



Hemchandracharya North Gujarat University PHD Exam

Exam Name : HNGU_PHD_Chemistry_01.02.2024_03.00 PM TO 05:00 PM

Exam Date : 2024-02-01

Exam Time : 03:00:00 PM To 05:00:00 PM

Total Marks : 100

Note : The correct answer is indicated by the green color. સાચો જવાબ લીલા રંગ દ્વારા સૂચવવામાં આવે છે.

Question List:

Section: Section-A

- What is the name of the variable that is controllable in the experiment? [1 Mark]
 - Secondary independent
 - Not controlled
 - Intermediate
 - **Independent**
- What isn't a research instrument? [1 Mark]
 - **Attitude Scale**
 - Sociometry
 - CAI Programme
 - Opinionnaire
- Which of the following is the symbolic portrayal of Null hypothesis? [1 Mark]
 - **$H_0 : T_2 = T_1$**
 - $H_0 : T_2 > T_1$
 - $H_0 : T_2 < T_1$
 - $H_0 : T_2 \neq T_1$
- Identify the correct statement [1 Mark]
 - Reliability ensures the validity
 - Validity ensures reliability
 - **Reliability and validity are independent of each other**
 - Reliability does not depend on objectivity
- Which is the appropriate classification of research? [1 Mark]
 - Basic, Applied and Action Research
 - Philosophical, Historical, Survey and Experimental Research
 - Quantitative and Qualitative Research
 - **All the this**
- The research project wherein the scientists try to identify an impact is called: [1 Mark]
 - Survey Research
 - Summative Research
 - Historical Research
 - **'Ex-post Facto' Research**
- Basic research demonstrates the capacity to : [1 Mark]
 - Synthesize new ideals
 - **Expound new principles**
 - Evaluate the existing material concerning research
 - Study the existing literature regarding various topics
- Which test is used by the researcher to test the Null Hypothesis ? [1 Mark]
 - F test
 - **ANOVA**
 - X²
 - factorial analysis
- When comparing the means of multiple groups or populations on a single independent variable, which statistical method is appropriate? [1 Mark]
 - **the t-test**
 - a pooled estimate of the standard error
 - one-way analysis of variance
 - two-way ANOVA

- The best sampling technique for a research subject with a heterogeneous population is [1 Mark]
 - Cluster Sampling
 - **Stratified Sampling**
 - Convenient Sampling
 - Lottery Method
- In which kind of research the Field-work-based research is classified ? [1 Mark]
 - **Empirical**
 - Historical
 - Experimental
 - Biographical
- In order to pursue the research, which of the following is priorly required? [1 Mark]
 - Developing a research design
 - **Formulating a research question**
 - Deciding about the data analysis procedure
 - Formulating a research hypothesis
- Under what circumstances does a Type-I error arise? [1 Mark]
 - The null hypotheses get accepted even if it is false
 - **The null hypotheses get rejected even if it is true**
 - Both the null hypotheses as well as alternative hypotheses are rejected
 - None of the This
- Which of the following are risks of plagiarism [1 Mark]
 - Losing of the inspiration
 - Destruction of the obtained solutions
 - Destroying the public image of researcher
 - **Losing of the titles obtained by researcher**
- Which of the following describes the research's objective? [1 Mark]
 - To test a hypothesis of a causal relationship between variables
 - To become familiar with a phenomenon
 - To determine the frequency with which something occurs or with it is associated with something else.
 - **All of the this**
- will be the correct order of the research process?
 1. Data Collection
 2. Formation of Hypothesis
 3. Sample Selection
 4. Formulating Objectives
 5. Implementation of research method [1 Mark]
 - 2-3-1-4-5
 - 1-3-2-4-5
 - **4-2-3-5-1**
 - 4-1-5-2-3
- What does the term randomization mean? [1 Mark]
 - Each and every unit of the population has an equal chance of selection in the sample
 - The selection or non-selection of a unit of population does not affect the selection or non-selection of the other unit of the population in the sample
 - It is a method of selection which is free from subjective biases
 - **All of the above**
- Formulation of a research problem depends on:
 - (a) What is the object behind the researcher's choice?
 - (b) What are the specific questions?
 - (c) What is the conceptual model?
 - (d) What negative factors to research upon?
 - (e) Reasons for unlimiting the study.
 - (f) Construction of hypotheses. [1 Mark]
 - (a), (c), (e) and (f)
 - (c), (d), (e) and (f)
 - (b), (c), (d) and (e)
 - **(a), (b), (c) and (f)**
- The components of a research design are:
 - (a) Comparison
 - (b) Control
 - (c) Reactivity
 - (d) Manipulation
 - (e) Non representativeness
 - (f) Generalization [1 Mark]
 - (c), (d), (e) and (f)
 - (b), (c), (d) and (e)
 - **(a), (b), (d) and (f)**
 - (a), (c), (e) and (f)
- Free will is a category of [1 Mark]
 - Sports law
 - Commercial law
 - **Ethics**
 - Political law

- While writing reports/manuscripts researchers sometimes use the abbreviation fn which implies: [1 Mark]
 - Figure number
 - Following number
 - **Footnote**
 - Final number
- Inquiries with few possible responses are called [1 Mark]
 - Open ended questions
 - **Structural questions**
 - Unstructured questions
 - Dichotomous questions
- Making inferences about the total population based on data from a subset is referred to as: [1 Mark]
 - Deductive inference
 - **Inductive inference**
 - Pseudo-inference
 - Objective inference
- Arrange the following components of a research paper written in APA style, in correct order
 - A. Figures
 - B. Methods
 - C. Introduction
 - D. Tables
 - E. Results [1 Mark]
 - C,E,B,D,A
 - C,B,A,D,E
 - **C,B,E,D,A**
 - C,B,E,A,D
- Applying a theory, a law, or a principle to a specific situation is called ____ in the field of education [1 Mark]
 - Pure research
 - Applied research
 - Action research
 - **Theoretical research**
- A sampling strategy that guarantees a known non-zero chance of selection is [1 Mark]
 - **Probability sampling**
 - Non probability sampling
 - multiple Choice
 - analysis
- The process of creating a list or sample of a certain community by employing a starting group of participants as informants is known as [1 Mark]
 - Convenience Sampling
 - **Snow ball Sampling**
 - Purposive sampling
 - Quota sampling
- Statistics is used by researchers to [1 Mark]
 - **Analyze the empirical data collected in a study**
 - Make their findings sound better
 - Operationally define their variables
 - Ensure the study comes out the way it was intended
- A literature review requires [1 Mark]
 - Planning
 - Good & clear writing
 - Lot of rewriting
 - **All of the this**
- A methodology wherein each constituent of the population has an equal probability of being represented within the sample... [1 Mark]
 - **Random sampling technique**
 - Stratified sampling technique
 - Incidental sampling technique
 - Purposive sampling technique
- Following the determination of the critical variables and the establishment of the theoretical framework's logical reasoning, the following stage in the research process is [1 Mark]
 - To conduct surveys
 - **To generate the hypothesis**
 - To focus group discussions
 - To use experiments in an investigation
- The quality of a research journal is indicated by its [1 Mark]
 - i10-score
 - g-index
 - h-index
 - **impact factor**
- Descriptive research describes: [1 Mark]
 - What was
 - **What is**
 - What will be

- Why is
- Which of the following nouns is relevant for qualitative study? [1 Mark]
 - **Exploration**
 - Comparison
 - Correlation
 - Prediction
- Which correlation coefficient describes the relationship between intelligence and creativity the best? [1 Mark]
 - **1**
 - 0.6
 - 0.5
 - 0.3
- In this question four alternatives are given for the idiom/phrase printed in bold. Choose the alternative which best expresses the meaning of the idiom/phrase. Hear it on the grapevine [1 Mark]
 - **To hear the rumor**
 - To find out the truth
 - To know something from unexpected source
 - To know something which is already a big news
- ____ Seen my brother, I came home [1 Mark]
 - After
 - **Having**
 - After having
 - Not
- The first and the last parts of the given sentence are numbered 1 and 6. The rest of the sentence is split into four parts named, P, Q, R and S. These four parts are not given in their proper order. Read the parts, arrange them properly and find out which of the four combinations given below is appropriate, and mark it as your answer.

1. Seeds are the
P. link in the food chain
Q. means control over lives,
R. source of life and the first
S. and control over seed
6. foods and freedom of people

[1 Mark]

 - RSPQ
 - SRPQ
 - RQSP
 - **RPSQ**

• Image [1 Mark]

In this question, there are three sentences. Each has a pair of words that are italicized and highlighted. From the italicized and highlighted words, select the most appropriate words (A or B) to form correct sentences. The sentence is followed by options that indicate the words, which may be selected to correctly complete the set of sentences. From the options given, choose the most appropriate one.

The new rules are supposed to enable farmers to sell their produce at *remunerative (A) /remonstrative (B)* prices.

The ICC Champions Trophy may not have the *allure (A) / allude (B)* of the World Cup or the ICC World Twenty 20, but it has its own charm, especially for Indians.

The only long-term solution is to gradually *align (A) / alight (B)* crop production with genuine price signals.

A	ABA	B	AAB
C	BAA	D	AAA

- A
- B
- C
- **D**
- Find one word for : Person with independent or unorthodox views [1 Mark]
 - Philosopher
 - Dictator
 - **Maverick**
 - Supremo
- What is the main difference between a mainframe and a super computer? [1 Mark]
 - Supercomputers are focused to execute as many programs as possible while mainframe uses its power to execute few programs as fast as possible.
 - Super computer is much larger than mainframe computers
 - Super computers are much smaller than mainframe computers
 - **Supercomputers are focused to execute few programs as fast as possible while mainframe uses its power to execute as many programs concurrently**
- An integrated circuit is [1 Mark]
 - A complicated circuit
 - An integrating device
 - **Fabricated on a tiny silicon chip**
 - Much costlier than a single transistor

- Once you load the suitable program and provide required data, computer does not need human intervention. This feature is known as [1 Mark]

- Versatility
- **Automation**
- Accuracy
- Reliability

- The terminal device that functions as a cash register, computer terminal, and OCR reader is the [1 Mark]

- OCR register terminal
- **POS terminal**
- Data collection terminal
- Video Display terminal

- What you would be doing if you use the keys Shift + F7 in MS word ? [1 Mark]

- Insert a table
- Find a text
- Insert a formula
- **Thesaurus**

- In an election between Vijaykumar and Pratimakumari, Vijaykumar got 55% of the total valid votes, 20% of the votes were invalid. If the total number of votes was 7500, the number of valid votes that Pratimakumari got, was : [1 Mark]

- 2500
- 3300
- **2700**
- 3600

- A bag contains 50 P, 25 P and 10 P coins in the ratio 5: 9: 4, amounting to Rs. 206. Find the number of coins of each type respectively. [1 Mark]

- **200, 360,160**
- 160, 360, 200
- 360, 160, 200
- 200160300

- FBG, GBF, HBI, IBH, ___ [1 Mark]

- HBL
- JBI
- **JBK**
- HBK

- The likes and professions of five friends Aarti, Mansi, Dipti, Vrunda and Srushti are given. Consider the following information and answer the question based on it.

1 Aarti likes yellow and is a student.

2 The Librarian likes Green.

3 Mansi and Vrunda like Purple and Blue respectively and neither of them is a Teacher.

4 Dipti likes Brown and the Inspector likes Blue.

5 One of the five is a Principal.

Identify the Teacher and color of her liking [1 Mark]

- Vrunda - Blue
- **Dipti - Brown**
- Aarti - Yellow
- Mansi - Purple

- Paw : Cat :: Hoof : ? [1 Mark]

- Lamb
- Eagle
- **Horse**
- Tiger

Section: Section-B

- Which of the following atom possesses highest electronegativity? [1 Mark]

- Li
- Si
- **F**
- S

- The number of metal-metal bonds in Ir₄(CO)₁₂ is [1 Mark]

- **6**
- 4
- 10
- 12

- Which of the following is an example of Hard acid? [1 Mark]

- HCl
- H₂SO₄
- InCl₃
- **BF₃**

- Identify the paramagnetic species from the following: [1 Mark]

- Ni(CO)₄
- [Ni(CN)₄]²⁻
- **[Ni(CI₄)]²⁻**

- All of these
- The brick red colour in the flame test indicates the presence of which of the following metal? [1 Mark]
 - Ca
 - Mg
 - Cu
 - Na
- The coordination number and geometry of cerium in $[\text{Ce}(\text{NO}_3)_6]^{2-}$ are respectively: [1 Mark]
 - 8 and cubic
 - 6 and trigonal prism
 - 12 and icosahedron
 - 6 and octahedron
- The shape and geometry of XeF_4 are respectively: [1 Mark]
 - Tetrahedral and Pyramidal
 - Square planar and octahedral
 - Triagonal planar and octahedral
 - Square planar and trigonal bipyramidal
- Which of the following properties account for the conductivity of metals ? [1 Mark]
 - Movement of ions
 - Strong ionic bond
 - Mobility of valence electrons
 - High melting point
- In the Periodic table, as we move from left to right in a period the atomic volume: [1 Mark]
 - First decreases then increases
 - First increases then decreases
 - Remain constant
 - increases regularly
- The complex used as an anti-cancer drug is? [1 Mark]
 - cis- $[\text{Pt}(\text{NH}_3)_2 \text{Cl}_2]$
 - trans- $[\text{Pt}(\text{NH}_3)_2 \text{Cl}_2]$
 - $[\text{Rh}(\text{NH}_3)_6]^{3+}$
 - $[\text{Co}(\text{NH}_3)_6]^{3+}$
- As per MO theory which of the molecule has zero bond order? [1 Mark]
 - N_2
 - F_2
 - He_2
 - H_2
- A colloidal system consisting of a solid dispersion medium, and a liquid dispersed phase is: [1 Mark]
 - Emulsion
 - Sol
 - Solid solution
 - Gel
- Propagation step occurs in: [1 Mark]
 - Chain Reaction
 - Polymer reaction
 - Parallel reaction
 - Both (A) and (B)
- Which one of the following statements is not true for gas adsorption following Langmuir isotherm? [1 Mark]
 - Monolayer adsorption
 - At very low pressure, the amount of gas absorbed is proportional to the pressure
 - At very high pressure, the amount of gas adsorbed reaches a constant value
 - Adsorption onto porous surface
- In a system consisting of an aqueous solution saturated with NaCl and KCl, the number of chemical constituents and number of components respectively will be: [1 Mark]
 - 3 and 3
 - 4 and 3
 - 3 and 2
 - 4 and 2

- Image [1 Mark]

In the classification of crystals, if $a \neq b \neq c$,
 $\alpha \neq \beta \neq \gamma \neq 90^\circ$, the crystal
 belongs to:

A	tetragonal system	B	monoclinic system
C	triclinic system	D	orthorhombic system

- A
- B
- C
- D

• Nylon-66 polymer is obtained by the condensation of, [1 Mark]

- Adipic acid and HMDA
- Phenol and formaldehyde
- Terephthalic acid and ethylene glycol
- Sebacic acid and hexamethylene

• A catalyst will affect the rate of the forward reaction by changing the _____. [1 Mark]

- Heat of reaction
- Potential energy
- Entropy
- Activation energy

• Low density Polythene is prepared by [1 Mark]

- Free radical polymerization
- Cationic polymerization
- Anionic polymerization
- Zeigler-Natta polymerization

• Natural rubber is a polymer of [1 Mark]

- Ethylene
- Isoprene
- Phenol
- Vinyl chloride

• Which substance is a reducing reagent in the following reaction? Reaction: $2Al + Cr_2O_3 \rightarrow Al_2O_3 + 2Cr$ [1 Mark]

- Al
- Cr_2O_3
- Al_2O_3
- Cr

• How many significant figures are present in the number 0.0025? [1 Mark]

- 6
- 5
- 2
- 4

• What amount of H_2SO_4 required to prepare 2 litres of 0.5 N H_2SO_4 solution? [1 Mark]

- 24.5
- 98
- 73.5
- 49

• The smallest possible cyclic system possessing aromaticity is [1 Mark]

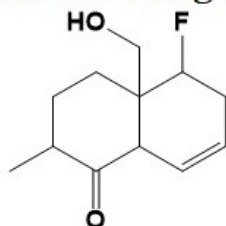
- Cyclopentadienyl anion
- Cyclopropenyl cation
- Tropylium cation
- Benzene

• When a conjugated double bond is appended in organic compound, the absorption band shifts to a higher wavelength (λ). This is referred to as: [1 Mark]

- Bathochromic shift
- Hypsochromic shift
- Chromophoric shift
- Auxochromic shift

• image [1 Mark]

How many Stereoisomers are possible for following compound?

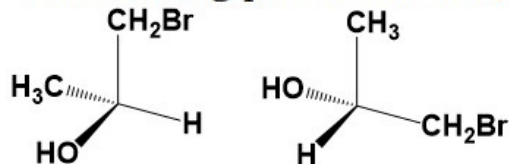


A	8	B	16
C	24	D	32

- A
- B
- C
- D

• image [1 Mark]

The following pair of the molecule is:

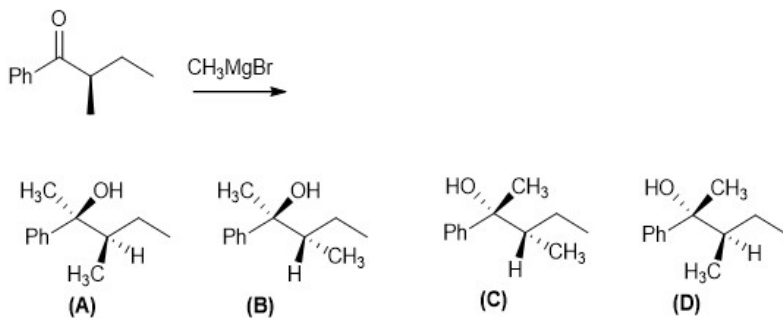


A	Enantiomers	B	Identical
C	Diastereomers	D	Meso compounds

- A
- B
- C
- D

• image [1 Mark]

Select the correct product (from A to D) for following reaction:



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

- A
- B
- C
- D

• Which of the following is a Prevost reagent? [1 Mark]

- I₂/Ag(OAc)(aq.)
- I₂/Ag(OAc)(dry)
- Hg(OAc)₂/NaBH₄
- 1% alkaline KMnO₄

• Which of the following is Syn addition reagent? [1 Mark]

- NaBH₄/CH₃OH
- Rh(PPh₃)₂Cl/D₂
- OsO₄/NaHSO₃
- All of these

• Consider the following statements regarding Enantiomers:

Statement I: Enantiomers are non-superimposable mirror images.

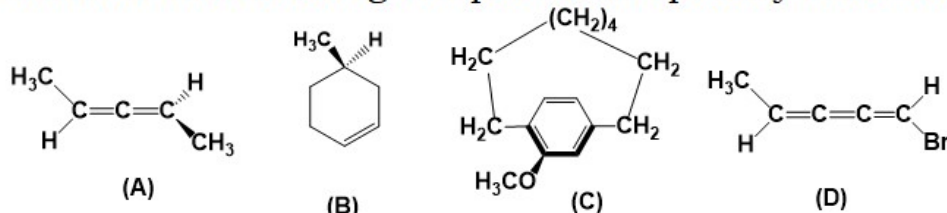
Statement II: Enantiomers have opposite configuration at each stereocentre.

Statement III: Enantiomers rotate the plane polarized light in to equal and opposite direction. [1 Mark]

- Statement I and II is correct but III is incorrect
- Statement I and III is correct but II is incorrect
- Only statement I is correct
- All the statements are correct

• image [1 Mark]

Which of the following compounds is optically inactive?



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

- A
- B
- C
- D

• image [1 Mark]

Select the correct product (from A to D) for following reaction:

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

- A
- B
- C
- D

• image [1 Mark]

Which of the following is not a suitable diene for the Diels-Alder cycloaddition reaction?

A		B	
C		D	

- A
- B
- C
- D

• image [1 Mark]

Select the correct product for the following reaction:

A		B	
C		D	

- A
- B
- C
- D

• image [1 Mark]

The major product formed in the following reaction sequence is:

A		B	
C		D	

- A
- B
- C

▪ **D**

• Select the correct HOMO of for the 1,3-butadiene and 1,3,5-hexatriene system respectively under thermal condition: [1 Mark]

- **Ψ_2 and Ψ_3**
- Ψ_3 and Ψ_2
- Ψ_3 and Ψ_4
- Ψ_4 and Ψ_5

• Claisen rearrangement is [1 Mark]

- 4+2 addition
- [1,3] sigmatropic
- **[3,3] sigmatropic**
- [1,5] sigmatropic

• The conversion of alpha-pinene to isobornyl chloride in presence of hydrochloric acid is known as [1 Mark]

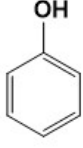
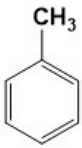
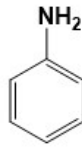

- Diels Alder reaction
- **Wagner-Meerwein rearrangement**
- Paterno-Buchi reaction
- Friedel-craft reaction

• image [1 Mark]

Choose the correct order of the Pka for the following acids: $\text{NCCH}_2\text{CH}_2\text{COOH}$ $\text{NO}_2\text{CH}_2\text{CH}_2\text{COOH}$ $\text{FCH}_2\text{CH}_2\text{COOH}$			
	I	II	III
A	I < II < III		C I < III < II
B	III < II < I		D II < I < III



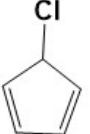
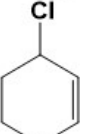
- A
- B
- C
- **D**

• image [1 Mark]

Choose the correct order of the following structure for their reactivity towards electrophilic substitution reaction.			
			
I	II	III	IV
A	I < II < III < IV		B IV < II < I < III
C	III < I < II < IV		D IV < I < II < III

- A
- **B**
- C
- D

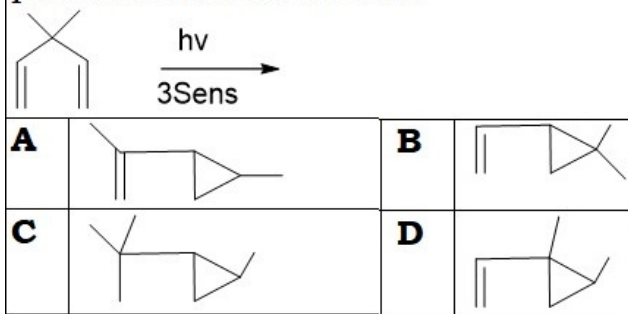
• image [1 Mark]

Which of the following compound will not give ppt with AgNO_3 ?			
A		B	
C		D	

- A
- B
- **C**
- D

• image [1 Mark]

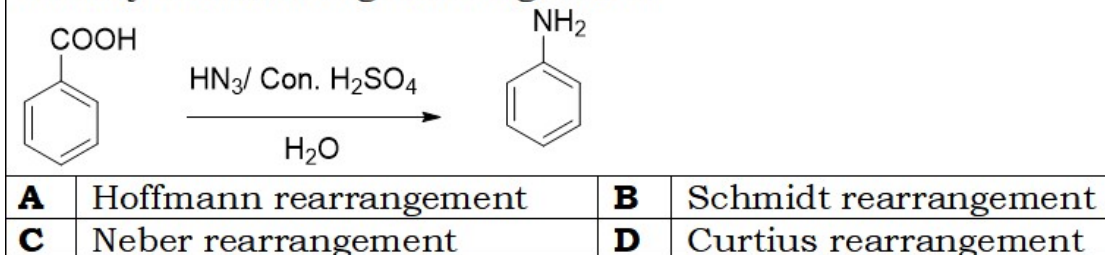
Predict the correct product of the following photochemical reaction:



- A
- **B**
- C
- D

• image [1 Mark]

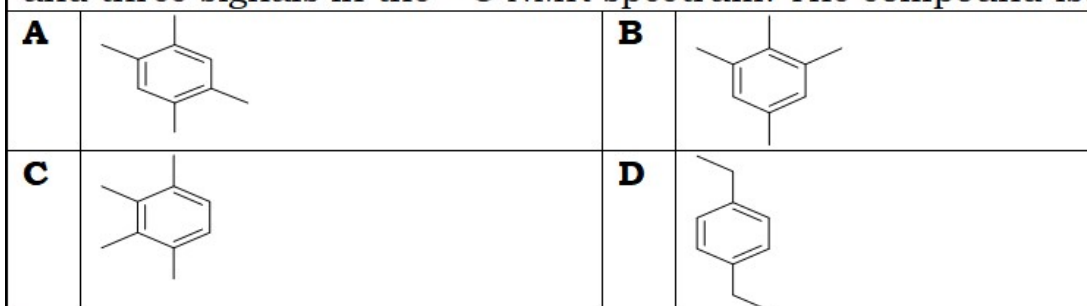
Identify the following rearrangement:



- A
- **B**
- C
- D

• image [1 Mark]

An organic compound having the molecular formula $C_{10}H_{14}$ exhibited two singlets in the 1H NMR spectrum and three signals in the ^{13}C NMR spectrum. The compound is:



- **A**
- B
- C
- D

• An organic compound when subjected to mass analysis, it showed M^+ and $M+2$ peaks in a 1:1 ratio indicated the presence of which of the following functional group in the compound? [1 Mark]

- **Br**
- Cl
- F
- I

• The UV light source used in the UV-Visible spectrophotometer is: [1 Mark]

- Mercury lamp
- Tungsten lamp
- **Deuterium lamp**
- Sodium lamp

• The order of carbonyl stretching frequency in the IR spectrum of ketone, amide and anhydride is: [1 Mark]

- Anhydride>Amide>Ketone
- **Anhydride> Ketone > Amide**
- Ketone > Anhydride> Amide
- Amide > Ketone > Anhydride

• Which of the following nuclei will not show NMR? [1 Mark]

- 1H
- ^{19}F
- **^{14}N**
- ^{31}P

• Which of the following base is not present in the RNA? [1 Mark]

- Guanine

- **Thymine**
- Cytosine
- Adenine