# **Question23**

## Match List I with List II

	List I		List II
	Element detected		Reagent used Product formed
Α	Nitrogen	١.	Na <sub>2</sub> [Fe(CN) <sub>5</sub> NO]
в	Sulphur	II.	AgNO <sub>3</sub>
С	Phosphorous	III.	Fe <sub>4</sub> [Fe(CN) <sub>6</sub> ] <sub>3</sub>
D	Halogen	IV.	(NH <sub>4</sub> ) <sub>2</sub> MoO <sub>4</sub>

# Choose the correct answer from the options given below: [6-Apr-2023 shift 1]

#### **Options:**

A. A-II, B-IV, C-I, D-III

- B. A-IV, B-II, C-I, D-III
- C. A-II, B-I, C-IV, D-III

D. A-III, B-I, C-IV, D-II

#### Answer: D

## Solution:

Nitrogen detection by lassaigne's method  $Na + C + N \rightarrow NaCN$  $6 \operatorname{NaCN} + \operatorname{FeSO}_4 \rightarrow \operatorname{Na}_4[\operatorname{Fe}(\operatorname{CN})_6] + \operatorname{Na}_2\operatorname{SO}_4$  $Na_4[Fe(CN)_6] + Fe^{3+} \rightarrow Fe_4[Fe(CN)_6]_3$ (Prussian blue) Sulphur detection by Sodium nitroprusside  $Na_{2}[Fe(CN)_{5}NO] + Na_{2}S \rightarrow Na_{4}[Fe(CN)_{5}NOS]$ [Purple] Phosphorus detection by ammonium molybdate  $Na_3PO_4 + 3HNO_3 \rightarrow H_3PO_4 + 3NaNO_3$  $H_3PO_4 + 12(NH_4)_2MoO_4 + 21HNO_3 \rightarrow$  $(NH_4)_3PO_4 \cdot 12MoO_3 + 21NH_4NO_3 + 12H_2O_3$ (canary yellow) Halogen give specific coloured ppt with AgNO<sub>3</sub>(aq)  $NaCl + AgNO_3(aq) \rightarrow AgCl + NaNO_3$ (White)  $NaBr + AgNO_3(aq) \rightarrow AgBr + NaNO_3$ (Pale yellow )  $NaI + AgNO_3(aq) \rightarrow AgI + NaNO_3$ (Yellow)

# **Question24**

From the figure of column chromatography given below, identify incorrect statements.

A. Compound 'c' is more polar than ' a ' and ' b '

B. Compound ' a ' is least polar

C. Compound ' b ' comes out of the column before 'c' and after ' a ' D. Compound ' a ' spends more time in the column Choose the correct answer from the options given below :-



[6-Apr-2023 shift 2]

#### **Options:**

A. A, B and C only

B. B, C and D only

C. A, B and D only

D. B and D only

Answer: A

The strongest acid from the following is [6-Apr-2023 shift 2]

**Options:** 

A.



В.







D.



Answer: A

## Solution:

Strongest acid from the following is

OH NO<sub>2</sub>

\_\_\_\_\_

# **Question26**

# The descending order of acidity for the following carboxylic acid is - A. $CH_3COOH$ B. $F_3C$ – COOH C. $CICH_2$ – COOH

D. BrCH<sub>2</sub> – COOH

Choose the correct answer from the options given below: [8-Apr-2023 shift 2]

**Options:** 

A. D > B > A > E > C

B. B > D > C > E > A

C. E > D > B > A > C

D. B > C > D < E > A

#### Answer: B

## Solution:

Solution: Acidity  $\alpha$  stability of conjugate base Stability order  $F_3C - COO^- > F - CH_2 - COO^- > Cl - CH_2 - COO^- > Br - CH_2 - COO^- > CH_3COO^-$ 

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# **Question27**

The correct IUPAC nomenclature for the following compound is :

## [8-Apr-2023 shift 2]

#### **Options:**

A. 2-Methyl-5-oxohexanoic acid

- B. 2-Formyl-5-methylhexan-6-oic acid
- C. 5-Formyl-2-methylhexanoic acid
- D. 5-Methyl-2-oxohexan-6-oic acid

#### Answer: A

## Solution:



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# **Question28**

Using column chromatography mixture of two compounds ' A ' and ' B ' was separated. 'A' eluted first, this indicates ' B ' has [10-Apr-2023 shift 1]

#### **Options:**

A. high  $R_f$ , weaker adsorption

B. high  $R_f$ , stronger adsorption

- C. low  $R_f$ , stronger adsorption
- D. low  $R_f$ , weaker adsorption

Answer: C

## Solution:

#### Solution:

More Polar the compound, the more it will adhere to the adsorbent and the smaller the distance it will travel from baseline, and Lower its  $\rm R_f$  value.

B has Low  $R_{\rm f}$  value and strong Adsoption

B = distance covered by substance from base line

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# **Question29**

The decreasing order of hydride affinity for following carbonations is:



Choose the correct answer from the options given below: [10-Apr-2023 shift 2]

**Options:** 

A. C, A, D, B

B. A, C, B, D

C. A, C, D, B

D. C, A, B, D

#### Answer: D

#### Solution:

Stability of carbocation  $\propto \frac{1}{\text{Hydride affinity}}$ 

 $\begin{array}{c|c} & & & + & + & + \\ & & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & & \\ & & & \\ & & & \\ & & & \\ & & & & \\ & & & \\ & & & \\ & & & & \\ & & & \\ & & & & \\ & & & & \\ & & & \\$ 

# **Question30**

The correct order for acidity of the following hydroxyl compound is :





# Choose the correct answer from the options given below: [10-Apr-2023 shift 2]

#### **Options:**

A. E > C > D > A > B

B. D > E > C > A > B

C. E > D > C > B > A

D. C > E > D > B > A

#### **Answer:** A

## Solution:

Acidity  $\propto$  stability of conjugate base Stability order



Activity  $\rightarrow E > C > D > A > B$ 

# Question31

In Carius tube, an organic compound 'X<sup>´</sup> is treated with sodium peroxide to form a mineral acid 'Y<sup>´</sup>.The solution of BaCl<sub>2</sub> is added to 'Y<sup>´</sup> to form a precipitate 'Z<sup>´</sup>.'Z ' is used for the quantitative estimation of an extra element. 'X ' could be [10-Apr-2023 shift 2]

#### **Options:**

- A. Chloroxylenol
- B. Methionine
- C. A nucleotide
- D. Cytosine

#### Answer: B

## Solution:



Carious method is used for quantitative analysis of sulfur

So Methionine is correct answer

**Question32** 



Where Nu = Nucleophile Find out the correct statement from the options given below for the above 2 reactions. [11-Apr-2023 shift 1]

#### **Options:**

A. Reaction (I) is of 1  $^{\rm st}$  order and reaction (II) is of 2  $^{\rm nd}$  order

B. Reaction (I) and (II) both are  $2^{nd}$  order

C. Reaction (I) and (II) both are 1  $^{\rm st}$  order

D. Reaction (I) is of 2  $^{nd}$  order and reaction (II) is of 1  $^{st}$  order

#### Answer: A

## Solution:



# **Question33**

Thin layer chromatography of a mixture shows the following observation



The correct order of elution in the silica gel column chromatography is [11-Apr-2023 shift 1]

#### **Options:**

A. B, A, C

B. C, A, B

C. A, C, B

D. B, C, A

Answer: C

#### **Solution:**

Solution:



According to the observation, A is more mobile and interacts with the mobile phase more than C, and C is more drawn to the mobile phase than B. Hence, the correct order of elution in the silica gel column chromatography is - B < C < A

\_\_\_\_\_

# **Question34**

# Compound from the following that will not produce precipitate on reaction with ${\rm AgNO}_3$ is :

[11-Apr-2023 shift 2]

**Options:** 

A.



Β.





D.



Answer: B

**Solution:** 



# **Question35**

The number of possible isomeric products formed when 3-chloro-1butene reacts with HCl through carbocation formation is \_\_\_\_\_ [11-Apr-2023 shift 2]

Answer: 4

Solution:



Total Possible Isomeric product = 1 + 3 = 4

#### \_\_\_\_\_

# Question36

Correct statements for the given reaction are :



A. Compound ' B' is aromatic

B. The completion of above reaction is very slow

C. 'A' shows tautomerism

D. The bond lengths of C – C in compound B are found to be same Choose the correct answer from the options given below: [12-Apr-2023 shift 1]

#### **Options:**

A. A,B and C only

B. A, C and D only

C. B, C and D only

D. A, B and D only

Answer: B

Solution:



Three organic compounds A, B and C were allowed to run in thin layer chromatography using hexane and gave the following result (see figure). The  $R_f$  value of the most polar compound is \_\_\_\_\_ × 10<sup>-2</sup>.



# [12-Apr-2023 shift 1]

Answer: 25

## Solution:

Most polar compound - C - because of lowest moulmerls in upper direction  $R_{f} = \frac{\text{Dis tan ce covered by compound}}{\text{Dis tance covered by solvent}} = \frac{2}{8} = 0.25 = 25 \times 10^{-2}$ 

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# Question38

The major product for the following reaction is :

 $\bigwedge_{CN} \xrightarrow{HO \longrightarrow SH}$ 

[13-Apr-2023 shift 2]









D.





## Solution:



# **Question39**

Given below are two statements, one is labelled as Assertion A and the other is labelled as Reason R. Assertion A : Order of acidic nature of the following compounds is A > B > C.



# Reason R : Fluoro is a stronger electron withdrawing group than Chloro group.

# In the light of the above statements, choose the correct answer from the options given below : [13-Apr-2023 shift 2]

#### **Options:**

A. Both A and R are correct and R is the correct explanation of A

B. A is false but R is true

C. Both A and R are correct but R is NOT the correct explanation of A

D. A is true but R is false

## Answer: C

## Solution:

Acidic strength  $\alpha - I$  effect  $\alpha \frac{I}{+1}$  effect F, Cl exerts -1 effect, Methyl exerts +I effect, C is least acidic. Among A and B; since inductive effect is distance dependent, Extent of -I effect is higher in A followed by B even though F is stronger electron withdrawing group than Cl. Thus, A is more acidic than B.

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# **Question40**

Given below are two statements :

Statement I : Tropolone is an aromatic compound and has  $8\pi$  electrons. Statement II :  $\pi$  electrons of >C = O group in tropolone is involved in aromaticity

In the light of the above statements, choose the correct answer from the options given below :

# [13-Apr-2023 shift 2]

## **Options:**

A. Statement I is false but Statement II is true

B. Statement I is true but Statement II is false

C. Both Statement I and Statement II are true

D. Both Statement I and Statement II are false

Answer: B

## Solution:



Tropolone is an aromatic compound and has  $8\pi$  electrons ( $6\pi e^-$  are endocyclic and  $2\pi e^-$  are exocyclic) and  $\pi$  electrons of C = O group in tropolone is not involved in aromaticity.

aromatic compound ( $6\pi e^{-}$ )

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# **Question41**

0.400g of an organic compound (X) gave 0.376g of AgBr in Carius method for estimation of bromine. % of bromine in the compound (X) is \_\_\_\_\_\_. (Given: Molar mass AgBr = 188gmol<sup>-1</sup>, Br = 80gmol<sup>-1</sup>) [13-Apr-2023 shift 2]

Answer: 40

## Solution:

mole of AgBr =  $\frac{0.376}{188}$ mole of Br<sup>-</sup> = mole of AgBr =  $\frac{0.376}{188}$ mass of Br<sup>-</sup> =  $\frac{0.376}{188} \times 80$ % of Br<sup>-</sup> =  $\frac{0.376 \times 80}{188 \times 0.4} \times 100 = 40\%$ 

# **Question42**

## Which of the following statement is correct for paper chromatography? [15-Apr-2023 shift 1]

## **Options:**

A. Water present in the pores of the paper forms the stationary phase.

B. Water present in the mobile phase gets absorbed by the paper which then forms the stationary phase

C. Paper sheet forms the stationary phase.

D. Paper and water present in its pores together form the stationary phase.

## Answer: A

## Solution:

Fact

\_\_\_\_\_

# **Question43**

Number of electrophilic centres in the given compound is



Answer: 3

# Solution:



\_\_\_\_\_

# **Question44**

Arrange the following carbocations in decreasing order of stability. A



[24-Jun-2022-Shift-2]

**Options:** 

A. A > C > B

B. A > B > C

C. C > B > A

D. C > A > B

**Answer:** A

## Solution:



Carbocation (A) is stabilised by hyperconjugation due to  $4\alpha$  hydrogen atoms. Carbocation (C) is also stabilised by hyperconjugation due to 4 a hydrogen atoms but destabilised by -1 effect of O-atom. Carbocation (B) is most stable as it is stabilised by resonance.

 $\therefore$  Correct decreasing order of stability is B > A > C



# **Question45**

0.2g of an organic compound was subjected to estimation of nitrogen by Dumas method in which volume of  $\rm N_2$  evolved (at STP) was found to be

```
22.400 mL. The percentage of nitrogen in the compound is _____[nearest integer]
(Given : Molar mass of N_2 is 28 \text{gmol}^{-1}. Molar volume of N_2 at STP : 22.4L )
[24-Jun-2022-Shift-2]
```

Answer: 14

## **Solution:**

Given volume of N<sub>2</sub> = 22.400 mL  $\therefore$  Moles of N<sub>2</sub> =  $\frac{22.400}{22400}$  =  $10^{-3}$  mole  $\therefore$  Moles of N atoms =  $2 \times 10^{-3}$  mole  $\therefore$  Weigh of N atoms =  $14 \times 2 \times 10^{-3}$  mole

```
= 28 \times 10^{-3} mole

\therefore% of N atom in the compound

= \frac{28 \times 10^{-3}}{0.2} \times 100

= 14
```

Phenol on reaction with dilute nitric acid, gives two products. Which method will be most efficient for large scale separation? [25-Jun-2022-Shift-1]

## **Options:**

- A. Chromatographic separation
- B. Fractional Crystallisation
- C. Steam distillation
- D. Sublimation

#### Answer: C

## Solution:



o-Nitrophenol and p-Nitrophenol can be easily separated by steam distillation.

**Question47** 

In the following structures, which on is having staggered conformation with maximum dihedral angle? [25-Jun-2022-Shift-1]

**Options:** 

A.


В.



C.



D.





Solution:



It is the staggered conformation with maximum dihedral angle.

# The IUPAC name of ethylidene chloride is : [25-Jun-2022-Shift-1]

### **Options:**

- A. 1-Chloroethene
- B. 1-Chloroethyne
- C. 1,2-Dichloroethane
- D. 1,1-Dichloroethane

Answer: D

# Solution:

Solution:

Ethylidene chloride is  $CH_3 - CHCl_2$ , its IUPAC name is 1,1-Dichloromethane.

\_\_\_\_\_

# **Question49**

Given below are two statements : one is labelled as Assertion A and the other is labelled as Reason R.

Assertion A : A mixture contains benzoic acid and napthalene. The pure benzoic acid can be separated out by the use of benzene.

Reason R : Benzoic acid is soluble in hot water.

In the light of the above statements, choose the most appropriate answer from the options given below. [25-Jun-2022-Shift-2]

## **Options**:

A. Both A and R are true and R is the correct explanation of A.

B. Both A and R are true but R is NOT the correct explanation of A.

C. A is true but R is false.

D. A is false but R is true.

# Answer: D

# Solution:

### Solution:

Since, both benzoic acid and naphthalene will dissolve in benzene. Hence assertion is wrong. Benzoic acid is almost insoluble in cold water but soluble in hot water. Hence Reason is true

\_\_\_\_\_

Given below are two statements :

Statement I : In 'Lassaigne's Test', when both nitrogen and sulphur are present in an organic compound, sodium thiocyanate is formed. Statement II : If both nitrogen and sulphur are present in an organic compound, then the excess of sodium used in sodium fusion will decompose the sodium thiocyanate formed to give NaCN and Na<sub>2</sub> S.

In the light of the above statements, choose the most appropriate answer from the options given below : [26-Jun-2022-Shift-1]

#### **Options:**

A. Both Statement I and Statement II are correct.

B. Both Statement I and Statement II are incorrect.

- C. Statement I is correct but Statement II is incorrect.
- D. Statement I is incorrect but Statement II is correct.

### Answer: A

# Solution:

**Solution:** Both statement I \& statement II are correct NaSCN + 2 Na  $\rightarrow$  NaCN + Na<sub>2</sub>S

\_\_\_\_\_

# Question51

Compound 'P' on nitration with dil. HNO<sub>3</sub> yields two isomers (A) and

(B). These isomers can be separated by steam distillation. Isomers (A) and (B) show the intramolecular and intermolecular hydrogen bonding respectively. Compound (P) on reaction with conc. HNO<sub>3</sub> yields a yellow compound ' C ', a strong acid. The number of oxygen atoms is present in compound ' C '\_\_\_\_\_ [26-Jun-2022-Shift-1]

Answer: 7



The correct order of nucleophilicity is [26-Jun-2022-Shift-2]

-----

**Options:** 

A.  $F^- > OH^-$ 

В.

 $H_2 \ddot{O} > OH^-$ 

C.

 $R\ddot{O}H > RO^{-}$ 

D.  $NH_2^- > NH_3$ 

### Answer: D

# Solution:

Solution:  $NH_3 \rightarrow NH_2^- + H^+$ Acid Conjugate base Conjugate base of acid is always a stronger nucleophile.

-----

# **Question53**

Total number of possible stereoisomers of dimethyl cyclopentane is [27-Jun-2022-Shift-1]

#### Answer: 6

### Solution:

Dimethyl cyclopentane



### no stereoisomer

will show stereo isomerism, Its stereo isomers are



will show stereo isomerism, Its stereo isomers are



Which of the following is most stable? [27-Jun-2022-Shift-2]

**Options:** 

A.



В.







C.



Answer: A

Solution:





1,3-cyclohexadiene is most stable because it is a neutral molecule. All others are intermediates and hence less stable.

# **Question55**

0.25g of an organic compound containing chlorine gave 0.40g of silver chloride in Carius estimation. The percentage of chlorine present in the compound is \_\_\_\_ [in nearest integer]

(Given : Molar mass of Ag is  $108 \text{gmol}^{-1}$  and that of Cl is  $35.5 \text{gmol}^{-1}$ ) [27-Jun-2022-Shift-2]

# Solution:

Given, weight of organic compound = 0.25g Moles of AgCl =  $\frac{0.4}{M}$ Molecular mass of AgCl(M) = 143.5 gm  $\therefore$  Moles of AgCl =  $\frac{0.4}{143.5}$   $\therefore$  Mass of Cl =  $\frac{0.4}{143.5} \times 35.5$ Mass % of Cl in the organic compound  $= \frac{35.5 \times 0.4}{0.25} \times 35.5$ = 39.58  $\approx 40$ 

\_\_\_\_\_

# **Question56**

Which one of the following techniques is not used to spot components of a mixture separated on thin layer chromatographic plate? [28-Jun-2022-Shift-1]

#### **Options:**

A. I<sub>2</sub> (Solid)

B. U.V. Light

- C. Visualisation agent as a component of mobile phase
- D. Spraying of an appropriate reagent

#### Answer: C

### Solution:

#### Solution:

TLC is a technique used to separate mixture of compounds based on differences in polarity. In TLC a glass plate coated with a stationary phase is spotted with the mixture to be separated.

\_\_\_\_\_

# **Question57**

Which of the following structure are aromatic in nature?



# [28-Jun-2022-Shift-1]

### **Options:**

A. A, B, C, and D

B. Only A and B

C. Only A and C

D. Only B, C and D

#### Answer: B

## Solution:

Solution: A and B are aromatic as they are cyclic, planar and has  $4n + 2\pi e^{-}(n = 1)$ 

-----

# Question58

The formula of the purple colour formed in Laissaigne's test for sulphur using sodium nitroprusside is [28-Jun-2022-Shift-1]

### **Options:**

A. NaFe[Fe(CN)<sub>6</sub>]

B.  $Na[Cr(NH_3)_2(NCS)_4]$ 

C.  $Na_2[Fe(CN)_5(NO)]$ 

D. Na<sub>4</sub>[Fe(CN)<sub>5</sub>(NOS)]

### Answer: D

In the estimation of bromine, 0.5g of an organic compound gave 0.40g of silver bromide. The percentage of bromine in the given compound is % (nearest integer)

(Relative atomic masses of Ag and Br are 108u and 80u, respectively). [28-Jun-2022-Shift-1]

```
Answer: 34
```

Solution:

```
Solution:

188g AgBr has 80g of Br

\therefore 0.4 gAgBr = \frac{80}{188} \times 0.4
```

% of Br in given organic compound =  $\frac{80 \times 0.4}{188 \times 0.5} \times 100$  $\approx 34\%$ 

**Question60** 

The correct IUPAC name of the following compound is :



## [28-Jun-2022-Shift-2]

**Options:** 

A. 4-methyl-2-nitro-5-oxohept-3-enal

B. 4-methyl-5-oxo-2-nitrohept-3-enal

 $C.\ 4-methyl-6-nitro-3-oxohept-4-enal$ 

D. 6-formyl-4-methyl-2-nitrohex-3-enal

## Answer: C



4-Methyl-6-nitro-3-oxohept-4-enal

-----

# **Question61**

Kjeldahl's method was used for the estimation of nitrogen in an organic compound. The ammonia evolved from 0.55g of the compound neutralised 12.5 mL of  $1MH_2SO_4$  solution. The percentage of nitrogen in the compound is\_\_\_\_\_\_. (Nearest integer) [29-Jun-2022-Shift-1]

#### Answer: 64

### Solution:

Meq of  $H_2SO_4$  used by  $NH_3 = 12.5 \times 1 \times 2 = 25$ % of N in the compound  $= \frac{25 \times 10^{-3} \times 14 \times 100}{0.55} = 63.6$ Meq. of  $H_2SO_4 =$  Meq. of  $NH_3$  $12.5 \times 1 \times 2 = 25$  meq. of  $NH_3$ = 25 millimoles of  $NH_3$ So Millimoles of ' N = 25 Moles of ' N = 25  $\times 10^{-3}$ wt. of N = 14  $\times 25 \times 10^{-3}$ % N =  $\frac{14 \times 25 \times 10^{-3}}{0.55} \times 100$ = 63.66 $\approx 64\%$ 

# **Question62**

**Observe structures of the following compounds** 



The total number of structures/compounds which possess asymmetric

### carbon atoms is \_\_\_\_\_ [29-Jun-2022-Shift-1]

Answer: 3

Solution:



Number of compounds containing asymmetric carbons are three.

\_\_\_\_\_

# **Question63**

Which of the following carbocations is most stable? [29-Jun-2022-Shift-2]

#### **Options:**

A.

OCH<sub>3</sub>

Β.



C.



D.



Answer: D



#### -----

# **Question64**

# The number of chiral alcohol(s) with molecular formula $C_4H_{10}O$ is\_\_\_\_[29-Jun-2022-Shift-2]

Answer: 2

Solution:



\_\_\_\_\_

# **Question65**

While estimating the nitrogen present in an organic compound by Kjeldahl's method, the ammonia evolved from 0.25g of the compound neutralized 2.5mL of 2M H  $_2$ SO $_4$ . The percentage of nitrogen present in

```
organic compound is
[25-Jul-2022-Shift-1]
```

Answer: 56

NH<sub>3</sub> gas is neutralized by 2.5 mL of 2MH<sub>2</sub>SO<sub>4</sub> ∴ Moles of NH<sub>3</sub> neutralized =  $2.5 \times 2 \times 2$  millimole =  $10 \times 10^{-3}$  moles ∴ Weight of N present in the compound will be =  $10 \times 10^{-3} \times 14$ = 0.14g∴% of ' N in compound =  $\frac{0.14}{0.25} \times 100$ = 56%

# **Question66**

The number of sp<sup>3</sup> hybridised carbons in an acyclic neutral compound with molecular formula  $C_4H_5N$  is [25-Jul-2022-Shift-1]

#### Answer: 1

### Solution:

$$DU = 4 + 1 - \left(\frac{5-1}{2}\right) = 3$$
  

$$H_{3}C - CH = CH - C \equiv N$$
  

$$\stackrel{\uparrow}{sp^{3}}CH_{2} = C = CH$$
  

$$CH_{2} = CH = CH = NH$$
  
Zero sp<sup>3</sup> carbon

#### -----

# **Question67**



[25-Jul-2022-Shift-2]

#### **Options:**

A. A > B > C > DB. B > A > C > DC. D > C > A > BD. D > C > B > A

Answer: A

# Solution:

The correct order of acid strength is



# **Question68**

The separation of two coloured substances was done by paper chromatography. The distances travelled by solvent front, substance A and substance B from the base line are 3.25cm, 2.08cm and 1.05cm, respectively. The ratio of  $R_f$  values of A to B is\_\_\_\_\_

[25-Jul-2022-Shift-2]

Answer: 2

### Solution:

$$\begin{split} R_{f} &= \frac{\text{Distance travelled by the substance}}{\text{Distance travelled by the solvent front}} \\ (R_{f})_{A} &= \frac{2.08}{3.25} \\ (R_{f})_{B} &= \frac{1.05}{3.25} \\ \frac{(R_{f})_{A}}{(R_{f})_{B}} &\simeq 2 \end{split}$$

\_\_\_\_\_

# **Question69**

The total number of monobromo derivatives formed by he alkanes with

# molecular formula $C_5H_{12}$ is (excluding stereo isomers) [25-Jul-2022-Shift-2]

#### Answer: 8

### Solution:



It is sum of distance of z from  $(3\sqrt{2}, 0)$  and  $(0, p\sqrt{2})$  For minimising, z should lie on AB and AB =  $5\sqrt{2}$ (AB)<sup>2</sup> =  $18 + 2p^2$ p =  $\pm 4$ 

\_\_\_\_\_

# **Question70**

 $\dot{c} + CH_4 \rightarrow A + B$ 

## A and B in the above atmospheric reaction step are : [26-Jul-2022-Shift-1]

#### **Options:**

A.  $C_2H_6$  and  $Cl_2$ 

B.  $\dot{C}HCl_2$  and  $H_2$ 

 $\dot{C}$ .  $\dot{C}H_3$  and HCl

D.  $C_2H_6$  and HCl

#### Answer: C

### Solution:

 $\dot{Cl} + CH_4 \rightarrow \dot{CH}_3 + HCl$ 

\_\_\_\_\_

# **Question71**

Which technique among the following, is most appropriate in separation

# of a mixture of 100 mg of p nitrophenol and picric acid? [26-Jul-2022-Shift-1]

#### **Options:**

- A. Steam distillation
- B. 2 5 ft long column of silica gel
- C. Sublimation
- D. Preparative TLC (Thin Layer Chromatography)

Answer: D

## Solution:

**Solution:** Thin layer chromatography is a technique used to isolate non-volatile mixtures. Hence, mixture of p-nitrophenol and Picric acid is separated by TLC.

\_\_\_\_\_

# **Question72**

### Which of the following compounds is not aromatic? [26-Jul-2022-Shift-1]

### **Options:**

A.



В.



C.





**Answer: C** 

# Solution:

[10] Annulene, although follow  $(4n + 2)\pi$  electron rule, but it is non-aromatic due to its non planar nature. It is nonplanar due to repulsion of C – H bonds present inside the ring.

\_\_\_\_\_

# **Question73**

# The correct stability order of the following diazonium salt is



### [26-Jul-2022-Shift-1]

#### **Options:**

- A. (A) > (B) > (C) > (D)
- B. (A) > (C) > (D) > (B)
- C. (C) > (A) > (D) > (B)
- D. (C) > (D) > (B) > (A)

#### Answer: B

#### Solution:



Since diazonium ion is a cation hence it is stabilized by electron donating groups and destabilized by electron withdrawing group.

Hence Stability order should be A > C > D > B.

# **Question74**

### The correct decreasing order of priority of functional groups in naming an organic Question: compound as per IUFAC system of nomenclature is [26-Jul-2022-Shift-2]

**Options:** 

A.  $-COOH > -CONH_2 > -COCl > -CHO$ 

B.  $SO_3H > -COCl > -CONH_2 > -CN$ 

 $C. -COOR > -COCl > -NH_2 > C = 0$ 

D.  $-COOH > -COOR > -CONH_2 > -COCl$ 

Answer: B

### Solution:

Solution:  $-SO_3H > -COCl > -CONH_2 > -CN$ 

\_\_\_\_\_

# **Question75**

Given below are two statements: one is labelled as Assertion A and, the

### other is labelled as Reason R. Assertion A: [6] Annulene, [8] Annulene and cis-[10] Annulene, are respectively aromatic, not-aromatic and aromatic.



Reason R: Planarity is one of the requirements of aromatic systems. In the light of the above statements, choose the most appropriate answer from the options given below. [27-Jul-2022-Shift-1]

#### **Options:**

A. Both A and R are correct and R is the correct explanation of A.

B. Both A and R are correct but R is NOT the correct explanation of A.

C. A is correct but R is not correct.

D. A is not correct but R is correct.

#### Answer: A

### Solution:

#### Solution:

[6] Annulene is aromatic because it is planar.

[8] Annulene and [10] Annulene are both not aromatic because they are not planar. So, Assertion (A) is not correct. Reason (R) is correct because planarity is one of the requirements of aromatic system.

\_\_\_\_\_

# **Question76**

In Carius method of estimation of halogen, 0.45g of an organic compound gave 0.36g of AgBr. Find out the percentage of bromine in the compound.

```
(Molar masses : AgBr = 188gmol^{-1}; Br = 80gmol^{-1})
[27-Jul-2022-Shift-1]
```

#### **Options:**

A. 34.04%

B. 40.04%

C. 36.03%

D. 38.04%

Answer: A

Mass of organic compound = 0.45 gmMass of AgBr obtained = 0.36 gm $\therefore$  Moles of AgBr =  $\frac{0.36}{188}$  $\therefore$  Mass of Bromine =  $\frac{0.36}{188} \times 80 = 0.1532 \text{ gm}$  $\therefore$ %Br in compound =  $\frac{0.1532}{0.45} \times 100 = 34.04\%$ 

# **Question77**

Optical activity of an enantiomeric mixture is +12.6° and the specific rotation of (+) isomer is +30° The optical purity is \_\_\_\_\_\_% [27-Jul-2022-Shift-1]

Answer: 42

# Solution:

Optical purity =  $\frac{\text{Total rotation}}{\text{Specific rotation}} \times 10 = \frac{12 \cdot 6}{30} \times 100$ = 42%

\_\_\_\_\_

# **Question78**

Match List - I with List - II.

List I	List II
(Mixture)	(Purification Process)
(A)Chloroform & Aniline	(I)Steam distillation
(B)Benzoic acid & Napthalene	(II)Sublimation
(C)Water & Aniline	(III)Distillation
(D)Napthalene & Sodium chloride	(IV)Crystallisation

# Choose the correct answer from the options given below : [27-Jul-2022-Shift-2]

#### **Options:**

A. (A) - (IV), (B) - (III), (C) - (I), (D) - (II)
B. (A) - (III), (B) - (I), (C) - (IV), (D) - (II)
C. (A) - (III), (B) - (IV), (C) - (II), (D) - (I)
D. (A) - (III), (B) - (IV), (C) - (I), (D) - (II)

#### Answer: D

### Solution:

- (A) Chloroform + Aniline  $\rightarrow$  (III) Distillation
- (B) Benzoic acid + Napthalene  $\rightarrow$  (IV) Crystallisation
- (C) Water + Aniline  $\rightarrow$  (I) Steam distillation
- (D) Napthalene + Sodium chloride  $\rightarrow$  (II) Sublimation

\_\_\_\_\_

# **Question79**

### Match List - I with List - II.

List - I	List - II
	(I)Spiro compound
	(II)Aromatic compound
	(III)Non-planar Heterocyclic compound
	(IV)Bicyclo compound

# Choose the correct answer from the options given below: [28-Jul-2022-Shift-1]

### **Options:**

- A. (A) (II), (B) (I), (C) (IV), (D) (III)
- B. (A) (IV), (B) (III), (C) (I), (D) (II)
- C. (A) (III), (B) (IV), (C) (I), (D) (II)
- D. (A) (IV), (B) (III), (C) (II), (D) (I)

### Answer: C

# Solution:



: Non-planar heterocyclic Compound

- : Bicyclo Compound
- : Spiro Compound
  - : Aromatic Compound

-----

# Question80

Among the following marked proton of which compound shows lowest pK<sub>a</sub> value? [28-Jul-2022-Shift-1]

**Options:** 

A.

Β.









Solution:



The conjugate base of compound (C) is stabilized by extended conjugation. Hence the indicated proton of compound C is most acidic i.e. will have lowest  $pK_a$ .

\_\_\_\_\_

# Question81

Given below are two statements: One is labelled as Assertion A and the other is labelled as Reason R Assertion A : Thin layer chromatography is an adsorption chromatography. Reason R: A thin layer of silica gel is spread over a glass plate of suitable size in thin layer chromatography which acts as an adsorbent. In the light of the above statements, choose the correct answer from the options given below [28-Jul-2022-Shift-2]

### **Options:**

A. Both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is NOT the correct explanation of A  $% \mathcal{A}$ 

C. A is true but R is false

D. A is false but R is true

Answer: A

### Solution:

Thin layer chromoatography (TLC) is another type of adsorption chromatography, which involve sepration of substance of a mixture ovel a thin layer of an adsorbent coated on glass plate.

A thin layer (about  $0.2 \,\mathrm{mm}$  thick) of an adsorbent (silica gel) or (Alumina) in spread overa glass plate of suitable size. Hence Assertion (A) is correct and Reason (R) is correct explanation of (A)

\_\_\_\_\_

# **Question82**

A sample of 0.125g of an organic compound when analyzed by Duma's method yields 22.78 mL of nitrogen gas collected over KOH solution at 280K and 759 mm Hg. The percentage of nitrogen in the given organic compound is \_\_\_\_(Nearest integer) Given :

(a) The vapour pressure of water of 280K is 14.2 mm Hg. (b) R = 0.082L atm K<sup>-1</sup>mol<sup>-1</sup> [28-Jul-2022-Shift-2]

#### Answer: 22

#### Solution:

 $P_{actual} = 759 - 14.2 = 744.8 \text{ mmHg}$   $n_{N_2} = \frac{744.8 \times 22.78}{760 \times 0.0821 \times 280 \times 1000}$  = 0.000971 molMass of N<sub>2</sub> = 0.02719 gm Percentage of nitrogen  $= \frac{0.0271}{0.125} \times 100 = 21.75 \approx 22$ 

\_\_\_\_\_

# **Question83**

Correct structure of y-methylcyclohexane carbaldehyde is [29-Jul-2022-Shift-2] Options:

Α.





C.









### Solution:



γ-Methyl cyclohexane carbaldehyde

# **Question84**

Given below are two statements. Statement 1: The compound



is optically active.

#### **Statement II :**



### is mirror image of above compound A. In the light of the above statement, choose the most appropriate answer from the options given below. [29-Jul-2022-Shift-2]

#### **Options:**

A. Both Statement I and Statement II are correct.

- B. Both Statement I and Statement II are incorrect.
- C. Statement I is correct but Statement II is incorrect.
- D. Statement I is incorrect but Statement II is correct.

#### Answer: C

### Solution:



Compound (A) in Statement-I and compound in Statement-II is not the mirror image of (I).

#### -----

# **Question85**

Given below are two statements:

Statement I A mixture of chloroform and aniline can be separated by simple distillation.

Statement II When separating aniline from a mixture of aniline and water by steam distillation aniline boils below its boiling point. In the light of the above statements, choose the most appropriate answer from the options given below. [26 Feb 2021 Shift 1]

#### **Options:**

- A. Statement I is false but statement II is true
- B. Both statement I and statement II are false
- C. Statement I is true but statement II is false
- D. Both statement I and statement II are true

#### Answer: D

### Solution:

#### Solution:

Statement I is true, i.e. a mixture of chloroform and aniline can be separated by simple distillation. Boiling points of chloroform (334K) and aniline (457 K) differ largely. So, on boiling the\/mixture, vapours of CH Cl<sub>3</sub> are formed first which is then condensed to pure liquid CH Cl<sub>3</sub>.

Whereas, the vapours of aniline will form later and liquid aniline can be collected separately. Statement II is also true, i.e. aniline and water can be separated by steam distillation technique. Aniline is steam volatile but immiscible with water. So, a mixture of aniline and water will boil close to but below 373K. After distillation, the mixture of aniline (bottom layer) and water (top layer) can be separated by separating funnel. So, both statements I and II are true (option-d).

------

# **Question86**

#### Reagent, 1-naphthylamine and sulphanilic acid in acetic acid is used for the detection of [18 Mar 2021 Shift 1]

#### **Options:**

A. N $_2$ O

- B.  $NO_3^-$
- C. NO
- D. N $O_2^-$

#### Answer: D

### Solution:

When a solution is acidified with acetic acid, sulphanilic acid and then 1-naphthylamine is added, the red coloured precipitate obtain indicates presence of N  $O_2^-$  anions. For detection of N  $O_2^-$  following test is used.



Above reagent is used to detect  $NO_2^{-ion}$ .



# **Question87**

Nitrogen can be estimated by Kjeldahl's method for which of the following compound? [17 Mar 2021 Shift 2]

**Options:** 

A.



В.





#### D.

C.



### Answer: B

### Solution:

#### Solution:

Nitrogen can be estimated by Kjeldahl's method for the benzyl amine as in this compound nitrogen is not the part of ring and is free to react.

Because this method can be readily applied to the compound in which nitrogen is free to react with the reagent. The compounds which have nitrogen in the ring (like pyridine), an azo compound, or in nitro compounds are not readily converted into the ammonium sulphate by the action of sulphuric acid.

\_\_\_\_\_

# **Question88**

### Given below are two statements. Statement I Retardation factor (R<sub>f</sub>) can be measured in

### metre\/centimetre.

Statement II R<sub>f</sub> value of a compound remains constant in all solvents. Choose the most appropriate answer from the options given below [17 Mar 2021 Shift 1]

#### **Options:**

A. Statement I is true but statement II is false.

- B. Both statement I and statement II are true.
- C. Both statement I and statement II are false.
- D. Statement I is false but statement II is true.

#### Answer: C



\_\_\_\_\_

# **Question89**

### In chromatography technique, the purification of compound is independent of [16 Mar 2021 Shift 1]

#### **Options:**

A. mobility or flow of solvent system

- B. solubility of the compound
- C. length of the column or TLC plate
- D. physical state of the pure compound

#### Answer: D

### Solution:

In chromatography technique, the purification of compound is independent of physical state of the pure compound (stationary phase). Chromatography is based on the principle of adsorbtion. Different substances are differently adsorbed.

The technique of chromatography uses the difference in the rates at which the components of a mixture move through a porous medium (stationary phase) under the influence of some solvent or gas (moving phase).

.....

# **Question90**



Answer: 78

### Solution:

Moles of benzoic acid =  $\frac{6.1}{122} \frac{\text{(weight)}}{\text{(molecular weight)}}$ = moles of m-bromobenzoic acid So, weight of m-bromobenzoic acid =  $\frac{6.1}{122} \times 201\text{g}$ = 10.05g % yield =  $\frac{\text{Actual weight}}{\text{Theoretical weight}} \times 100$ =  $\frac{7.8}{10.05} \times 100$ = 77.61% = 78%

\_\_\_\_\_

# **Question91**

grams of 3-hydroxy propanal (M W = 74) must be dehydrated to produce 7.8g of acrolein (M W = 56)( $C_3H_4O$ ), if the percentage yield is 64 (Round off to the nearest integer). [Given: Atomic masses : C = 12.0u, H = 1.0u, O = 16.0u] [18 Mar 2021 Shift 1]

Answer: 16

### Solution:

```
On reaction
```

 $\begin{array}{l} \text{HO} - \text{CH}_2 - \text{CH}_2 - \text{CHO} \xrightarrow{\Delta} \text{C}_3 \text{H}_4 \text{O} + \text{H}_2 \text{O} \\ 3\text{-hydroxy propanal} & \overset{64}{64} & \text{Acrolein} \\ & \text{(mol.wt = 74)} & \text{(mol.wt = 56)} \end{array}$ Let's assume required man of 3-hydroxypropanal be x to produce 0.64g acrolein. ∴ Number of moles = x/74 Now, 7.8g of acrolein gives,  $\frac{x}{74} \times 0.64 = 7.8/56$  $\Rightarrow x = 16.10$ or x ≈ 16.00

A reaction of 0.1 mole of benzylamine with bromomethane gave 23g of benzyl trimethyl ammonium bromide. The number of moles of bromomethane consumed in this reaction are  $n \times 10^{-1}$ , when  $n = \dots$  (Round off to the nearest integer).

(Given : Atomic masses: C = 12.0u, H = 1.0u, N = 14.0u, Br = 80.0u ] [18 Mar 2021 Shift 1]

#### Answer: 3

### Solution:

Benzylamine reacts with bromoethane to produce benzyl trimethyl ammonium bromide. The reaction is as follows :



# **Question93**

Which purification technique is used for high boiling organic liquid compound (decomposes near its boiling point)? [22 Jul 2021 Shift 2]

**Options:** 

- A. Simple distillation
- B. Steam distillation
- C. Fractional distillation
- D. Reduced pressure distillation

Answer: D

Solution:

Solution:

Reduced pressure distillation or vacuum distillation is used for the purification of high boiling organic liquids which decomposes at or below their boiling point.

\_\_\_\_\_

# **Question94**

### The metal that can be purified economically by fractional distillation method is: [20 Jul 2021 Shift 1]

#### **Options:**

- A. Fe
- B. Zn
- C. Cu
- D. Ni

#### Answer: B

### Solution:

Solution:

Zinc can be purified economically by fractional distillation.

------

# **Question95**

0.8 g of an organic compound was analysed by Kjeldahl's method for the estimation of nitrogen. If the percentage of nitrogen in the compound was found to be 42%, then \_\_\_\_\_ mL of 1 M H  $_2$ SO $_4$  would have been neutralized by the ammonia evolved during the analysis. [25 Jul 2021 Shift 2]

Answer: 12

# Solution:

 $\begin{array}{l} \text{Organic compound : } 0.8\text{gm} \\ \text{wt. of N} &= \left(\frac{42}{100} \times 0.8\right)\text{gm} \\ \text{mole of N} &= \frac{42 \times 0.8}{100 \times 14} = \frac{2.4}{100}\text{mol} \\ \text{moles of N H}_3 &= \frac{2.4}{100} \\ 2\text{N H}_3 &+ \text{H}_2\text{SO}_4 \rightarrow (\text{N H}_4)_2\text{SO}_4 \\ \frac{2.4}{100}\text{ mole} & \frac{1.2}{100}\text{ mole} \\ \frac{1.2}{100} &= 1 \times \text{V}(1) \\ \Rightarrow \text{V}_{\text{H}_2\text{SO}_4} &= \frac{1.2}{100}\text{l} = 12\text{ml} \end{array}$ 

\_\_\_\_\_

# Question96



# For above chemical reactions, identify the correct statement from the following: [20 Jul 2021 Shift 1]

### **Options:**

- A. Both compound 'A' and compound 'B' are dicarboxylic acids
- B. Both compound 'A' and compound 'B' are diols
- C. Compound 'A' is diol and compound 'B' is dicarboxylic acid
- D. Compound 'A' is dicarboxylic acid and compound 'B' is diol

#### Answer: D

### Solution:



Methylation of 10 g of benzene gave 9.2 g of toluene. Calculate the percentage yield of toluene \_\_\_\_\_. (Nearest integer) [22 Jul 2021 Shift 2]

Answer: 78

### Solution:

 $\begin{array}{l} C_6H_6 + CH_3Cl \rightarrow C_6H_5CH_3 + HCl \\ \frac{10}{78} \qquad \left(\frac{10}{78} \times 92\right)gm \Rightarrow \\ \frac{A_y}{T_y} = \% \text{ yield } = \frac{9.2}{920} \times 78 \times 100 \Rightarrow 78\% \end{array}$ 

-----

# **Question98**

When 0.15g of an organic compound was analyzed using Carius method for estimation of bromine, 0.2397g of AgBr was obtained. The percentage of bromine in the organic compound is \_\_\_\_\_.(Nearest integer) [Atomic mass : Silver = 108, Bromine = 80] [20 Jul 2021 Shift 2]

Answer: 68
Moles of Br = Moles of AgBr obtained  $\Rightarrow$  Mass of Br =  $\frac{0.2397}{188} \times 80$ g therefore % Br in the organic compound =  $\frac{W_{Br}}{W_T} \times 100$ =  $\frac{0.2397 \times 80}{188 \times 0.15} \times 100 = 0.85 \times 80$ = 68  $\Rightarrow$  Nearest integer is '68'

-----

## **Question99**

In Carius method, halogen containing organic compound is heated with fuming nitric acid in the presence of : [20 Jul 2021 Shift 2]

#### **Options:**

A.  $H N O_3$ 

B. AgN O<sub>3</sub>

C. CuSO<sub>4</sub>

D. BaSO<sub>4</sub>

**Answer: B** 

#### Solution:

#### Solution:

Organic compound is heated with fuming nitric acid in the presence of silver nitrate in carius method. Lunar caustic (AgN  $O_3$ ) is used as reagent hare to distinguish Cl<sup>-</sup>, Br and I<sup>-</sup>respectively as follows.

Cl<sup>-</sup>(aq)  $\xrightarrow{AgNO_3} AgCl \downarrow_{ppt}$  white Br<sup>-</sup>(aq)  $\xrightarrow{AgNO_3} AgBr \downarrow$  ppt pale yellow I<sup>-</sup>(aq)  $\xrightarrow{AgNO_3} AgI \downarrow$  ppt Dark yellow

-----

## **Question100**

In the sulphur estimation, 0.471g of an organic compound gave 1.44g of barium sulphate. The percentage of sulphur in the compound is .....%. (Nearest integer) (Atomic mass of Ba = 137u) [26 Aug 2021 Shift 2]

Answer: 42

### Solution:

Atomic mass of sulphur is 32 g. Molecular weight of  $BaSO_4$  is 233g. So, weight of sulphur in  $BaSO_4$  $= \frac{Atomic mass of sulphur}{Molecular weight of BaSO_4} \times Weight of BaSO_4$   $= \frac{32}{233} \times 1.44$ Percentage of sulphur  $= \frac{Weight of sulphur}{Weight of organic compound} \times 100$   $= \frac{32}{233} \times \frac{1.44}{0.471} \times 100 = 41.98 \approx 42\%$ 

# Question101

### The number of stereoisomers possible for 1, 2 - dimethyl cyclopropane is [26 Aug 2021 Shift 2]

#### **Options:**

- A. one
- B. four
- C. two
- D. three

#### Answer: D

#### Solution:

1, 2-dimethylcyclopropane is

CH<sub>3</sub>

Hence, stereoisomers are as follows



meso form in optically inactive, whereas enantiomeric pairs are optically active. Therefore, total number of stereo isomers are three (3).

\_\_\_\_\_

## **Question102**

Arrange the following conformational isomers of n -butane in order of their increasing potential energy





II.

IV.



## [31 Aug 2021 Shift 2]

#### **Options:**

A. II < III

B. I < IV < III < II

C. II < IV < III < I

D. I < III < IV < II

### Answer: D

## Solution:

The order of potential energy of above conformations is





Fully eclipsed

Partially eclipsed



The fully eclipsed form is least stable due to repulsion between bulky  $(-CH_3)$  methyl group at front and rear carbon atom.

 $\therefore$  It has maximum potential energy.

While the repulsion in anti form is minimum.

 $\therefore$  It has minimum potential energy.

\_\_\_\_\_

## **Question103**

Given below are two statements.

One is labelled as Assertion (A) and the other is labelled as Reason (R). Assertion (A) A simple distillation can be used to separate a mixture of propanol and propanone.

Reason (R) Two liquids with a difference of more than 20°C in their boiling points can be separated by simple distillations.

In the light of the above statements, choose the most appropriate answer from the options given below.

[31 Aug 2021 Shift 1]

#### **Options:**

A. (A) is false but (R) is true.

B. Both (A) and (R) are correct but (R) is not the correct explanation of (A).

C. (A) is true but (R) is false

D. Both (A) and (R) are correct and (R) is the correct explanation of (A).

Answer: D

Solution:

Propanol and propanone can be separated by simple distillation technique as difference in boiling point of propanol and propanone is more than  $20^{\circ}$ C. Boiling point of propanol =  $97^{\circ}$ C. Boiling point of propanone =  $56^{\circ}$ C Difference in boiling points =  $41^{\circ}$  C >  $20^{\circ}$ C Hence, option (d) is correct.

Question104

The transformation occurring in Duma's method is given below

 $C_{2}H_{7}N + \left(2x + \frac{y}{2}\right)CuO \rightarrow xCO_{2} + \frac{y}{2}H_{2}O + \frac{z}{2}N_{2} + \left(2x + \frac{y}{2}\right)Cu$ The value of y is ...... (Integer answer) [31 Aug 2021 Shift 2]

Answer: 7

### Solution:

For the reaction  $C_{2}H_{7}N + \left(2x + \frac{y}{2}\right)CuO \rightarrow xCO_{2} + \frac{y}{2}H_{2}O + \frac{z}{2}N_{2} + \left(2x + \frac{y}{2}\right)Cu$ On reactant side number of H-atom = 7 On product side number of H-atom =  $\frac{y}{2} \times 2$   $7 = \frac{y}{2} \times 2$  $\therefore y = 7$ 

\_\_\_\_\_

## **Question105**

[27 Aug 2021 Shift 1]

**Answer: 1125** 

Solution:

In Dumas method,  $C_{x}H_{y}N_{z} + \left(2x + \frac{y}{2}\right)CuO \rightarrow xCO_{2} + \frac{y}{2}H_{2}O + \frac{z}{2} + \left(2x + \frac{y}{2}\right)Cu$ N, N-dimethylaminopentane has formula  $C_{7}H_{17}N$ . So, relating with  $C_{x}H_{y}N_{z}$  x = 7 y = 17 z = 1Molar mass of  $C_{7}H_{17}N = 115g$  = 22.5 moles of CuO 57.5g i.e.  $\left(\frac{57.5}{115}\right)C_{7}H_{17}N$  will utilise  $= \frac{22.5}{115} \times 57.5$  moles of CuO  $= 11.25g \text{ mol} \approx 1125 \times 10^{-2} \text{ mol}$ 

## **Question106**

In carius method for estimation of halogens, 0.2g of an organic compound gave 0.188g of AgBr. The percentage of bromine in the compound is ...... (Nearest integer) [Atomic mass; Ag = 108, Br = 80] [27 Aug 2021 Shift 1]

Answer: 40

#### Solution:

Mass of bromine = 80 u Mass of silver = 108 u Mass of AgBr = 108 + 80 = 188 u Weight of organic compound = 0.2 g % of Br =  $\frac{\text{Molar mass of Br}}{\text{Molar mass of AgBr}} \times \frac{\text{Weight of AgBr}}{\text{Weight of organic compound}} \times 100$ =  $\frac{80}{188} \times \frac{0.188}{0.2} \times 100 = 40\%$ .

\_\_\_\_\_

## **Question107**

The increasing order of basicity for the following intermediates is (from weak to strong)



#### **Options:**

A. (iii) <(i) < (ii) < (iv) < (v) B. (v) < (i) < (iv) < (ii) < (iii) C. (v) < (iii) < (iii) < (iv) < (i) D. (iii) <(iv) < (ii) < (i) < (v)

#### Answer: C

### Solution:

**Solution:** Basicity order can be determined by the cummulative effect of the factors on the electron density of concerned atom.

\_\_\_\_\_

## **Question108**

A flask contains a mixture of is hexane and 3 methyl pentane. One of the liquids boils at 63°C while the other boils at 60°C. What is the best way to separate the two liquids and which one will be distilled out first? [Jan. 08,2020(I)]

#### **Options:**

- A. fractional distillation, isohexane
- B. simple distillation, 3 -methylpentane
- C. simple distillation, isohexane
- D. fractional distillation, 3 -methylpentane

#### Answer: A

#### Solution:

Liquid having lower boiling point comes out first in fractional distillation. Simple distillation can't be used as boiling point difference is very small.

3-Methylpantane will show greater boiling point ( $63^{\circ}$ C) comparative to isohexane due to symmetrical structure. Therefore isohexane distilled out first.

\_\_\_\_\_

## **Question109**

### The correct order of stability for the following alkoxides is:



## [Jan. 07, 2020 (II)]

#### **Options:**

A. (B) > (A) > (C)

- B. (C) > (B) > (A)
- C. (C) > (A) > (B)

D. (B) > (C) > (A)

#### Answer: B

#### Solution:

#### Solution:

Electron withdrawing group like (N  $O_2$ ) increase stability of alkoxide ion by dispersal of negative charge. In (B) and (C) structures negative charge is in conjugation with double bond and also stabilised by electron withdrawing effect of nitro group.

\_\_\_\_\_

## **Question110**

## The IUPAC name of the following compound is:



## [Sep. 06, 2020 (II)]

#### **Options:**

- A. 2 -nitro-4-hydroxymethyl-5-amino benzaldehyde
- B. 3-amino-4-hydroxymethyl-5-nitrobenzaldehyde
- $C.\ 5\ amino\ 4\ hydroxymethyl-2\ nitrobenzaldehyde$
- D. 4 -amino-2-formyl- 5 -hydroxymethyl nitrobenzene

#### Answer: C

### Solution:



5-Amino- 4 -hydroxymethyl-2-nitrobenzaldehyde

Question111

## The IUPAC name of the following compound is :

\_\_\_\_\_



[Sep. 04,2020 (I)]

#### **Options:**

A. 5-Bromo-3-methylcyclopentanoic acid

B. 4 -Bromo-2-methylcyclopentane carboxylic acid

C. 3-Bromo-5-methylcyclopentanoic acid

D. 3-Bromo-5-methylcyclopentane carboxylic acid

#### Answer: B

### Solution:



4-Bromo-2-methylcyclopentane carboxylic acid

\_\_\_\_\_

## **Question112**

## The IUPAC name for the following compound is :



## [Sep. 02, 2020 (I)]

#### **Options:**

- A. 2,5 -dimethyl-5-carboxy-hex-3-enal
- B. 2,5 -dimethyl-6-carboxy-hex-3-enal
- C. 2,5 -dimethyl-6-oxo-hex-3-enoic acid
- D. 6-formyl-2-methyl-hex-3-enoic acid

### Answer: C

## Solution:



(2, 5 -dimethyl 1 - 6 -oxo-hex-3-enoic acid)

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## **Question113**

In an estimation of bromine by Carius method, 1.6g of an organic compound gave 1.88g of AgBr. The mass percentage of bromine in the compound is

(Atomic mass, Ag = 108,  $Br = 80gmol^{-1}$ ) [NV, Sep. 06, 2020 (I)]

Answer: 50

## Solution:

Mass of organic compound = 1.6g Mass of AgBr = 1.88g Moles of Br = Moles of AgBr =  $\frac{1.88}{188}$  = 0.01 Mass of Br = 0.01 × 80 = 0.80g % of Br =  $\frac{0.80 \times 100}{1.60}$  = 50% Alternate Method: % of Br =  $\frac{\text{Wt. of AgBr}}{\text{Wt. of O.C.}} \times \frac{\text{Molar mass of Br}}{\text{AgBr}} \times 100$ =  $\frac{1.88}{1.6} \times \frac{80}{188} \times 100 = 50\%$ 

------

## **Question114**

## Which one of the following compounds possesses the most acidic hydrogen? [Sep. 03,2020(I)]

**Options:** 

A.

$$N = C \xrightarrow{C = N} H$$

B. H<sub>3</sub>C – C  $\equiv$  C – H

D.



#### Answer: D

### Solution:

#### Solution:

Acidic strength  $\propto -I$ , -M effect. Due to strong -I, and -M effect of three  $-COOCH_3$  groups, it has most acidic Hydrogen.

\_\_\_\_\_

## **Question115**

### Glycerol is separated in soap industries by: [Sep. 03,2020(I)]

#### **Options:**

- A. Fractional distillation
- B. Differential extraction
- C. Steam distillation
- D. Distillation under reduced pressure

#### Answer: D

### Solution:

Glycerol can be separated from spent-lye in soap industry by using reduce pressure distillation technique.

------

## **Question116**

### What is the IUPAC name of the following compound?



## [Jan. 10, 2019 (II)]

#### **Options:**

- A. 3-Bromo-1, 2-dimethylbut-1-ene
- B. 3-Bromo-3-methyl-1,2-dimethylprop-1-ene
- C. 2-Bromo-3-methylpent-3-ene
- D. 4-Bromo-3-methylpent-2-ene

#### Answer: D

### Solution:

Solution: IUPAC name: 4 -Bromo-3-methylpent- 2 -ene

## ------

## **Question117**

## The IUPAC name for the following compound is:



## [April 12, 2019 (II)]

### **Options:**

- A. 3 -methyl-4-(3-methylprop-l-enyl)-l-heptyne
- B. 3,5-dimethyl-4-propylhept-6-en-l-yne
- C. 3-methyl-4-(1-methylprop-2-ynyl)-l-heptene

D. 3,5-dimethyl-4-propylhept-l-en-6-yne

#### Answer: D

### Solution:



3, 5 -dimethyl-4-propylhept- 1 -en-6-yne

-----

## **Question118**

### The correct IUPAC name of the following compound is:



## [April 9, 2019(I)]

### **Options:**

- A. 5-chloro-4-methyl-1-nitrobenzene
- B. 2 -chloro-1-methyl-4-nitrobenzene
- C. 3-chloro-4-methyl-1-nitrobenzene
- D. 2 -methyl-5-nitro-1-chlorobenzene

### Answer: B

## Solution:



2-Chloro-1-methyl-4-nitrobenzene

\_\_\_\_\_

## **Question119**

## The IUPAC name of the following compound is: $H_{3}C - \overset{\cup}{C}H - \overset{\cup}{C}H - CH_{2} - COOH$ [April 8, 2019 (I)]

#### **Options:**

A. 4, 4-Dimethyl-3-hydroxybutanoic acid

B. 2-Methyl-3-hydroxypentan-5-oic acid

 $C. \ 3-Hydroxy-4-methylpentanoic \ acid$ 

D. 4-Methyl-3-hydroxypentanoic acid

Answer: C

Solution:

3-Hydroxy-4-methyl pentanoic acid

\_\_\_\_\_

## **Question120**

## Which of the following compounds will show the maximum 'enol' content? [April 8, 2019 (II)]

#### **Options:**

A. CH <sub>3</sub>COCH <sub>2</sub>COOC<sub>2</sub>H <sub>5</sub>

B. CH <sub>3</sub>COCH <sub>2</sub>COCH <sub>3</sub>

C. CH <sub>3</sub>COCH <sub>3</sub>

D. CH <sub>3</sub>COCH <sub>2</sub>CON H <sub>2</sub>

#### Answer: B

## Solution:

#### Solution:

Enolic form of acetylacetone (b) is quite stable due to H-bonding which leads to stable 6 -membered ring.

------

## **Question121**

The increasing order of nucleophilicity of the following nucleophiles is:

## (i) $CH_{3}CO_{2}^{\Theta}$ (ii) $H_{2}O$ (iii) $CH_{3}SO_{3}^{\Theta}$ (iv) ${}^{\ddot{0}}H$ [April 10, 2019 (II)]

#### **Options:**

A. (i) < (iv) < (iii) < (ii)

- B. (ii) <( iii ) < ( iv )< (i)
- C. (iv) <(i) < (iii) < (ii)

D. (ii) < (iii) < (iv)

#### Answer: D

#### Solution:

#### Solution:

If the lone pair donating tendency on oxygen is reduced, nucleophilicity reduced. This is because the electron density of larger atoms is more readily distorted since the electrons are further from the nucleus. H  $_2O$  = Neutral molecule

$$CH_{3}SO_{3}^{\Theta} = CH_{3}S^{\Theta} - O^{-} = Charged ion$$
  
 $CH_{3}COO^{\Theta} = CH_{3} - C^{-} - O^{-} = Charged ion$   
 $\bigcup_{0}^{\Theta}$ 

OH = Charged ion Thus, the increasing order of nucleophilicity is:  $H_2O < CH_3SO_3^{\Theta} < CH_3COO^{\Theta} < OH$ 

\_\_\_\_\_

## **Question122**

### The IUPAC name of the following compound is:



## [Online April 15, 2018(I)]

#### **Options:**

- A. 3 -cthyl-4-methylhex-4-ene
- B. 4,4 -diethyl-3-methylbut-2-ene
- C. 4 -methyl-3-ethylhex-4-ene
- D. 4 -ethyl-3-methylhex-2-ene

#### Answer: D

### Solution:

4-Ethyl-3-methylhex-2-cne

\_\_\_\_\_

## **Question123**

### The increasing order of basicity of the following compounds is



## **Options:**

A. (i) < (ii) < (iii) < (iv)</li>
B. (ii) < (i) < (iii) < (iii) < (iv)</li>
C. (ii) < (i) < (iv) < (iii)</li>
D. (iv) < (ii) < (i) < (i) < (iii)</li>

#### Answer: C

### Solution:



Hence, correct order of basicity will be: (ii)  $\leq$  (*iv*)  $\leq$  (*iv*)  $\leq$  (*iii*).

The most polar compound among the following is: [Online April 16, 2018]

**Options:** 

A.

B.



C.



D.



Answer: C

## Solution:

Among the substituents attached to the given compounds, fluorine has maximum electronegativity. so it will push electron pair towards itself. In option (b), the two F groups are attached opposite to each other, thus net dipole moment will cancel out and reduce its polarity. In option (d), the F groups are attached in slightly opposite direction, thus this also decreases its polarity. But in option (c), the compound has the two F groups along same direction, thus net dipole moment will increase in this direction and therefore it will exhibit maximum polarity. Hence the compound in option (c) has maximum polarity.

\_\_\_\_\_

On the treatment of the following compound with a strong acid, the most susceptible site for bond cleavage is:



### [Online April 15, 2018(II)]

#### **Options:**

- A. O2 C3
- B. O5 C6
- C. C4 O5
- D. C1 O2
- **Answer: B**

### Solution:

#### Solution:

The lone pair of electrons on  $O_2$  is involved in resonance with C = C. Hence  $O_2$  will not be protonated. The lone pair of electrons on O5 is not involved in resonance with C = C. Hence, O5 will be protonated. Chloride ion will then attack least substituted C atom (C6)



#### Two compounds I and II are eluted by column chromatography(adsorption of I > II). Which one of the following is a correct statement? [Online April 15, 2018 (II)]

#### **Options:**

A. II moves slower and has higher  $R_p$  value than I

B. II moves faster and has higher  $R_{\rm f}$  value than I

C. I moves faster and has higher  $\rm R_{\rm f}$  value than II

D. I moves slower and has higher  $R_{\rm f}$  value than II

#### Answer: B

### Solution:

#### Solution:

Since, adsorption of I > II, I is firmly attached to column (stationary phase). Hence, it moves slowly and will cover little distance, while II is loosely attached to column (stationary phase). Hence, it moves faster and will cover large distance.

-----

## **Question127**

### The IUPAC name of the following compound is:

## [Online April 8, 2017]

#### **Options:**

- A. 1, 1- dimethyl-2-ethylcyclohexane
- B. 2 ethyl -1, 1 -dimethylcyclohexane
- C. I-cthyl-2,2-dimethylcyclohexane
- D. 2, 2-dimethyl-1-ethylcyclohexane

#### Answer: B

### Solution:



2-Ethyl-1,1-dimethylcyclohexane

\_\_\_\_\_

## **Question128**

In the following structure, the double bonds are marked as I, II, III and IV



Geometrical isomerism is not possible at site(s): [Online April 9, 2017]

\_\_\_\_\_

#### **Options:**

A. III

B. I

C. I and III

D. III and IV

Answer: B

Solution:

 $\mathbf{H}_{b}$ I a

Both substituents are same (Isomer not possible)

## Which of the following statements is not true about partition chromatography? [Online April 8, 2017]

#### **Options:**

A. Mobile phase can be a gas

- B. Stationary phase is a finely divided solid adsorbent
- C. Separation depends upon equilibration of solute between a mobile and a stationary phase
- D. Paper chromatography is an example of partition chromatography

#### Answer: B

### Solution:

#### Solution:

Partition chromatography is the process of separation whereby the component of the mixture get distributed into two phases that may be liquid-liquid, liquid gas but not to solid-gas. Thus, it is not possible that the stationory phase is a finally devided solid adsorbent in partition chromatography.

\_\_\_\_\_

## Question130

# The increasing order of the boiling points for the following compounds is :

(I)  $C_2H_5OH$ (II)  $C_2H_5Cl$ (III)  $C_2H_5CH_3$ (IV)  $C_2H_5OCH_3$ [Online April 9, 2017]

#### **Options:**

A. (III) < (IV) < (II) < (I)

B. (IV) < (III) < (I) < (II)

C. (II) < (III) < (IV) < (I)

D. (I I I I) < (I I) < (I V)

#### Answer: A

### Solution:

(I)  $C_2H_5OH$  Hydrogen bonding Hydrogen bonding > dipole-dipole (II)  $C_2H_5Cl$  Dipole-dipole  $C_2H_5Cl$  is more polar than  $C_2H_5OCH_3$  so, dipole-dipole  $C_2H_5Cl$  > dipole-dipole $C_2H_5OCH_3$ (III)  $C_2H_5CH_3$  Weak vander Waals yarces (IV)  $C_2H_5OCH_3$  Dipole-dipole Thus, boiling points order is (III) < (IV) < (II) < (I).

## **Question131**

A mixture containing the following four compounds is extracted with 1M HCl. The compound that goes to aqueous layer is :



## [Online April 8,2017]

#### **Options:**

A. (I)

B. (II)

C. (III)

D. (IV)

Answer: B

### Solution:

#### Solution:

When the given mixture is shaken with 1 M H Cl, amine get protonated and becomes cation  $\left( \begin{array}{c} & \\ \mathbf{R}_2 \overset{\oplus}{\mathbf{N}} \mathbf{H}_2 \end{array} \right)$ , which does not dissolve in organic solvent but usually dissolve in  $\mathbf{H}_2 \mathbf{O}$  due to its charge. So, shaking with aqueous  $\mathbf{H} \mathbf{Cl}$  willpull amines into the aqueous phase and leave all other compounds in organic layer.

\_\_\_\_\_

## Question132

```
The increasing order of the reactivity of the following halides for the S_N 1 reaction is

CH_3CH CH_2CH_3CH_3CH_2CH_2Cl_2

\downarrow_{Cl}^{(II)}

p - H_3CO - C_6_{H_4}^{(III)} - CH_2Cl_2

[2017]

Options:

A. (III) < (II) < (I)

B. (II) < (I) < (III)
```

C. (I) < (III) < (II)

D. (II) < (III) < (I)

#### Answer: B

### Solution:

#### Solution:

Since  $S_N 1$  reactions involve the formation of carbocation as intermediate in the rate determining step, more the stability of carbocation higher will be the reactivity of alkyl halides towards  $S_N 1$  route. Since stability of carbocationsfollows order.  $CH_3 - CH_2 - CH_2 < CH_3 - CH - CH_2 - CH_3$   $^{1^{\circ} carbocation}$  $Max. stable due to + Meffect of - OCH_3 group.$ 

\_\_\_\_\_

## **Question133**

### Which of the following molecules is least resonance stabilized? [2017]

#### **Options:**

A.



B.



C.

D.



Answer: D

Solution:



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## **Question134**

## The hydrocarbon with seven carbon atoms containing a neopentyl and a vinyl group is: [Online April 9, 2016]

#### **Options:**

A. 2,2 - dimethyl -4 - pentene

- B. 4,4 dimethyl pentene
- C. isopropyl-2-butene
- D. 2, 2- -dimethyl-3-pentene

### Answer: B

## Solution:

$$\begin{array}{c} CH_3 \\ \downarrow \\ H_3C - C - CH_2 - CH = CH_2 \\ \downarrow \\ CH_3 \end{array}$$

\_\_\_\_\_

## **Question135**

### The absolute configuration of is:

 $\begin{array}{c} & CO_2H \\ H \longrightarrow OH \\ H \longrightarrow CI \\ CH_3 \end{array}$ [2016]

## **Options:**

A. (2S, 3S)

B. (2R, 3R)

C. (2R, 3S)

D. (2S, 3R)

#### Answer: D

### Solution:



## **Question136**

The distillation technique most suited for separating glycerol from pent-l-ye in the soap industry is:

### [2016]

#### **Options:**

- A. Steam distillation.
- B. Distillation under reduced pressure.
- C. Simple distillation
- D. Fractional distillation

#### Answer: B

## Solution:

Pent-I-ye and glycerol are separated by distillation under reduced pressure. Under the reduced pressure, the liquid boil at low temperature and the temperature of decomposition will not reach. e.g. glycerol boils at  $290^{\circ}$ C with decomposition but at reduced pressure it boils at  $180^{\circ}$ C without decomposition.

\_\_\_\_\_

## **Question137**

### Which of the following compounds will exhibit geometrical isomerism? [2015]

#### **Options:**

A. 2 - Phenyl -1 - butene

- B. 1, 1 Diphenyl 1 propene
- C. 1 Phenyl -2 butene
- D. 3 Phenyl 1 butene

#### Answer: C

### Solution:

 $H_{3}C - C = CH - CH_{2}Ph$ 

In 1 -phenyl-2-butene, the two groups around the doubly bonded carbons are different. This compound can show cis-and trans-isomerism.

\_\_\_\_\_

## Question138

### The optically inactive compound from the following is: [Online April 10, 2015]

#### **Options:**

- A. 2 chloropropanal
- B. 2 chlorobutane
- C. 2 chloropentane
- D. 2 chloro -2 methylbutane

### Answer: D

### Solution:

The optically inactive compound must contains achiral carbon atom(s). Option (d) contains achiral carbon atom



## **Question139**

## The number of structural isomers for $C_6H_{14}$ is : [Online April 11,2015]

#### **Options:**

A. 4

B. 3

C. 6

D. 5

#### Answer: D

#### Solution:



### Which of the following pairs of compounds are positional isomers ? [Online April 11,2015]

**Options:** 

A.  $CH_{3} - CH_{2} - CH_{2} - CH_{3} - CH_{3} = CH_{3} - CH_{2} - CH_{2} - CH_{2} - CH_{3}$ B.  $CH_{3} - CH_{2} - CH_{2} - CH_{2} - CH = CH = CH_{3} = CH_{2} - CH_{2} - CH_{2} - CH_{3} = CH_{3} - CH_{3} - CH_{2} - CH_{2} - CH_{3} = CH_{3} - CH_{3} - CH_{3} - CH_{2} - CH_{3} = CH_{3} - CH$ 

Answer: A

Solution:

Solution:

Pentan-2-one and pentan-3-one are position isomers. (b), (c), (d) contain different compounds aldehyde and ketones. These exhibit functional group is omerism.

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## **Question141**

In allene ( $C_3H_4$ ), the type(s) of hybridization of the carbon atoms is (are): [Online April 11, 2014]

**Options:** 

A. sp and  $sp^3$ 

B.  $sp^2$  and sp

C. only  $sp^2$ 

D.  $sp^2$  and  $sp^3$ 

#### Answer: B

### Solution:

\_\_\_\_\_

## The correct IUPAC name of the following compound is:



## [Online April 19, 2014]

### **Options:**

- A. 4 methyl 3 ethylhexane
- B. 3 ethyl -4 methylhexane
- C. 3,4 -ethylmethylhexane
- D. 4 ethyl 3 methylhexane

### Answer: B

## Solution:

$$\begin{array}{c}
 CH_{3} \\
 \dot{L}_{4} \\
 \dot{L}_{3} \\
 \dot{C}_{4} \\
 \dot{L}_{2} \\
 \dot{L}_{2} \\
 \dot{L}_{2} \\
 \dot{L}_{3} \\
 \dot{L}_{4} \\
 \dot{L}_{4} \\
 \dot{L}_{5} \\
 \dot{L}_{6} \\
 \dot{L}_{1} \\
 \dot{L}_{1} \\
 \dot{L}_{1} \\
 \dot{L}_{1} \\
 \dot{L}_{3} \\
 \dot{L}_{1} \\
 \dot{L}_{1} \\
 \dot{L}_{3} \\
 \dot{L}_{1} \\$$

3-Ethyl-4-methylhexane

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## **Question143**

## Which one of the following acids does not exhibit optical isomerism? [Online April 12, 2014]

### **Options:**

A. Lactic acid

- B. Tartaric acid
- C. Maleic acid
- D. alpha -amino acids

## Answer: C

## Solution:

#### Solution:

Optically active compounds contain an asymmetric (chiral) carbon atom (a carbon atom attached to four different atoms or groups). Therefore, all acids except maleic acid exhibit optical isomerism.

## For which of the following molecule significant $\mu \neq 0$ ?



## [2014]

#### **Options:**

A. Only (i)

B. (i) and (ii)

C. Only(iii)

D. (iii) and (iv)

Answer: D

### Solution:





In both the molecules the bond moments are not cancelling with each other and hence the molecules has a resultant dipole.

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## **Question145**

In which of the following pairs A is more stable than B ? [Online April 9, 2014]

**Options:** 

A.





В.







D.  $Ph_3C'$ , (CH <sub>3</sub>)<sub>3</sub>C'

Answer: D

### Solution:

Solution:

 $Ph_3$  C is more stable than  $(CH_3)_3$  C because resonance stabilisation effect in  $Ph_3$  C is more pronounced as compared to hyperconjugation stabilisation effect in  $(CH_3)_3$  C, overall stability orderamong free radical is: Triphenylmethyl > benzyl > allyl > tertiary alkyl > secondary > primary > methyl > vinyl

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## **Question146**

Arrange in the correct order of stability (decreasing order) for the following molecules:



(III)



### [Online April 22, 2013]

### **Options:**

A. (I ) > (I I ) > (I I I ) > (I V )

B. (IV) > (III) > (II) 
$$\approx$$
 (I)

C. (I) > (II) 
$$\approx$$
 (III) > (IV)

D. 
$$(III) > (I) \approx (II) > (IV)$$

#### Answer: D

### Solution:

## **Question147**

A solution of (-) - 1 - chloro -1 - phenylethane in toluene racemises slowly in the presence of a small amount of SbCl<sub>5</sub>, due to the formation of: [2013]

#### **Options:**

- A. carbanion
- B. carbene
- C. carbocation
- D. free radical

Answer: C

### Solution:

Carbocations are planar, hence can beattacked on either sideto form racemic mixture.  $Cl - CH_{3} - CH_{3} \xrightarrow{SbCl_{5}} Ph - CH_{CH} - CH_{3} + SbCl_{6} \xrightarrow{-} Ph - CH_{3} + SbCl_{5} \xrightarrow{Cl} (d + 1) mixture$ 

## **Question148**

## The order of stability of the following carbocations is:



B.II > III > I

C.I > II > III

D.III > I > II

#### Answer: D

### Solution:

#### Solution:

Higher stability of allyl and benzyl carbocations is due to dispersal of positive charge by resonance



Resonating structures of benzyl carbocation

whereas in alkyl carbocations dispersal of positive charge on different hydrogen atoms is due to inductive effect. Hence the correct order of stability will be



Question149

Which one of the following is most stable? [Online April 9, 2013]

**Options:** 

A.

Β.





**Answer:** A

### Solution:

#### Solution:

3° carbocations are most stable.

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## **Question150**

#### Given



In the above compounds correct order of reactivity in electrophilic substitution reactions will be: [Online April 25,2013]

**Options:** 

A. B > A > C > D

B. D > C > B > A

C. A > B > C > D

D. B > C > A > D

#### Answer: A

### Solution:

-Cl and  $-CH_3$  groups are o and p directing. They are electron releasing due to +M and hyperconjugation effects. Further since such groups increase electron density in the nucleus, they facilitate further electrophilic substitution and hence known as activating group. The activating effect of these groups is in order of  $-CH_3 > -X$  but chlorine exceptionally deactive the ring due to strong -I effect. Hence, it is difficult to carry out substitution in chlorobenzene than in benzene. Further  $-NO_2$  is a deactivating group, hence deactivates the benzene nucleus, i.e. hinder the further substitution. Thus nitrobenzene undergo electrophilic substitution with a great difficulty, hence the correct order will be



## **Question151**

In nucleophilic substitution reaction, order of halogens as incoming (attacking) nucleophile is:

 $I \rightarrow Br^{>}Cl^{-}$ 

The order of halogens as departing nucleophile should be: [Online April 25, 2013]

**Options:** 

- A.  $Br^- > I^{->}Cl^-$
- B.  $I^{->}Br^{-} > Cl^{-}$

C. Cl<sup>-</sup> > Br<sup>-</sup> > I<sup>-</sup>

D. Cl<sup>-</sup> > I<sup>-</sup> > Br<sup>-</sup>

#### Answer: B

### Solution:

#### Solution:

Since the leaving group breaks away as a base, it is easier to displace weaker bases as compared to stronger bases. Thus less basic the substituent, the more easily it is displaced. Since the basic strength of the given groups is in order.  $I^{-} < Br^{-} < Cl^{-}$ Thus the order of halogen leaving groups is  $I^{-} > Br^{-} > Cl$ 

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## **Question152**

### Which of the following cannot be represented by resonance structures? [Online May 7, 2012]

#### **Options:**

A. Dimethyl ether

B. Nitrate anion
C. Carboxylate anion

D. Toluene

#### **Answer: A**

### Solution:

Solution: Ethers, due to absence of delocalized pair of electrons do not show resonance.

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### **Question153**

### The IUPAC name of the compound is

H₂C — CH — CH₁

### [Online May 7, 2012]

#### **Options:**

- A. 1,2 -propoxide
- B. propylene oxide
- C. 1, 2 oxo propane
- D. 1,2 -cpoxy propane

### **Answer: D**

### Solution:

Solution: 1,2 -Epoxy propane is the correct IUPAC name of given compound.

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### **Question154**

### The IUPAC name of the following compound is

 $CH_3 C = C C C = C - CH_2CH_3$ 

### [Online May 19,2012]

### **Options:**

- A. (E)-2-hepten-4-yne
- B. (Z) 5 -hepten- 3 -yne
- C. (E)-5-hepten-3-yne
- D. (Z)-2-hepten-4-yne

#### Answer: A

### Solution:

Solution:  $\frac{{}^{1}CH_{3}}{H} = \frac{2}{C} = \frac{3}{C} = \frac{H}{C} = \frac{5}{C} = \frac{6}{C} + \frac{7}{C}$ (E) - 2 - hepten - 4 - yne

### **Question155**

### Dipole moment is shown by [Online May 26, 2012]

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#### **Options:**

A. 1,2 -dichlorobenzene

B. trans-2, 3 -dichloro-2-butene

- C. 1,4 -chlorobenzene
- D. trans-1,2-dinitroethene

Answer: A

### Solution:

Solution: In 1,2 -dichlorobenzene the two dipoles are at  $60^{\circ}$  (i.e. unsymmetric). Thus possesses dipole moment.

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### **Question156**

## How many cyclic structures are possible for $\rm C_4H_{\ 6}$ ? [Online May 7, 2012]

#### **Options:**

- A. 3
- B. 5
- C. 6
- D. 4

Answer: B

### Solution:

Five cyclic structures are possible for  $C_4H_6$ . These are as following:



### **Question157**

### Maleic acid and fumaric acids are [Online May 26,2012]

\_\_\_\_\_

#### **Options:**

- A. chain isomers
- B. functional isomers
- C. tautomers
- D. geometrical isomers

#### Answer: D

### Solution:

Solution:Maleic acid and fumaric acids are geometrical isomers.H - C - COOHH - C - COOH

H = C = COOH H = C = COOHMaleic acid

H – C – COOH II HOOC – C – H Fumaric acid

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### **Question158**

In the below mentioned compounds the decreasing order of reactivity towards electrophilic substitution is



### [Online May 12, 2012]

#### **Options:**

- A. (iv) > (i) > (ii) > (iii)
- B. (ii) >(iii) > (i) > (iv)
- C. (iii) >(i) > (iv) > (ii)
- D. (i) > (ii) > (iii) > (iv)

#### Answer: D

### Solution:

### Solution: $-OCH_3$ and $-CH_3$ groups are activating group while $-CF_3$ is a deactivating group. Thus order is



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### **Question159**

### The change in the optical rotation of freshly prepared solution of glucose is known as: [2011RS]

#### **Options:**

- A. racemisation
- B. specific rotation
- C. mutarotation
- D. tautomerism

Answer: C

### Solution:

Solution:

When either of the two forms of glucose is dissolved in water, there is change in rotation till the equilibrium value of

## Out of the following, the alkene that exhibits optical isomerism is [2010]

### **Options:**

- A. 3-methyl-2-pentene
- B. 4 -methyl-1-pentene
- C. 3-methyl-1-pentene
- D. 2 -methyl-2-pentene

### Answer: C

### Solution:

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### **Question161**

The correct order of increasing basicity of the given conjugate bases  $(R = CH_3)$  is [2010]

### **Options:**

- A.  $RCO\overline{O} < HC \equiv \overline{C} < \overline{R} < \overline{N}H_2$
- B.  $\overline{R} < HC \equiv \overline{C} < RCO\overline{O} < \overline{N}H_2$
- C. RCO $\overline{O} < \overline{N}H_2 < HC \equiv \overline{C} < \overline{R}$
- D. RCO $\overline{O}$  < H C =  $\overline{C}$  <  $\overline{N}$  H  $_2$  <  $\overline{R}$

### Answer: D

### Solution:

 $\therefore$  the correct order of basicity is RCOO<sup>-</sup> < CH  $\equiv$  C<sup>-</sup> < N H <sub>2</sub> - < R<sup>-</sup>

\_\_\_\_\_

### Question162

## The IUPAC name of neopentane is [2009]

### **Options:**

- A. 2, 2-dimethylpropane
- B. 2-methylpropane
- C. 2,2 -dimethylbutane
- D. 2- methylbutane

### Answer: A

### Solution:

Neopentane or 2, 2- Dimethylpropane

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### **Question163**

## The alkene that exhibits geometrical isomerism is: [2009]

### **Options:**

- A. 2 methyl propene
- B. 2 -butene
- C. 2 methyl -2 butene
- D. propene
- Answer: B
- Solution:



The number of stereoisomers possible for a compound of the molecular formula  $CH_3 - CH = CH - CH (OH) - Me$  is: [2009]

**Options:** 

A. 2

B. 4

C. 6

D. 3

Answer: B

### Solution:

 $\begin{array}{l} CH_{3}-CH = CH - CHCH \\ {}_{OH}^{I} & {}_{3} \end{array}$  It exhibits both geometrical as well as optical isomerism. cis -R cis -S trans - R trans - S

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### **Question165**

Arrange the carbanions, (CH  $_3$ ) $_3$ C, CCl  $_3$ , (CH  $_3$ ) $_2$ CH, C $_6$ H  $_5$ CH  $_2$ order of their decreasing stability is [2009]

**Options:** 

A.  $(CH_3)_2\overline{CH} > \overline{CCl}_3 > C_6H_5\overline{CH}_2 > (CH_3)_3\overline{C}$ B.  $\overline{CCl}_3 > C_6H_5\overline{CH}_2 > (CH_3)_2\overline{CH} > (CH_3)_3\overline{C}$ C.  $(CH_3)_3\overline{C} > (CH_3)_2\overline{CH} > C_6H_5\overline{CH}_2 > \overline{CCl}_3$ D.  $C_6H_5\overline{CH}_2 > \overline{CCl}_3 > (CH_3)_3\overline{C} > (CH_3)_2\overline{CH}$ 

#### Answer: B

### Solution:

$$Cl = Cl = C_6H_5\overline{C}H_2 > (CH_3)_2\overline{C}H > (CH_3)_3\overline{C}$$

\_\_\_\_\_

-ve charge -M effect highly dispersed delocalises due to - I effect -ve charge +1 effect of CH<sub>3</sub> group intensifies the -ve charge

### **Question166**

# The correct decreasing order of priority for the functional groups of organic compounds in the IUPAC system of nomenclature is [2008]

### **Options:**

A. -COOH,  $-SO_3H$ ,  $-CONH_{2'}$ , -CHO

B.  $-SO_3H$ , -COOH,  $-CONH_2$ , -CHO

C. –CH O, –COOH , –SO<sub>3</sub>H , –CON H  $_{\rm 2}$ 

D. -CON H  $_2$  - CH O, -SO $_3$ H , -COOH

### Answer: A

### Solution:

The correct order of priority for the given functional group is

 $-COOH > -SO_3H > -C - NH_2 > -C - H$ 

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### **Question167**

### The absolute configuration of

### [2008]

**Options**:

A. S, S

B. R, R

C. R, S

D. S, R

Answer: B

### Solution:

Solution:

The absolute configuration is (R, R) (use priority rules to get the absolute configuration)

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### **Question168**

The electrophile, E  $^{\oplus}$  attacks the benzene ring to generate the intermediate  $\sigma$  – complex. Of the following, which  $\sigma^-$  complex is lowest energy? [2008]

**Options:** 

A.



Β.



C.



D.





### Solution:

In option (b) the complex formed is with benzene whereas in other cases it is formed with nitrobenzene with  $-NO_2$  group in different positions (o-, m-, p-). The complex formed with nitrobenzene in any position of  $-NO_2$  group is less stablethan the complex formed with benzene, so the most stable complex has lowest energy.

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### **Question169**

### The IUPAC name of is

### [2007] Options:

optionst

A. 3-ethyl-4,4-dimethylheptane

B. 1,1 -diethyl-2,2-dimethylpentane

C. 4,4 -dimethyl – 5, 5 -diethylpentane

D. 5,5 -dicthyl -4, 4 -dimethylpentane.

### Answer: A

### Solution:

 ${}^{7}_{CH_{3}}$  -  ${}^{6}_{CH_{2}}$  -  ${}^{5}_{CH_{2}}$  -  ${}^{4}_{CH_{2}}$  -  ${}^{3}_{CH_{2}}$  -  ${}^{2}_{CH_{2}}$  -  ${}^{1}_{CH_{2}}$  -  ${}^{$ CH<sub>3</sub> CH<sub>5</sub>CH<sub>3</sub> 3-Ethyl-4,4-dimethylheptane

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### Question170

Which one of the following conformations of cyclohexane is chiral? [2007]

### **Options:**

- A. Boat
- B. Twist boat
- C. Rigid

D. Chair

### Answer: B

### Solution:

Chiral conformation will not have plane of symmetry. Since twist boat does not have plane of symmetry, it is chiral.



### **Question171**

### Which of the following molecules is expected to rotate the plane of plane-polarised light? [2007]

**Options:** 

A.

H,N



COOH





D.



#### Answer: B

### Solution:

#### Solution:

The organic compounds which have chiral carbon atom (a carbon atom attached to four different groups or atoms) and do not have plane of symmetry rotate plane polarised light.  $_{
m CHO}$   $_{*}$ 

H O – 
$$\overset{|}{\underset{CH_2OH}{\overset{}}}$$
 – H (\* is asymmetric carbon)

### Presence of a nitro group in a benzene ring [2007]

#### **Options:**

- A. deactivates the ring towards electrophilic substitution
- B. activates the ring towards electrophilic substitution
- C. renders the ring basic
- D. deactivates the ring towards nucleophilic substitution.

### Answer: A

### Solution:

Solution:

Nitro group is electron withdrawing group, so it deactivates the ring towards electrophilic substitution.

------

### Question173

### The IUPAC name of the compound shown below is :



#### **Options:**

- A. 3 -bromo-1-chlorocyclohexene
- B. 1 -bromo-3-chlorocyclohexene
- C. 2 -bromo-6-chlorocyclohex-1-ene
- D. 6-bromo-2-chlorocyclohexene

#### Answer: A

### Solution:

3-Bromo-1-chlorocyclohexene

\_\_\_\_\_

# Increasing order of stability among the three main conformations (i.e. Eclipse, Anti, Gauche) of 2 -fluorocthanol is [2006]

#### **Options:**

A. Eclipse, Anti, Gauche

B. Anti, Gauche, Eclipse

C. Eclipse, Gauche, Anti

D. Gauche, Eclipse, Anti

Answer: A

### Solution:

#### Solution:



Due to hydrogen bonding between H  $\&F\,$  gauche conformation is most stable, hence the correct order is Eclipse, Anti, Gauche

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### **Question175**

## The increasing order of stability of the following free radicals is [2006]

**Options:** 

A.  $(C_6H_5)_2$  CH <  $(C_6H_5)_3$  C <  $(CH_3)_3$  C <  $(CH_3)_2$  CH

B.  $(CH_3)_2$   $CH < (CH_3)_3$   $C < (C_6H_5)_2$   $CH < (C_6H_5)_3$  C

C.  $(CH_3)_3$  C <  $(CH_3)_2$  CH <  $(C_6H_5)_2$  CH <  $(C_6H_5)_3$  C

D.  $(C_6H_5)_3$  C <  $(C_6H_5)_2$  CH <  $(CH_3)_3$  C <  $(CH_3)_2$  CH

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#### Answer: B

### Solution:

#### Solution:

The order of stability of free radicals  $(C_6H_5)_3$   $C > (C_6H_5)_2$   $CH > (CH_3)_3$   $C > (CH_3)_2$  CHThe stabilisation of first two is due to resonance and last two is due to hyper conjugation.

 $CH_{3}Br + Nu^{-} \rightarrow CH_{3} - Nu + Br^{-}$  The decreasing order of the rate of the above reaction with nucleophiles (Nu ) A to D is [Nu<sup>-</sup> = (A)PhO, (B)AcO, (C)HO, (D)CH<sub>3</sub>O<sup>-</sup>] [2006]

### **Options:**

A. A > B > C > D

B. B > D > C > A

C. D > C > A > B

D. D > C > B > A

#### Answer: C

### Solution:

 $CH_{3}COO^{-} < C_{6}H_{5}O^{-} < OH^{-} < OCH_{3}$ e^s are delocalised Max.e^- density on O

### **Question177**



The alkene formed as a major product in the above elimination reaction is

### [2006]

**Options:** 

A.



B.



D. CH  $_2$  = CH  $_2$ 

#### Answer: D

### Solution:

**Hofmann's rule :** When theoretically more than one type of alkenes are possible in eliminations reaction, the alkene containing least alkylated (least substituted) double bond is formed as major product. Hence



Note: Therefore less sterically hundred  $\beta$  -hydrogen is removed.

**Question178** 

### Which types of isomerism is shown by 2,3 -dichlorobutane? [2005]

#### **Options:**

A. Structural

B. Geometric

C. Optical

D. Diastereo

Answer: C

### Solution:

#### Solution:

 $CH_3 \xrightarrow{CI CI} CH_3 \xrightarrow{H H} CH_3$ 

 $CH_2 - CH_2$ , 2, 3 -Dichlorobutane exhibits optical isomerism due to the presence of two asymmetric carbon atoms.

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### **Question179**

## Due to the presence of an unpaired electron, free radicals are: [2005]

**Options:** 

- A. cations
- B. anions
- C. chemically inactive
- D. chemically reactive

Answer: D

### Solution:

Solution:

Free radicals are electrically neutral, unstable and very reactive on account of the presence of odd electrons.

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### **Question180**

## The decreasing order of nucleophilicity among the nucleophiles is (A) CH $_{2^{\rm C}}$ – O $^-$

(B) CH <sub>3</sub>O<sup>-</sup>

(C) CN<sup>-</sup>



### [2005]

#### **Options:**

A. (C) > (B) > (A) > (D)B. (B) > (C) > (A) > (D)C. (D) > (C) > (B) > (A)

D. (A) > (B) > (C) > (D)

Answer: A

### Solution:

#### Solution:

In moving down a group, the basicity and nucleophilicity are inversely related, i.e. nucleophilicity increases while basicity decreases. In going from left to right across a period, the basicity and nucleophilicity are directly related. Both of the characteristics decrease as the electronegativity of the atom bearing lone pair of electrons increases. If the nucleophilic centre of two or more species is same, nucleophilicity parallels basicity, i.e. more basic the species, stronger is its nucleophilicity.

Hence based on the above facts, the correct order of nucleophilicity will be  $CN_{(C)}^- > CH_3O^- > CH_3COO^- > H_3CC_6H_4SO_3^-$ 

### Question181

### The IUPAC name of the compound is

### [2004]

### **Options:**

A. 3,3 -dimethyl –1 - cyclohexanol

B. 1, 1 -dimethyl-3-hydroxy cyclohexane

C. 3, 3-dimethyl-1-hydroxy cyclohexanc

D. 1, l-dimethyl-3-cyclohexanol

Answer: A

### Solution:

HO

3, 3-Dimethyl - 1 cyclohexanol

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### **Question182**

Which one of the following does not have sp<sup>2</sup> hybridised carbon? [2004]

### **Options:**

- A. Acetonitrile
- B. Acetic acid
- C. Acetone
- D. Acetamide
- Answer: A

### Solution:

Solution:



### Which of the following will have a mesoisomer also? [2004]

#### **Options:**

A. 2,3 - Dichloropentane

B. 2,3 -Dichlorobutane

C. 2-Chlorobutane

D. 2-Hydroxypropanoic acid

Answer: B

### Solution:

Solution:

Note: Compounds containing two similar chiral Catoms have plane of symmetry and can exist in meso form too.



meso-2, 3-Dichlorobutane

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### **Question184**

Amongst the following compounds, the optically active alkane having lowest molecular mass is [2004]

**Options:** 

A. CH<sub>3</sub> - 
$$\overset{H}{\overset{L}{\underset{C_{2}H_{5}}{\overset{L}{\underset{C_{2}H_{5}}{\overset{L}{\underset{C_{2}H_{5}}{\overset{CH_{3}}{\underset{C_{2}H_{5}}{\overset{CH_{3}}{\underset{C_{2}H_{5}}{\overset{CH_{3}}{\underset{C_{2}H_{5}}{\overset{CH_{3}}{\underset{C_{2}H_{5}}{\overset{CH_{3}}{\underset{C_{2}H_{5}}{\overset{CH_{3}}{\underset{C_{2}H_{5}}{\overset{CH_{3}}{\underset{C_{2}H_{5}}{\overset{CH_{3}}{\underset{C_{2}H_{5}}{\overset{CH_{3}}{\underset{C_{2}H_{5}}{\overset{CH_{3}}{\underset{C_{2}H_{5}}{\overset{CH_{3}}{\underset{C_{2}H_{5}}{\overset{CH_{3}}{\underset{C_{2}H_{5}}{\overset{CH_{3}}{\underset{C_{2}H_{5}}{\overset{CH_{3}}{\underset{C_{2}H_{5}}{\overset{CH_{3}}{\underset{C_{2}H_{5}}{\overset{CH_{3}}{\underset{C_{2}H_{5}}{\overset{CH_{3}}{\underset{C_{2}H_{5}}{\overset{CH_{3}}{\underset{C_{2}H_{5}}{\overset{CH_{3}}{\underset{C_{2}H_{5}}{\overset{CH_{3}}{\underset{C_{2}H_{5}}{\overset{CH_{3}}{\underset{C_{2}H_{5}}{\overset{CH_{3}}{\underset{C_{2}H_{5}}{\overset{CH_{3}}{\underset{C_{2}H_{5}}{\overset{CH_{3}}{\underset{C_{2}H_{5}}{\overset{CH_{3}}{\underset{C_{2}H_{5}}{\overset{CH_{3}}{\underset{C_{2}H_{5}}{\overset{CH_{3}}{\underset{C_{2}H_{5}}{\overset{CH_{3}}{\underset{C_{2}H_{5}}{\overset{CH_{3}}{\underset{C_{2}H_{5}}{\overset{CH_{3}}{\underset{C_{2}H_{5}}{\overset{CH_{3}}{\underset{C_{2}H_{5}}{\overset{CH_{3}}{\underset{C_{2}H_{5}}{\overset{CH_{3}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\overset{CH_{3}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}H_{5}}{\underset{C_{2}$$

C. CH  $_3$  – CH  $_2$  – CH  $_2$  – CH  $_3$ 

D. CH<sub>3</sub> – CH<sub>2</sub> – C  $\equiv$  CH

### Answer: A

### Solution:

Only 2 -cylcopropylbutane has a chiral centre, CH  $_{3} - \bigcup_{\substack{H \\ C_{2}H_{5}}}^{H} - \triangleleft$ 

### **Question185**

### Which of the following compounds is not chiral? [2004]

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### **Options:**

- A. 1 -chloro-2-methyl pentane
- B. 2 -chloropentane
- C. 1 -chloropentane
- D. 3 -chloro-2-methyl pentane

### Answer: C

### Solution:

Solution: 1 -chloropentane is not chiral while others are chiral in nature (a)  $Cl CH_{2}CH CH_{2}CH_{2}CH_{2}CH_{3}$ (b)  $H_{3}CCH CH_{2}CH_{2}CH_{2}CH_{3}$ (c)  $Cl CH_{2}CH_{2}CH_{2}CH_{2}CH_{2}CH_{3}$ (d)  $L_{3}CH CH CH_{2}CH_{2}CH_{2}CH_{3}$ (e)  $L_{3}CH CH CH_{2}CH_{2}CH_{2}CH_{3}$ (f)  $L_{3}CH CH CH_{2}CH_{2}CH_{3}$ (g)  $L_{3}CH CH CH CH_{2}CH_{3}$ 

\_\_\_\_\_

### **Question186**

The reaction

$$R - C X + N_{u}^{\Theta} \longrightarrow R - C N_{u}^{O} + X^{\Theta}$$

is fastest when X is [2005, 2004]

#### **Options:**

A. OCOR

B.  $OC_2H_5$ 

C. N H  $_2$ 

D. Cl

Answer: D

### Solution:

Solution: -Cl is the best leaving group among the given options.

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### **Question187**

Consider the acidity of the carboxylic acids: (1) PhCOOH (2)  $o - NO_2C_6H_4COOH$ (3)  $p - NO_2C_6H_4COOH$ (4)  $m - NO_2C_6H_4COOH$ Which of the following order is correct? [2004]

#### **Options:**

A. 2 > 4 > 1 > 3B. 2 > 4 > 3 > 1C. 1 > 2 > 3 > 4D. 2 > 3 > 4 > 1

#### Answer: D

### Solution:

#### Solution:

In carboxylic acids, presence of electron withdrawing substituent e.g.  $-NO_2$  disperses the negative charge of the anion and stabilises it and hence increases the acidity of the parent acid.

Further o -isomer will have higher acidity than corresponding m -and p -isomers due to ortho and high inductive effect of  $-NO_2$  group. Since nitro group at p position has more pronounced electron withdrawing than  $-NO_2$  group at m - position, hence the correct order is:



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### **Question188**

### Which of the following is the strongest base? [2004]

**Options:** 

A.



Β.



C.



D.



#### Answer: D

### Solution:

**Solution:** Lone pair of electrons present on the nitrogen of benzyl amine is not involved in resonance.

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### Question189

The general formula  $C_n H_{2n} O_2$  could be for open chain [2003]

**Options:** 

- A. carboxylic acids
- B. diols
- C. dialdehydes
- D. diketones

Answer: A

### Solution:

Solution:  $C_{\rm n} H_{\rm 2n} O_{\rm 2}$  is general formula for carboxylic acid

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### **Question190**

## The IUPAC name of CH $_3$ COCH (CH $_3$ ) $_2$ is [2003]

#### **Options:**

- A. 2 -methyl-3-butanone
- B. 4 -methylisopropyl ketone
- C. 3 -methyl-2-butanone
- D. Isopropylmethyl ketone

Answer: C

### Solution:

$$\begin{array}{ccc} O & CH_3 \\ & & 2 \\ CH_3 - C - & CH - CH_3 \end{array}$$

3-Methyl-2-butanone

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### **Question191**

#### 

### it is true that [2003]

### **Options:**

A. only I and II are chiral compounds

- B. only III is a chiral compound
- C. only II and IV are chiral compounds
- D. all four are chiral compounds

### Answer: A





### In the anion H COO<sup>-</sup> the two carbon-oxygen bonds are found to be of equal length. What is the reason for it? [2003]

### **Options:**

- A. The C = O bond is weaker than the C O bond
- B. The anion H COO<sup>-</sup> has two resonating structures
- C. The anion is obtained by removal of a proton from the acid molecule
- D. Electronic orbitals of carbon atom are hybridised

### Answer: B

### Solution:

 $\mathrm{H}\,\mathrm{COO}^-$  exists in following resonating structures

 $H - C \to H - C = 0$ Hence in it both the carbon oxygen bonds are found equal.

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### Question193

### Which of the following compounds has wrong IUPAC name? [2002]

#### **Options:**

A.

CH  $_3$  – CH  $_2$  – CH  $_2$  – COO – CH  $_2 \rm CH$   $_3 \rightarrow$  ethyl butanoate

B.

 $\operatorname{CH}_{3} - \operatorname{CH}_{0}_{|_{CH_{3}}} - \operatorname{CH}_{2} - \operatorname{CH} \operatorname{O} \rightarrow 3 \text{ -methyl-butanol}$ 

 $\operatorname{CH}_{3} - \operatorname{CH}_{0} - \operatorname{CH}_{0} - \operatorname{CH}_{3} \rightarrow 2\text{-methyl-3-butanol}$ 

D.

$$CH_{3} - CH_{-} - CH_{-} - CH_{2} - CH_{3} \rightarrow 2 \text{ -methyl-3-pentanone}$$

#### Answer: C

### Solution:

According to IUPAC convention alcohols are having more priority than saturated carbons. As the IUPAC name of compound shown above is: 3 - methyl butan -2- ol

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### Question194

### In which of the following species is the underlined carbon having sp<sup>3</sup> hybridisation? [2002]

#### **Options:**

- A. CH <sub>3</sub>COOH
- B. CH <sub>3</sub>xCH <sub>2</sub>OH
- C. CH <sub>3</sub>xCOCH <sub>3</sub>
- D. CH<sub>2</sub> = xCH CH<sub>3</sub>

### Answer: B

### Solution:

In molecules (a), (c) and (d), the carbon atom has a multiple bond, only (b) has  ${\rm sp}^3$  hybridisation.

### **Question195**

## A similarity between optical and geometrical isomerism is that [2002]

### **Options:**

- A. each forms equal number of isomers for a given compound
- B. if in a compound one is present then so is the other
- C. both are included in stereoisomerism
- D. they have no similarity

#### Answer: C

### Solution:

Both differ in the arrangement of group in space, therefore grouped under sterio-isomerism.

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### **Question196**

Which of the following does not show geometrical isomerism? [2002]

#### **Options:**

A. 1,2 - dichloro-1-pentene

- B. 1,3 -dichloro- 2 -pentene
- C. 1,1 -dichloro-1-pentene
- D. 1,4 -dichloro- 2 -pentene

#### Answer: C

### Solution:

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### Question197

## Racemic mixture is formed by mixing two [2002]

#### **Options:**

A. isomeric compounds

- B. chiral compounds
- C. meso compounds
- D. enantiomers with chiral carbon

### Answer: D

### Solution:

A mixture of equal amount of two enantiomers is called a racemic mixture.

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### **Question198**

### Following types of compounds (as I, II)

$$CH_{3}CH = CHCH_{3}CH_{3}CH_{3}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_{1}CH_$$

are studied in terms of isomerism in:

### [2002]

#### **Options:**

- A. chain isomerism
- B. position isomerism
- C. conformers
- D. stereoisomerism

#### Answer: D

### Solution:

#### Solution:

Stereoisomerism, isomers differ in the arrangement of groups in space. The two structures show stereoisomerism. Structure I shows geometrical isomerism as it contains two different atoms or groups H and CH  $_3$  attached to each carbon containing double bond.

$$H_{3}C$$

$$H_{1}C = C \begin{pmatrix} CH_{3} & H \\ H & H_{3}C \end{pmatrix} C = C \begin{pmatrix} CH_{3} & H \\ H & H_{3}C \end{pmatrix}$$
*trans-butene*

cis-butene trans-butene Structure II shows optical isomerism as it contains a chiral carbon (attached to four different groups) atom.



### **Question199**

Arrangement of  $(CH_3)_3C-$ ,  $(CH_3)_2CH-CH_3-CH_2-$  when attached to benzyl or an unsaturated group in increasing order of inductive effect is [2002]

### **Options:**

- A.  $(CH_3)_3C < (CH_3)_2CH < CH_3 CH_2 -$
- B. CH  $_3$  CH  $_2$  < (CH  $_3$ ) $_2$ CH < (CH  $_3$ ) $_3$ C –
- C. (CH  $_3$ ) $_2$ CH 4(CH  $_3$ ) $_3$ C < CH  $_3$  CH  $_2$  -
- D.  $(CH_3)_3C < CH_3CH_2 < (CH_3)_2CH -$

### Answer: B

### Solution:

Solution:

 $-CH_3$  group has +I effect, as number of  $-CH_3$  group increases, the inductive effect increases. Therefore the correct order is

 $CH_{3} - CH_{2} - < (CH_{3})_{2}CH - < (CH_{3})_{3}C -$ 

### **Question200**

## The functional group, which is found in amino acid is [2002]

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#### **Options:**

A. - COOH group

B. N H <sub>2</sub> group

C. – CH <sub>3</sub> group

D. both (a) and (b).

Answer: D

### Solution:

Solution: Amino acids contain  $-\,N\,H_2$  and  $-\,COOH\,$  groups, e.g glycine H  $_2N\,CH$   $_2COOH$  .

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