ENTRANCE TEST – 2020
MDCAT – CHEMISTRY

TEST # 02 UHS TOPIC – 1 (Organic Chemistry)
TOPIC: FUNDAMENTAL CHEMISTRY

Q.51 **Consider the following statements about nature of carbon and their primary suffix:

	Nature of carbon	Primary suffix
I	Saturated carbon chain	–ane
II	Unsaturated carbon chain (one C=C bond)	–ene
III	Unsaturated carbon chain (two C=C bonds)	–adiene
IV	Unsaturated carbon chain (two C≡C bonds)	–adiyne

Mark the correct statement:

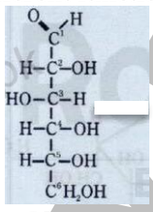
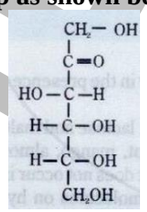
A) I only
C) II and IV
B) II only
D) I, II, III and IV

Q.52 **Glucose and fructose are:

A) Metamers of each other
C) Tautomers of each other
B) Functional group isomers of each other
D) Chain isomers of each other

Answer Explanation: (B)

Glucose and fructose are functional group isomers of each other because they have same molecular formula but different functional group as shown below

- **Structural formula:** **Glucose** **Fructose**
- **Molecular formula:** **$C_6H_{12}O_6$** **$C_6H_{12}O_6$**
- **Functional group** $-\overset{\overset{O}{\|}}{C}-H$ $-\overset{\overset{O}{\|}}{C}-$

Q.53 **Consider the following properties of organic compounds?

I. Isomorphism
II. Catenation
III. Complexity of organic compounds
IV. Isomerism

Which of the above statement is/are incorrect about organic compounds?

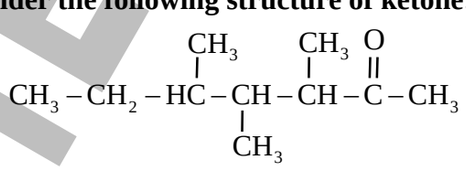
A) I only
C) II and IV
B) II only
D) I, II, III and IV

Answer Explanation: (A) It is incorrect

In fact organic compounds show the following properties

- **Resonance**
- **Catenation**
- **Complexity of organic compound**
- **Isomerism**

Q.54 **Consider the following structure of ketone:

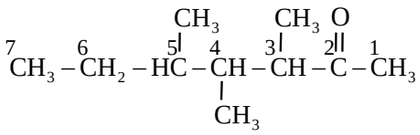


The correct name according to IUPAC is:

A) 3,4,5-Trimethyl-3-heptanone
C) 2,3,4-Trimethyl-3-heptanone
B) 3,4,5-Trimethyl-2-heptanone
D) 3,3,4-Trimethyl-2-heptanone

Answer Explanation: (B)

The correct name of the given ketone structure according to IUPAC is 3,4,5-Trimethyl-2-heptanone



Q.55 **In steam cracking, higher hydrocarbons in the vapour phase are:

A) Mixed with steam and heated for a short duration to about 900°C and cooled rapidly

B) Broken down by heating at high temperature and pressure

C) Cracked at lower temperature to about 500°C and lower pressure in the presence of suitable catalyst

D) Mixed with steam and cooled slowly

Answer Explanation: (A)

- **In steam cracking, higher hydrocarbons in the vapour phase are mixed with steam and heated for a short duration to**

Q.56 **All of the following substances are inorganic in nature EXPECT:

A) Sodium carbonate **C) Sugar**

B) Carbon disulphide D) Graphite

Q.57 **Consider the following structure

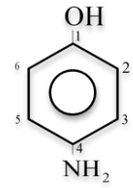
The correct IUPAC name of the above given structure is:

A) 4-Aminophenol C) 4-Aminocarbenol

B) 4-Hydroxyaniline D) 1-Hydroxianiline

Answer Explanation: (A)

The correct IUPAC name of the given structure is 4-aminophenol



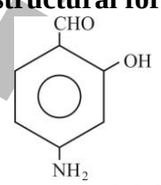
Reason:

The order of priority of the functional groups (left to right)

–COOH, –CN, –CHO, –$COCH_3$, –OH, –NH_2, –OR

- **According to the order of priority of the functional groups, –OH functional group is preferred to –NH_2 in numbering.**

Q.58 **Consider the following structural formula:



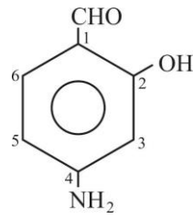
The correct name according to IUPAC is:

A) 4-Amino-6-hydroxybenzaldehyde C) 2-Amino-4-hydroxybenzaldehyde

B) 4-Amino-2-hydroxybenzaldehyde D) 3-Amino-4-hydroxybenzaldehyde

Answer Explanation: (B)

The correct name according to IUPAC of the given structure is 4-Amino-2-hydroxybenzaldehyde



Q.59 **Which of the following is formula of cycloalkanes?

A) C_nH_{2n} C) C_nH_{2n+2}

B) C_nH_{2n-2} D) C_nH_{2n+1}

Answer Explanation: (A)

Options	Molecular formula	Name
A)	**C_nH_{2n}**	**Cycloalkanes**
B)	**C_nH_{2n-2}**	**Alkynes**
C)	**C_nH_{2n+2}**	**Alkanes**
D)	**C_nH_{2n+1}**	**Alkyl**

Q.60 Identify the incorrect statement:

A) Organic means … life or living

B) Inorganic means … lifeless (non-living source)

C) Methane … the simplest organic compounds

D) HCN and Na_2CO_3 … organic compounds

Answer Explanation: (D)

HCN and Na_2CO_3 are not organic compounds though they contain carbon because they do not show the following properties of organic compounds.

- **Low melting points**
- **Low boiling points**
- **Low solubility in water, high solubility in non-polar solvents**
- **Flammable**
- **Solutions are nonconductors of electricity**
- **Exhibit covalent bonding**
- **Exhibit isomerism**
- **Chemical reactions are usually slow**

Q.61 In cis-trans isomerism, the trans-form shows all of the following properties EXCEPT:

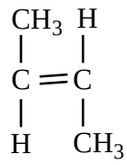
A) It is non-polar molecule C) It has higher melting point

B) It has higher boiling point D) It is symmetrical

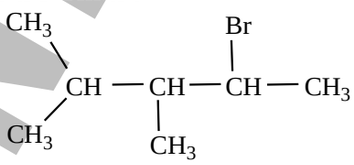
Answer Explanation: (B)

Trans-form has the following characteristics feature:

- **It is symmetrical molecule**
- **It has comparatively higher melting point**
- **It has comparatively lower boiling point**



Q.62 Consider the following structural formula:



The correct name according to IUPAC is:

A) 2,3-Dimethyl-4-bromopentane

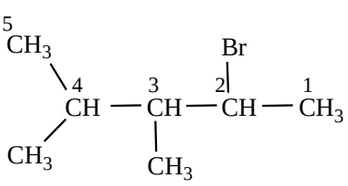
B) 2-Bromo-2,2-dimethylpentane

C) 2-Bromo-3,4-dimethylpentane

D) 3-Bromo-3,4-dimethylpentane

Answer Explanation: (C)

The correct name according to IUPAC of the given structure is 2-Bromo-3,4-dimethylpentane



Q.63 Which of the following is the least stable carbocation?

A) CH_3^+ C) $CH_3\text{-}C^+H_2$

B) $(CH_3)_2C^+H$ D) $(CH_3)_3C^+$

Answer Explanation: (A)

Order of increasing stability of carbocation is as follow:

$CH_3^+ < CH_3\text{-}C^+H_2 < (CH_3)_2C^+H < (CH_3)_3C^+$

It shows that greater is the number of alkyl group attached with the carbocation, greater is the stability. Alkyl groups are electron donating and thus the stabilize the carbocation.

Q.64 **The IUPAC name of the following compound is:

$$H_2C = CH - HC = CH - HC = HC - CH_3$$

A) 2,4,5-Triheptene
C) 2,4,6-Triheptene
B) 1,3,5-Heptatriene
D) 2,4,6-Heptatriene

Answer Explanation: (B)

The correct name of the given structure according to IUPAC is 1,3,5-Heptatriene.

$$\overset{1}{H_2C} = \overset{2}{CH} - \overset{3}{HC} = \overset{4}{CH} - \overset{5}{HC} = \overset{6}{HC} - \overset{7}{CH_3}$$

Q.65 Which of the following is not nucleophile?

A) Ethene
C) Benzene
B) Ethyne
D) Acetylonium ion

Answer Explanation: (D)

Opt.	Species	Nucleophile / Electrophile
A)	Ethene	Nucleophile
B)	Ethyne	Nucleophile
C)	Benzene	Nucleophile
D)	Acetylonium ion	Electrophile

Q.66 Which of the following alkenes does not show geometric isomerism?

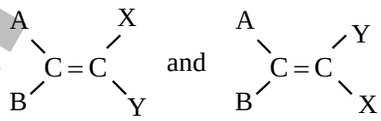
A) 2-Butene
C) 1-Hexene
B) 1-Bromo-2-chloropropene
D) 2-Pentene

Answer Explanation: (C)

- **1 – Hexene ($^1CH_2 = {}^2CH - {}^3CH_2 - {}^4CH_2 - {}^5CH_2 - {}^6CH_3$) does not show geometric isomerism because it does not fulfil the following conditions of geometric isomerism.**

Further Explanation:

- **All alkenes do not show geometrical isomerism.**
- **Geometrical isomerism is possible only when each carbon atom that forms the double bond is attached to two different groups.**
- **The general formula:**



are geometrical isomers only if A ≠ B and X ≠ Y.
A can be the name as X and Y, and
B can be the same as X or Y.

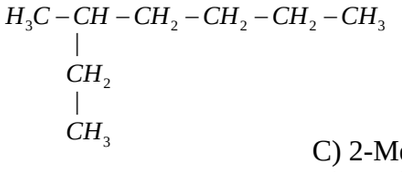
Q.67 Which one of the following reagents is not an electrophile?

A) NO_2^+
C) CH_3^+
B) SO_3
D) C_2H_4

Answer Explanation: (D)

Opt.	Species	Electrophile / Nucleophile
A)	NO_2^+	Electrophile
B)	SO_3	Electrophile
C)	CH_3^+	Electrophile
D)	C_2H_4	Nucleophile

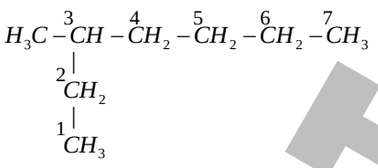
Q.68 Which of the following is correct name of the given alkane according to IUPAC?



A) 3-Methylheptane
C) 2-Methylheptane
B) 2-Ethylhexane
D) 2-Ethylheptane

Answer Explained (A)

The correct name of the given structure according to IUPAC is 3-Methylheptane:



Q.69 Which one of the following shows metamerism?
A) $CH_3 – CH_2CH = CH_2$ and $H_3C\ CH=CH – CH_3$
B) $CH_3 – CH_2CHO$ and CH_3COCH_3
C) $(CH_3)_3\ CH$ and $CH_3 – CH_2 – CH_2 – CH_3$
D) $H_3C – NH – C_3H_7$ and $C_2H_5 – NH – C_2H_5$

Answer Explanation: (D)

Opt.	Organic compounds	Type of structural isomerism
A)	$CH_3 – CH_2CH = CH_2$ and $H_3C\ CH=CH – CH_3$	Position isomerism
B)	$CH_3 – CH_2CHO$ and CH_3COCH_3	Functional group isomerism
C)	$(CH_3)_3\ CH$ and $CH_3 – CH_2 – CH_2 – CH_3$	Chain isomerism
D)	$H_3C – NH – C_3H_7$ and $C_2H_5 – NH – C_2H_5$	Metamerism

Q.70 Select from the following which one is alcohol:
A) CH_3COOH
C) $CH_3–O–CH_3$
B) $CH_3–CH_2–OH$
D) $CH_3–CH_2CHO$

Answer Explanation: (B)

Given structure ($CH_3–CH_2–OH$) is an example of alcohol.

Opt.	Structural formula	Name
A)	CH_3COOH (RCOOH)	Ethanoic acid
B)	$CH_3–CH_2–OH$ (ROH)	Ethanol
C)	$CH_3–O–CH_3$ (ROR)	Methoxy methane
D)	$CH_3–CH_2CHO$ (RCHO)	Propanal

Q.71 Which of the following is not type of structural isomerism?
A) Metamerism
C) Chain isomerism
B) Functional group isomerism
D) Cis-trans isomerism

Answer Explanation: (D)

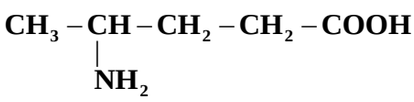
- **Cis-trans isomerism is not type of structural isomerism**
- **It is a type of stereoisomerism.**
- **Geometric isomerism results from a restriction of rotation about double bonds or about single bonds in cyclic compounds.**
- **The two carbon atoms of the C = C bond and the four atoms that are attached to them all lie in one plane and their positions in space are fixed.**
- **Rotation around the C = C bond is not possible because rotation would break the π bond.**

Q.72 Which of the following statements is incorrect about nucleophile?
A) It is rich in electrons
B) It can be negatively charged ion
C) It can have lone pair of electrons on the central atom of a molecule
D) It can be deficient one electron pair on the central atom of a molecule

Answer Explanation: (D)

It can have lone pair of electron on the central atom of a molecule such as $H_2\ddot{O}$, $\ddot{N}H_3$.

Q.73 Consider the following structure of carboxylic acid



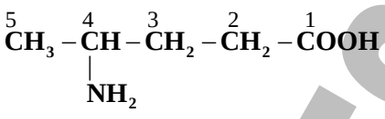
The correct name according to IUPAC name is:

A) 4-Amino pentanoic acid C) 2-Amino butanoic acid

B) 2-Amino pentanoic acid D) 3-Amino pentanoic acid

Answer Explanation: (A)

The correct name according to IUPAC name of the given structure is 4-Amino pentanoic acid



Q.74 Which of the following is the most stable alkyl free radical?

A) CH_3-CH_2-C$^\bullet H_2$ **C) $(H_3C$-$CH_2)_3$ C$^\bullet$**

B) $(CH_3$-$CH_2)_2$C$^\bullet$H D) CH_3-C$^\bullet H_2$

Answer Explanation: (C)

Order of decreasing stability of alkyl free radical is as follow:

$(H_3C$-$CH_2)_3$C$^\bullet$ > CH_3-$CH_2)_2$C$^\bullet$H > CH_3-CH_2-C$^\bullet H_2$ > CH_3-C$^\bullet H_2$

Q.75 Select the nucleophile from the following?

A) $AlCl_3$ C) NO_2^+

B) I^+ **D) CH_3O^-**

Answer Explanation: (D)

Options	Species	Nucleophile / Electrophile
A)	$AlCl_3$	Electrophile
B)	I^+	Electrophile
C)	NO_2^+	Electrophile
D)	CH_3O^-	Nucleophile

Q.76 Which one of the following compounds does not show position isomerism?

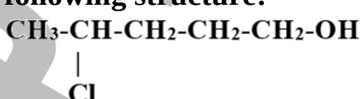
A) Dichlorobenzene C) Butene

B) Propanol **D) Propene**

Answer Explanation: (D)

Propene ($CH_3 – CH = CH_2$) does not show position isomerism because it has only one possible structure.

Q.77 Consider the following structure:



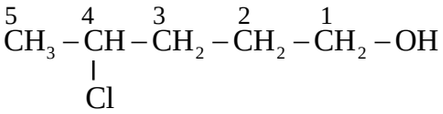
What is the most correct name of the above given structure according to IUPAC?

A) 4-Chloro-1-pentanol C) 1-Chloro-4-pentanol

B) 2-Chloro-4-pentanol D) 4-Chloro-3-pentanol

Answer Explanation: (A)

The most correct name according to IUPAC of the given structure is 4-Chloro-1-pentanol



Q.78 The application of cracking is/are:

A) To increase production of petrol
B) To produce petrochemicals
C) Both A and B
D) Neither A nor B

Answer Explanation: (C)

The applications of cracking are

- **To increase production of petrol**
- **To produce petrochemicals**

Q.79 Which of the following is a heterocyclic compound?

A) Aniline
B) Pyridine
C) Styrene
D) Toluene

Answer Explanation: (B)

- **Pyridine is a heterocyclic compound.**
- **The compounds in which the ring consists of atoms of more than one kind are called heterocyclic compounds or heterocycles.**
- **In heterocyclic compounds generally one or more atoms of elements such as nitrogen (N), oxygen (O) or sulphur (S) are present.**
- **The atom other than carbon viz, N, O or S, present in the ring is called heteroatom.**
- **Pyridine, Furan, Pyrrole and Thiophene are examples of heterocyclic compounds.**

Q.80 Which of the following statements does not match correctly?

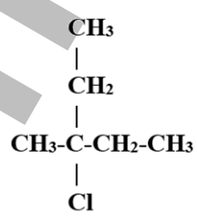
A) $-NO_2$ … nitro group
B) $-\overset{O}{\overset{\|}{C}}-X$ … acid halide group
C) $-\overset{O}{\overset{\|}{C}}-OH$ … carboxyl group
D) $>C=NH$ **… amido group**

Answer Explanation: (D)

It is incorrect statement. Correct statement is as follow:

Options	Structure	Name
D)	$>C=NH$	**Imino group**

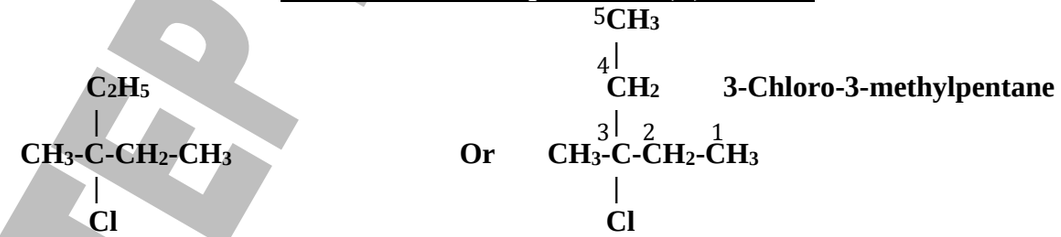
Q.81 Consider the following structure:



The correct name of the above structure according to IUPAC is:

A) 2-Chloro-2-methylpentane
B) 3-Chloro-3-methylpentane
C) 3-Chloro-2-methylpentane
D) 3-Chloro-3-methylisopentane

Answer Explanation: (B)

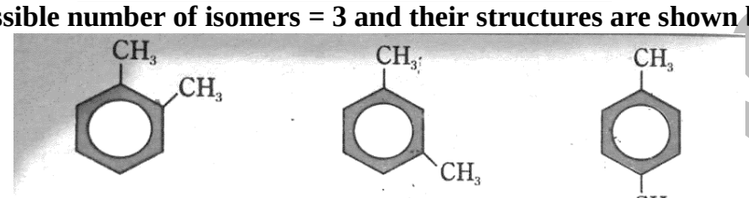


Q.82 Xylene has possible number of isomers:

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

Answer Explanation: (B)

Xylene has possible number of isomers = 3 and their structures are shown below:



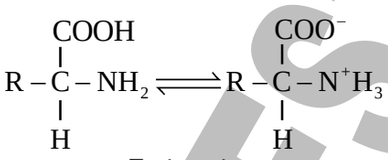
1,2 Dimethylbenzene (o-xylene) | 1,3 Dimethylbenzene (m-xylene) | 1,4 Dimethylbenzene (p-xylene)

Q.83 The type of structural isomerism which arises due to shifting of proton from one atom to the other atom in the same molecule is called:

A) Metamerism
B) Mesomerism
C) Sterioisomerism
D) Tautomerism

Answer Explanation: (D)

The type of structural isomerism which arises due to shifting of proton from one atom to the other atom in the same molecule is called tautomerism.



Zwitter ion

(α-amino acid shows tautomerism)

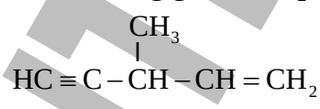
Q.84 Which formula represents a compound which has cis-trans isomerism?

A) C_2H_6O
B) $C_2H_2O_4$
C) $CH_3–CH_2Cl$
D) $C_2H_2Cl_2$

Answer Explanation: (D)

Cis-form (1,2-Dichloroethene) **Trans-form (1,2-Dichloroethen)**

Q.85 The IUPAC name of the following given compound is:



A) 3-Methyl-1-penten-4-yne
B) 3-Methyl-1-pentyn-4-ene
C) 2-Methyl-1-penten-4-yne
D) 2-Methylhepta-1,3,5-triene

Answer Explanation: (A)

The IUPAC name of the following compound of the given structure is 3-Methyl-1-penten-4-yne.