

DU PhD in Chemistry

Topic:- CHEM PHD S2

1) Parameter defining microcanonical, canonical and grand canonical ensembles are:

[Question ID = 10022]

1. (N, V, T), (N, V, E) and (μ , V, T)

[Option ID = 40082]

2. (N, V, E), (N, V, T) and (μ , V, T)

[Option ID = 40083]

3. (N, V, T), (μ , V, T) and (N, V, E)

[Option ID = 40084]

4. (μ , V, T), (N, V, T) and (N, V, E)

[Option ID = 40085]

Correct Answer :-

• (N, V, E), (N, V, T) and (μ , V, T)

[Option ID = 40083]

2) What is Scifinder ?

[Question ID = 10023]

1. World's largest database of chemistry literature

[Option ID = 40086]

2. Country's largest database of chemistry literature

[Option ID = 40087]

3. Continental's largest database of chemistry literature

[Option ID = 40088]

4. India's largest database of chemistry literature

[Option ID = 40089]

Correct Answer :-

• World's largest database of chemistry literature

[Option ID = 40086]

3) Match the shape to the formula. Which pairing is incorrect?

[Question ID = 10024]

1. $[\text{XeF}_5]^-$; pentagonal planar

[Option ID = 40090]

2. XeO_3 ; trigonal planar

[Option ID = 40091]

3. XeF_4 ; square planar

[Option ID = 40092]

4. $[\text{XeF}_3]^+$; T-shaped

[Option ID = 40093]

Correct Answer :-

• XeO_3 ; trigonal planar

[Option ID = 40091]

4) Langmuir adsorption isotherm equation shows the variation of extent of adsorption as a function of:

[Question ID = 10026]

1. Pressure

[Option ID = 40098]

2. Temperature

[Option ID = 40099]

3. pH of medium

[Option ID = 40100]

4. All of these

[Option ID = 40101]

Correct Answer :-

- Pressure

[Option ID = 40098]

5) Which statement is incorrect about XeF₂, XeF₄ and XeF₆?

[Question ID = 10027]

1. All three compounds react with silica glass at 298 K.

[Option ID = 40102]

2. All three compounds can be sublimed under vacuum.

[Option ID = 40103]

3. All three compounds are oxidizing agents.

[Option ID = 40104]

4. All three compounds react with H₂O.

[Option ID = 40105]

Correct Answer :-

- All three compounds react with silica glass at 298 K.

[Option ID = 40102]

6) Green chemistry aims to?

[Question ID = 10029]

1. Design chemical products and process that maximize profits

[Option ID = 40110]

2. Design safer chemical products and processes that reduce or eliminate the use and generation of hazardous substances

[Option ID = 40111]

3. Design chemical products and processes that work most efficiently

[Option ID = 40112]

4. Utilize non-renewable energy

[Option ID = 40113]

Correct Answer :-

- Design safer chemical products and processes that reduce or eliminate the use and generation of hazardous substances

[Option ID = 40111]

7) An aqueous solution containing a concentration of 2.5×10^{-8} OH⁻ ions will have a pH of which of the following?

[Question ID = 10030]

1. 6.40

[Option ID = 40114]

2. 6.42

[Option ID = 40115]

3. 7.40

[Option ID = 40116]

4. 7.76

[Option ID = 40117]

Correct Answer :-

- 6.40

[Option ID = 40114]

8) An appropriate source to find out descriptive information is

[Question ID = 10031]

1. Bibliography

[Option ID = 40118]

2. Directory

[Option ID = 40119]

3. Encyclopedia

[Option ID = 40120]

4. Dictionary

[Option ID = 40121]

Correct Answer :-

- Encyclopedia

[Option ID = 40120]

9) Which of the following statements regarding a conjugated system is false?

[Question ID = 10032]

1. Electrons are shared between more than two atoms, rather than being localized within bond joining two specific atoms

[Option ID = 40122]

2. The molecule must be cyclic (ring-structured)

[Option ID = 40123]

3. The molecule must feature alternating single and double bonds

[Option ID = 40124]

4. The system arises from the overlap of neighboring p-orbital

[Option ID = 40125]

Correct Answer :-

- The molecule must be cyclic (ring-structured)

[Option ID = 40123]

10) The standard reduction potential E° for half reactions are :



The EMF of the cell reaction $\text{Fe}^{2+} + \text{Zn} = \text{Zn}^{2+} + \text{Fe}$ is :

[Question ID = 10034]

1. +0.41 V

[Option ID = 40130]

2. +0.76 V

[Option ID = 40131]

3. +0.35 V

[Option ID = 40132]

4. +1.17 V

[Option ID = 40133]

Correct Answer :-

- +0.76 V

[Option ID = 40131]

11) The main purpose of research in education is to _____

[Question ID = 10035]

1. Increase social status of an individual

[Option ID = 40134]

2. Increase job prospects of an individual

[Option ID = 40135]

3. Help in the personal growth of an individual

[Option ID = 40136]

4. Help the candidate become an eminent educationist

[Option ID = 40137]

Correct Answer :-

- Help the candidate become an eminent educationist

[Option ID = 40137]

12) Spectroscopic transitions leading to the change in polarizability ellipsoid of a molecule will appear at which region of the electromagnetic spectrum?

[Question ID = 10036]

1. Ultraviolet
[Option ID = 40138]
2. Microwave
[Option ID = 40139]
3. Infra-red
[Option ID = 40140]
4. Raman
[Option ID = 40141]

Correct Answer :-

- Raman
[Option ID = 40141]

13) What is the unit of cell constant of a conductor?

[Question ID = 10038]

1. cm-1
[Option ID = 40146]
2. cm
[Option ID = 40147]
3. Siemens
[Option ID = 40148]
4. None of these
[Option ID = 40149]

Correct Answer :-

- cm-1
[Option ID = 40146]

14) In the process of conducting research 'Formulation of Hypothesis is followed by:

[Question ID = 10039]

1. Statement of Objectives
[Option ID = 40150]
2. Analysis of Data
[Option ID = 40151]
3. Selection of Research Tools
[Option ID = 40152]
4. Collection of Data
[Option ID = 40153]

Correct Answer :-

- Selection of Research Tools
[Option ID = 40152]

15) A 10 cm³ of NaOH solution of pH 8 is mixed with 990 cm³ of water. What is the pH of the resulting solution?

[Question ID = 10040]

1. 8
[Option ID = 40154]
2. 7
[Option ID = 40155]
3. 6
[Option ID = 40156]
4. Between 7 and 8
[Option ID = 40157]

Correct Answer :-

- Between 7 and 8
[Option ID = 40157]

16) The heterocyclic ring present in the amino-acid histidine is:

[Question ID = 10041]

1. pyridine
[Option ID = 40158]
2. tetrahydropyrrole
[Option ID = 40159]
3. indole
[Option ID = 40160]
4. imidazole
[Option ID = 40161]

Correct Answer :-

- imidazole
[Option ID = 40161]

17) The essential qualities of a researcher are:

[Question ID = 10042]

1. Spirit of free enquiry
[Option ID = 40162]
2. Reliance on observation and evidence
[Option ID = 40163]
3. Systematization or theorizing of knowledge
[Option ID = 40164]
4. All of these
[Option ID = 40165]

Correct Answer :-

- All of these
[Option ID = 40165]

18) The second-order rate constant (k_2) for the reaction of I⁻ with trans-[PtCl(CH₃)(PEt₃)₂] in methanol at 30°C is 40 L.mol⁻¹s⁻¹ and with N³⁻ is 7.0 L.mol⁻¹s⁻¹. The given ¹⁹⁵Pt values are 5.42 and 3.58 for the two nucleophiles respectively. The value of nucleophilic discrimination constant (S) and the first-order rate constant (C) for the reaction could be:

[Question ID = 10043]

1. 0.41, -0.61
[Option ID = 40166]
2. 0.41, -0.41
[Option ID = 40167]
3. 0.61, -0.41
[Option ID = 40168]
4. None of these
[Option ID = 40169]

Correct Answer :-

- 0.41, -0.61
[Option ID = 40166]

19) The ratio of the relative intensities of the carbon signals in the first order ¹³C NMR spectrum of CD₃Cl is:

[Question ID = 10044]

1. 1:4:6:4:1
[Option ID = 40170]
2. 1:3:3:1
[Option ID = 40171]
3. 1:6:15:20:15:6:1
[Option ID = 40172]
4. 1:3:6:7:6:3:1
[Option ID = 40173]

Correct Answer :-

- 1:3:6:7:6:3:1
[Option ID = 40173]

20) Research is:

[Question ID = 10045]

1. Searching again and again

[Option ID = 40174]

2. Finding solution to any problem

[Option ID = 40175]

3. Working in a scientific way to search for truth of any problem

[Option ID = 40176]

4. None of these

[Option ID = 40177]

Correct Answer :-

- Working in a scientific way to search for truth of any problem

[Option ID = 40176]

21) What is the final, stable nuclide, X, if radon-222 decays by the emission of four alpha particles and four beta particles?

[Question ID = 10046]

1. tungsten-206

[Option ID = 40178]

2. tungsten-214

[Option ID = 40179]

3. platinum-210

[Option ID = 40180]

4. lead-206

[Option ID = 40181]

Correct Answer :-

- lead-206

[Option ID = 40181]

22) Which type of study is loosely structured and designed to expand understanding of a topic and provide insights?

[Question ID = 10048]

1. Formal

[Option ID = 40186]

2. Descriptive

[Option ID = 40187]

3. Exploratory

[Option ID = 40188]

4. Experimental

[Option ID = 40189]

Correct Answer :-

- Exploratory

[Option ID = 40188]

23) In which region of the infrared spectrum would you expect to find a peak characteristic of a triple bond stretch?

[Question ID = 10049]

1. 4000 - 3000 cm^{-1}

[Option ID = 40190]

2. 2500 - 2000 cm^{-1}

[Option ID = 40191]

3. 2000 - 1500 cm^{-1}

[Option ID = 40192]

4. 1500 - 750 cm^{-1}

[Option ID = 40193]

Correct Answer :-

- 2500 - 2000 cm^{-1}

[Option ID = 40191]

24) In the dichromate dianion :

[Question ID = 10050]

1. 4 Cr–O bonds are equivalent

[Option ID = 40194]

2. 6 Cr–O bonds are equivalent

[Option ID = 40195]

3. All Cr–O bonds are equivalent

[Option ID = 40196]

4. All Cr–O bonds are nonequivalent

[Option ID = 40197]

Correct Answer :-

• 6 Cr–O bonds are equivalent

[Option ID = 40195]

25) Which of the following is a Wiley Journal?

[Question ID = 10051]

1. Chemical Communication

[Option ID = 40198]

2. Organic Letter

[Option ID = 40199]

3. Angewandte Chemie

[Option ID = 40200]

4. Organic & Biomolecular Chemistry

[Option ID = 40201]

Correct Answer :-

• Angewandte Chemie

[Option ID = 40200]

26) The term symbol/s for $S = \frac{1}{2}$ and $L = 2$ are:

[Question ID = 10052]

1. 3P_2 , 3P_1 and 3P_0

[Option ID = 40202]

2. $^2P_{5/2}$ and $^2P_{3/2}$

[Option ID = 40203]

3. $^2D_{5/2}$ and $^2D_{3/2}$

[Option ID = 40204]

4. 2D_3 and 2D_4

[Option ID = 40205]

Correct Answer :-

• $^2D_{5/2}$ and $^2D_{3/2}$

[Option ID = 40204]

27) The frequency of 3×10^{18} Hz falls in the:

[Question ID = 10053]

1. Microwave region

[Option ID = 40206]

2. Infra-red region

[Option ID = 40207]

3. Visible and ultraviolet region

[Option ID = 40208]

4. X-ray region

[Option ID = 40209]

Correct Answer :-

• X-ray region

[Option ID = 40209]

28) A diffraction pattern from a single cubic lattice gives the first (lowest) diffraction angle as 15.5° in an experiment with incident X-rays of wavelength 0.154 nm. The corresponding cell length responsible for this diffracted beam is which of the following?

[Question ID = 10054]

1. 0.29 nm

[Option ID = 40210]

2. 29 nm

[Option ID = 40211]

3. 0.15 nm

[Option ID = 40212]

4. 2.3 nm

[Option ID = 40213]

Correct Answer :-

- 0.29 nm

[Option ID = 40210]

29) Which statement about the trans-effect and the trans-influence is correct?

[Question ID = 10056]

1. The trans-influence is a ground-state effect, whereas the trans-effect has a kinetic origin

[Option ID = 40218]

2. The trans-effect is a ground-state effect, whereas the trans-influence has a kinetic origin

[Option ID = 40219]

3. Both the trans-effect and trans-influence are ground-state effects

[Option ID = 40220]

4. Rates of substitution are affected by the trans-effect but have nothing to do with the trans-influence of ligands.

[Option ID = 40221]

Correct Answer :-

- The trans-influence is a ground-state effect, whereas the trans-effect has a kinetic origin

[Option ID = 40218]

30) Which of the following is not a journal?

[Question ID = 10057]

1. Science

[Option ID = 40222]

2. Tetrahedron Letters

[Option ID = 40223]

3. Sci-finder

[Option ID = 40224]

4. Nature

[Option ID = 40225]

Correct Answer :-

- Tetrahedron Letters

[Option ID = 40223]

31) Electronic transitions originating from the 2S energy level of an atom to higher levels belong to which series?

[Question ID = 10059]

1. Lyman Series

[Option ID = 40230]

2. Balmer Series

[Option ID = 40231]

3. Brackett Series

[Option ID = 40232]

4. Pfund Series

[Option ID = 40233]

Correct Answer :-



- Balmer Series

[Option ID = 40231]

32) Cryogenic liquids are:

[Question ID = 10060]

1. Materials with boiling points of less than -73°C

[Option ID = 40234]

2. Materials with boiling points of more than 73°C

[Option ID = 40235]

3. Materials with boiling points 100°C

[Option ID = 40236]

4. Materials which are toxic and colored

[Option ID = 40237]

Correct Answer :-

- Materials with boiling points of less than -73°C

[Option ID = 40234]

33) It takes 12 minutes for the concentration of a radioactive species to decay to its 1/8th value of its original concentration. What is the rate constant of this radioactive decay reaction?

[Question ID = 10061]

1. 240 s^{-1}

[Option ID = 40238]

2. 0.00231 s^{-1}

[Option ID = 40239]

3. 0.00289 s^{-1}

[Option ID = 40240]

4. 865.8 s^{-1}

[Option ID = 40241]

Correct Answer :-

- 0.00289 s^{-1}

[Option ID = 40240]

34) The ground state of a harmonic oscillator has number of nodes:

[Question ID = 10062]

1. 3

[Option ID = 40242]

2. 2

[Option ID = 40243]

3. 1

[Option ID = 40244]

4. 0

[Option ID = 40245]

Correct Answer :-

- 0

[Option ID = 40245]

35) As the temperature of a solution is increased, the conductance in an electrolyte solution will

[Question ID = 10065]

1. Become zero

[Option ID = 40254]

2. Remain the same

[Option ID = 40255]

3. Increase

[Option ID = 40256]

4. Decrease

[Option ID = 40257]

Correct Answer :-

- Increase

[Option ID = 40256]

36) In a reverse micro-emulsion, W_o is defined as:

[Question ID = 10066]

1. $W_o = \frac{[\text{surfactant}]}{[\text{water}]}$

[Option ID = 40258]

2. $W_o = \frac{[\text{water}]}{[\text{surfactant}]}$

[Option ID = 40259]

3. $W_o = 1/[\text{water}]$

[Option ID = 40260]

4. $W_o = 1/[\text{surfactant}]$

[Option ID = 40261]

Correct Answer :-

- $W_o = 1/[\text{surfactant}]$

[Option ID = 40261]

37) In an inner-sphere electron transfer reaction, which of the following ligands could not act as a bridging ligand?

[Question ID = 10067]

1. 1,10-phenanthroline

[Option ID = 40262]

2. 4,4'-bipyridine

[Option ID = 40263]

3. Pyrazine

[Option ID = 40264]

4. bis(4-pyridyl)methane

[Option ID = 40265]

Correct Answer :-

- 1,10-phenanthroline

[Option ID = 40262]

38) A doctor studies the relative effectiveness of two drugs of dengue fever. His research would be classified as:

[Question ID = 10068]

1. Descriptive Survey

[Option ID = 40266]

2. Experimental Research

[Option ID = 40267]

3. Case Study

[Option ID = 40268]

4. Ethnograph

[Option ID = 40269]

Correct Answer :-

- Experimental Research

[Option ID = 40267]

39) Which one among the following journal has the highest impact?

[Question ID = 10070]

1. Science

[Option ID = 40274]

2. Organic Letters

[Option ID = 40275]

3. Angewandte Chemie

[Option ID = 40276]

4. Nature

[Option ID = 40277]

Correct Answer :-

- Science

[Option ID = 40274]

40) Which of the following does not used to calculate h-index?

[Question ID = 10071]

1. Web of Science

[Option ID = 40278]

2. Scopus

[Option ID = 40279]

3. Google Scholar

[Option ID = 40280]

4. Sci-finder

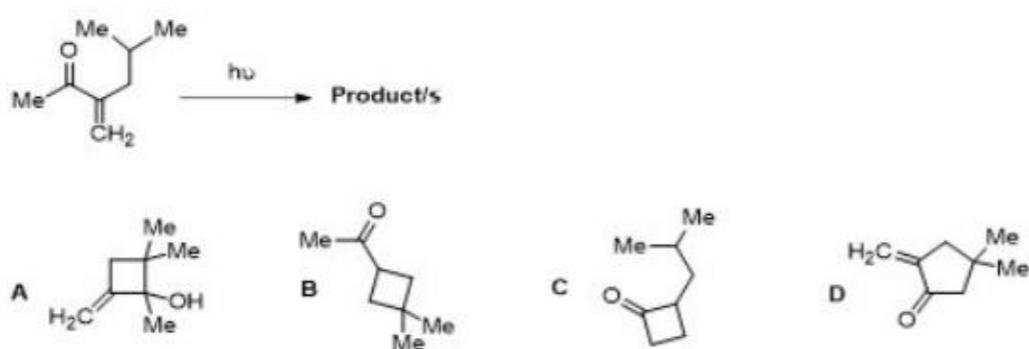
[Option ID = 40281]

Correct Answer :-

- Sci-finder

[Option ID = 40281]

41) Amongst the following reaction, the major products formed in the following photochemical reactions are:



[Question ID = 10191]

1. A and C

[Option ID = 40758]

2. B and C

[Option ID = 40759]

3. A and D

[Option ID = 40760]

4. A and B

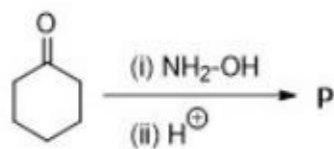
[Option ID = 40761]

Correct Answer :-

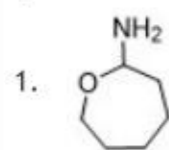
- A and B

[Option ID = 40761]

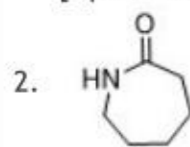
42) The major product (P) and the rearrangement involved in the following reaction is:



[Question ID = 10192]



[Option ID = 40762]



[Option ID = 40763]



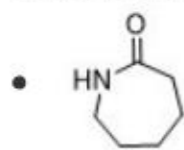


[Option ID = 40764]

4. none of these

[Option ID = 40765]

Correct Answer :-



[Option ID = 40763]

43) Match the following drugs with their medicinal activity

(A) 5-fluorouracil	(i) anti-bacterial
	(ii) cholesterol
(B) amoxicillin lowering	(iii) anticancer
	(iv) anti-inflammatory

[Question ID = 10193]

1. A-i, B-ii

[Option ID = 40766]

2. A-iv, B-iii

[Option ID = 40767]

3. A-iii, B-iv

[Option ID = 40768]

4. A-iii, B-i

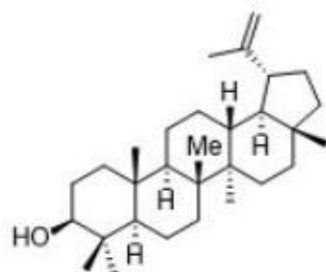
[Option ID = 40769]

Correct Answer :-

• A-iii, B-i

[Option ID = 40769]

44) Number of isoprene units present in lupeol is:



[Question ID = 10194]

1. two

[Option ID = 40770]

2. four

[Option ID = 40771]

3. six

[Option ID = 40772]

4. eight

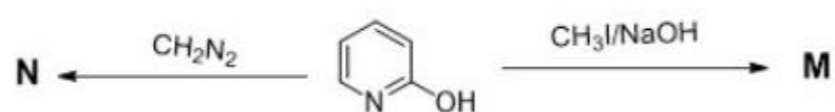
[Option ID = 40773]

Correct Answer :-

• six

[Option ID = 40772]

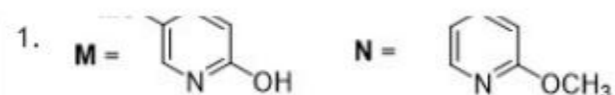
45) The major product M and N formed in the following reactions are:



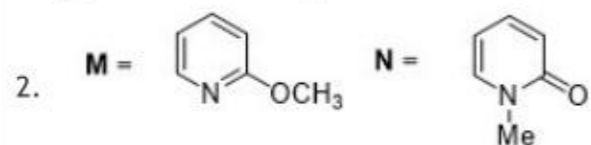
[Question ID = 10195]

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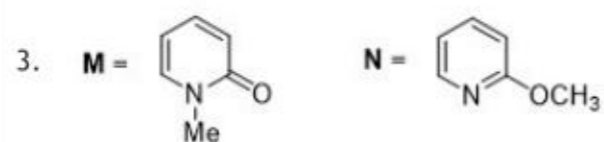




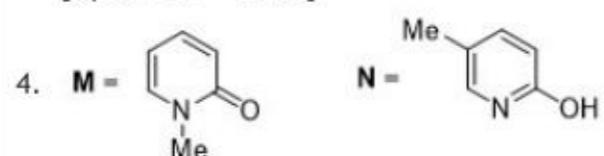
[Option ID = 40774]



[Option ID = 40775]

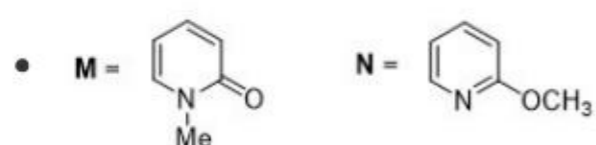


[Option ID = 40776]



[Option ID = 40777]

Correct Answer :-



[Option ID = 40776]

46) The absolute configurations of the chiral centers of starting ketone in the following reaction are:



[Question ID = 10196]

1. 3R, 6S

[Option ID = 40778]

2. 3S, 6S

[Option ID = 40779]

3. 3R, 6R

[Option ID = 40780]

4. 3S, 6R

[Option ID = 40781]

Correct Answer :-

• 3R, 6S

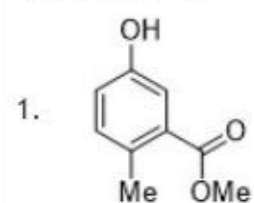
[Option ID = 40778]

47) An organic compound ($C_9H_{10}O_3$) exhibited the following spectral data:

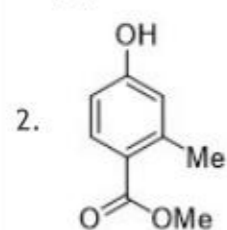
IR: 3400, 1680 cm^{-1}

1H NMR: δ 7.8 (1H, d, $J = 8.0$ Hz), 7.0 (1H, d, $J = 8$ Hz), 6.5 (1H, s), 5.8 (1H, s, D_2O exchangeable), 3.9 (3H, s), 2.3 (3H, s). The compound is:

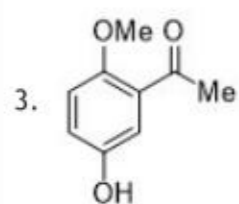
[Question ID = 10197]



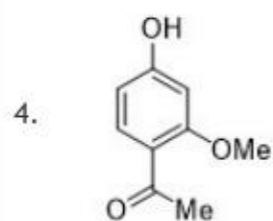
[Option ID = 40782]



[Option ID = 40783]

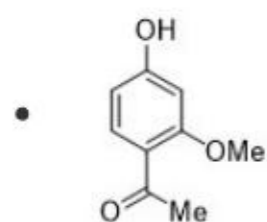


[Option ID = 40784]



[Option ID = 40785]

Correct Answer :-



[Option ID = 40785]

48) The sign below indicates what type of safety hazard?



[Question ID = 10198]

1. Biohazard

[Option ID = 40786]

2. Toxic chemical

[Option ID = 40787]

3. Hazardous

[Option ID = 40788]

4. Fire-catching

[Option ID = 40789]

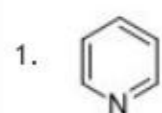
Correct Answer :-

• Biohazard

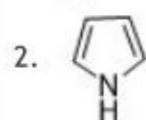
[Option ID = 40786]

49) Which of the following compounds would not be considered aromatic in its behavior?

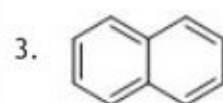
[Question ID = 10199]



[Option ID = 40790]



[Option ID = 40791]



[Option ID = 40792]



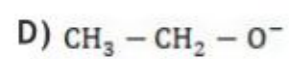
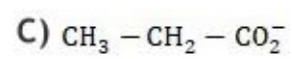
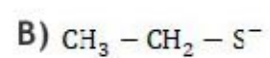
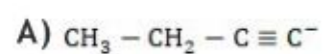
[Option ID = 40793]

Correct Answer :-



[Option ID = 40793]

50) Rank the following in decreasing order of basic strength is:



[Question ID = 10200]

1. B > A > D > C

[Option ID = 40794]

2. D > A > B > C

[Option ID = 40795]

3. A > D > B > C

[Option ID = 40796]

4. A > D > C > B

[Option ID = 40797]

Correct Answer :-

• A > D > B > C

[Option ID = 40796]