Test Paper : **III**

Test Subject : **CHEMICAL SCIENCES**

Test Subject Code : **K-2717**

Test Booklet Serial No. : _____

OMR Sheet No. : _____

Roll No. | | | | | | | | |

(Figures as per admission card)

Name & Signature of Invigilator/s

Signature : _____

Name : _____

Paper : III

Subject : CHEMICAL SCIENCES

Time : 2 Hours 30 Minutes | Maximum Marks : 150

Number of Pages in this Booklet : **16** | Number of Questions in this Booklet : **75**

ಅಭ್ಯರ್ಥಿಗಳಿಗೆ ಸೂಚನೆಗಳು

1. ಈ ಪುಟದ ಮೇಲ್ತುದಿಯಲ್ಲಿ ಒದಗಿಸಿದ ಸ್ಥಳದಲ್ಲಿ ನಿಮ್ಮ ರೋಲ್ ನಂಬರನ್ನು ಬರೆಯಿರಿ.
2. ಈ ಪತ್ರಿಕೆಯು ಬಹು ಆಯ್ಕೆ ವಿಧದ ಎಪ್ಪತ್ತೈದು ಪ್ರಶ್ನೆಗಳನ್ನು ಒಳಗೊಂಡಿದೆ.
3. ಪರೀಕ್ಷೆಯ ಪ್ರಾರಂಭದಲ್ಲಿ, ಪ್ರಶ್ನೆಪುಸ್ತಿಕೆಯನ್ನು ನಿಮಗೆ ನೀಡಲಾಗುವುದು. ಮೊದಲ 5 ನಿಮಿಷಗಳಲ್ಲಿ ನೀವು ಪುಸ್ತಿಕೆಯನ್ನು ತೆರೆಯಲು ಮತ್ತು ಕೆಳಗಿನಂತೆ ಕಡ್ಡಾಯವಾಗಿ ಪರೀಕ್ಷಿಸಲು ಕೋರಲಾಗಿದೆ.
   (i) ಪ್ರಶ್ನೆ ಪುಸ್ತಿಕೆಗೆ ಪ್ರವೇಶಾವಕಾಶ ಪಡೆಯಲು, ಈ ಹೊದಿಕೆ ಪುಟದ ಅಂಚಿನ ಮೇಲಿರುವ ಪೇಪರ್ ಸೀಲನ್ನು ಹರಿಯಿರಿ. ಸ್ಟಿಕ್ಕರ್ ಸೀಲ್ ಇಲ್ಲದ ಅಥವಾ ತೆರೆದ ಪುಸ್ತಿಕೆಯನ್ನು ಸ್ವೀಕರಿಸಬೇಡಿ.
   (ii) **ಪುಸ್ತಿಕೆಯಲ್ಲಿನ ಪ್ರಶ್ನೆಗಳ ಸಂಖ್ಯೆ ಮತ್ತು ಪುಟಗಳ ಸಂಖ್ಯೆಯನ್ನು ಮುಖಪುಟದ ಮೇಲೆ ಮುದ್ರಿಸಿದ ಮಾಹಿತಿಯೊಂದಿಗೆ ತಾಳೆ ನೋಡಿರಿ. ಪುಟಗಳು/ಪ್ರಶ್ನೆಗಳು ಕಾಣೆಯಾದ, ಅಥವಾ ದ್ವಿಪ್ರತಿ ಅಥವಾ ಅನುಕ್ರಮವಾಗಿಲ್ಲದ ಅಥವಾ ಇತರ ಯಾವುದೇ ವ್ಯತ್ಯಾಸದ ದೋಷಪೂರಿತ ಪುಸ್ತಿಕೆಯನ್ನು ಕೂಡಲೆ 5 ನಿಮಿಷದ ಅವಧಿ ಒಳಗೆ, ಸಂವೀಕ್ಷಕರಿಂದ ಸರಿ ಇರುವ ಪುಸ್ತಿಕೆಗೆ ಬದಲಾಯಿಸಿಕೊಳ್ಳಬೇಕು. ಆ ಬಳಿಕ ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆಯನ್ನು ಬದಲಾಯಿಸಲಾಗುವುದಿಲ್ಲ, ಯಾವುದೇ ಹೆಚ್ಚು ಸಮಯವನ್ನೂ ಕೊಡಲಾಗುವುದಿಲ್ಲ.**
4. ಪ್ರತಿಯೊಂದು ಪ್ರಶ್ನೆಗೂ (A), (B), (C) ಮತ್ತು (D) ಎಂದು ಗುರುತಿಸಿದ ನಾಲ್ಕು ಪರ್ಯಾಯ ಉತ್ತರಗಳಿವೆ. ನೀವು ಪ್ರಶ್ನೆಯ ಎದುರು ಸರಿಯಾದ ಉತ್ತರದ ಮೇಲೆ, ಕೆಳಗೆ ಕಾಣಿಸಿದಂತೆ ಅಂಡಾಕೃತಿಯನ್ನು ಕಪ್ಪಾಗಿಸಬೇಕು.
   ಉದಾಹರಣೆ: (A) (B) ● (D)
   (C) ಸರಿಯಾದ ಉತ್ತರವಾಗಿದ್ದಾಗ.
5. ಪ್ರಶ್ನೆಗಳಿಗೆ ಉತ್ತರಗಳನ್ನು, **ಪತ್ರಿಕೆ III ಪುಸ್ತಿಕೆಯೊಳಗೆ ಕೊಟ್ಟಿರುವ OMR ಉತ್ತರ ಹಾಳೆಯಲ್ಲಿ ಮಾತ್ರವೇ ಸೂಚಿಸತಕ್ಕದ್ದು.** OMR ಹಾಳೆಯಲ್ಲಿನ ಅಂಡಾಕೃತಿ ಹೊರತುಪಡಿಸಿ ಬೇರೆ ಯಾವುದೇ ಸ್ಥಳದಲ್ಲಿ ಗುರುತಿಸಿದರೆ, ಅದರ ಮೌಲ್ಯಮಾಪನ ಮಾಡಲಾಗುವುದಿಲ್ಲ.
6. OMR ಉತ್ತರ ಹಾಳೆಯಲ್ಲಿ ಕೊಟ್ಟ ಸೂಚನೆಗಳನ್ನು ಜಾಗರೂಕತೆಯಿಂದ ಓದಿರಿ.
7. ಎಲ್ಲಾ ಕರಡು ಕೆಲಸವನ್ನು ಪುಸ್ತಿಕೆಯ ಕೊನೆಯಲ್ಲಿ ಮಾಡತಕ್ಕದ್ದು.
8. ನಿಮ್ಮ ಗುರುತನ್ನು ಬಹಿರಂಗಪಡಿಸಬಹುದಾದ ನಿಮ್ಮ ಹೆಸರು ಅಥವಾ ಯಾವುದೇ ಚಿಹ್ನೆಯನ್ನು, ಸಂಗತವಾದ ಸ್ಥಳ ಹೊರತು ಪಡಿಸಿ, OMR ಉತ್ತರ ಹಾಳೆಯ ಯಾವುದೇ ಭಾಗದಲ್ಲಿ ಬರೆದರೆ, ನೀವು ಅನರ್ಹತೆಗೆ ಬಾಧ್ಯರಾಗಿರುತ್ತೀರಿ.
9. ಪರೀಕ್ಷೆಯು ಮುಗಿದನಂತರ, ಕಡ್ಡಾಯವಾಗಿ OMR ಉತ್ತರ ಹಾಳೆಯನ್ನು ಸಂವೀಕ್ಷಕರಿಗೆ ನೀವು ಹಿಂತಿರುಗಿಸಬೇಕು ಮತ್ತು ಪರೀಕ್ಷಾ ಕೊಠಡಿಯ ಹೊರಗೆ OMR ನ್ನು ನಿಮ್ಮೊಂದಿಗೆ ಕೊಂಡೊಯ್ಯಕೂಡದು.
10. ಪರೀಕ್ಷೆಯ ನಂತರ, ಪರೀಕ್ಷಾ ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆಯನ್ನು ಮತ್ತು ನಕಲು OMR ಉತ್ತರ ಹಾಳೆಯನ್ನು ನಿಮ್ಮೊಂದಿಗೆ ತೆಗೆದುಕೊಂಡು ಹೋಗಬಹುದು.
11. **ನೀಲಿ/ಕಪ್ಪು ಬಾಲ್‌ಪಾಯಿಂಟ್ ಪೆನ್ ಮಾತ್ರವೇ ಉಪಯೋಗಿಸಿರಿ.**
12. **ಕ್ಯಾಲ್ಕುಲೇಟರ್, ವಿದ್ಯುನ್ಮಾನ ಉಪಕರಣ ಅಥವಾ ಲಾಗ್ ಟೇಬಲ್ ಇತ್ಯಾದಿಯ ಉಪಯೋಗವನ್ನು ನಿಷೇಧಿಸಲಾಗಿದೆ.**
13. **ಸರಿ ಅಲ್ಲದ ಉತ್ತರಗಳಿಗೆ ಋಣ ಅಂಕ ಇರುವುದಿಲ್ಲ.**
14. **ಕನ್ನಡ ಮತ್ತು ಇಂಗ್ಲೀಷ್ ಆವೃತ್ತಿಗಳ ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆಗಳಲ್ಲಿ ಯಾವುದೇ ರೀತಿಯ ವ್ಯತ್ಯಾಸಗಳು ಕಂಡುಬಂದಲ್ಲಿ, ಇಂಗ್ಲೀಷ್ ಆವೃತ್ತಿಗಳಲ್ಲಿರುವುದೇ ಅಂತಿಮವೆಂದು ಪರಿಗಣಿಸಬೇಕು.**

Instructions for the Candidates

1. Write your roll number in the space provided on the top of this page.
2. This paper consists of seventy five multiple-choice type of questions.
3. At the commencement of examination, the question booklet will be given to you. In the first 5 minutes, you are requested to open the booklet and compulsorily examine it as below :
   (i) To have access to the Question Booklet, tear off the paper seal on the edge of the cover page. Do not accept a booklet without sticker seal or open booklet.
   (ii) **Tally the number of pages and number of questions in the booklet with the information printed on the cover page. Faulty booklets due to pages/questions missing or duplicate or not in serial order or any other discrepancy should be got replaced immediately by a correct booklet from the invigilator within the period of 5 minutes. Afterwards, neither the Question Booklet will be replaced nor any extra time will be given.**
4. Each item has four alternative responses marked (A), (B), (C) and (D). You have to darken the circle as indicated below on the correct response against each item.
   Example : (A) (B) ● (D)
   where (C) is the correct response.
5. Your responses to the question of Paper III are to be indicated in the **OMR Sheet kept inside the Booklet**. If you mark at any place other than in the circles in OMR Sheet, it will not be evaluated.
6. Read the instructions given in OMR carefully.
7. Rough Work is to be done in the end of this booklet.
8. If you write your name or put any mark on any part of the OMR Answer Sheet, except for the space allotted for the relevant entries, which may disclose your identity, you will render yourself liable to disqualification.
9. You have to return the test OMR Answer Sheet to the invigilators at the end of the examination compulsorily and must NOT carry it with you outside the Examination Hall.
10. You can take away question booklet and carbon copy of OMR Answer Sheet after the examination.
11. **Use only Blue/Black Ball point pen.**
12. **Use of any calculator, Electronic gadgets or log table etc., is prohibited.**
13. **There is no negative marks for incorrect answers.**
14. **In case of any discrepancy found in the Kannada translation of a question booklet the question in English version shall be taken as final.**

CHEMICAL SCIENCES

PAPER – III

Note : This paper contains **seventy-five (75)** objective type questions. **Each** question carries **two (2)** marks. **All** questions are **compulsory**.

1. The structure of SF_4 molecule predicted by VSEPR theory is

(A) Square planar

(B) Tetrahedral

(C) Trigonal bipyramidal

(D) Square pyramidal

2. The bond order in O_2^{2-} ion is

(A) 1

(B) 2

(C) $3/2$

(D) $5/2$

3. The number of unpaired electrons present in $[CoF_6]^{3-}$ and $[Co(NH_3)_6]^{3+}$ is

(A) 2 and 1

(B) 4 and 3

(C) 1 and 3

(D) 4 and 0

4. Which of the following can be acceptable electronic configuration of xenon atom in the first excited state ?

(A) $5s^2 5p^6$

(B) $5s^2 5p^4 5d^2$

(C) $5s^2 5p^5 5d^1$

(D) $5s^2 5p^3 5d^3$

5. Molten iodine conducts electricity because of the formation of

(A) $I_2 + I_3^-$

(B) $I_3^+ + I_3^-$

(C) I_3^+

(D) I_3^-

6. The oxidation state of S in sulphurous acid is

(A) 2

(B) 3

(C) 4

(D) 6

7. If thermal conductivity detector is used as a detector in GLC then the carrier gas should be

(A) nitrogen

(B) oxygen

(C) hydrogen

(D) carbon dioxide

8. The PMR spectra of cis–and trans–isomers of NiHCl $(Et_3P)_2$ show

(A) doublet of doublet and a triplet

(B) triplet and a doublet

(C) quartet and a singlet

(D) singlet and a quartet

9. The separation efficiency of a column can be expressed in terms of

(A) length of the column

(B) width of the column

(C) diameter of the column

(D) number of theoretical plates in the column

10. The resonance frequency of a proton in a magnetic field of 14.1 T is

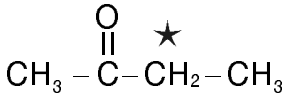
(A) 400 MHz

(B) 649 MHz

(C) 562 MHz

(D) 333 MHz

11. What is the multiplicity expected in the hydrogen NMR spectrum for the hydrogen atoms marked by a "star" in the following compound ?



(A) singlet

(B) triplet

(C) quartet

(D) heptet

12. HPLC with solvent gradient system can have the following detector

(A) Refractive index detector

(B) UV detector

(C) W lamp detector

(D) Hg lamp detector

13. Which of the following substances is used as a solid standard calibrent in magnetic susceptibility measurements ?

(A) $K_3[Fe(CN)_6]$

(B) $K_4[Fe(CN)_6]$

(C) KCl

(D) $Hg[Co(NCS)_4]$

14. Neutrons ejected from a nucleus usually have a very high energy and are called

(A) slow neutrons

(B) intermediate neutrons

(C) fast neutrons

(D) protons

15. The symmetry species of the normal modes of H_2O are

(A) $A_1 + B_1$

(B) $2A_1 + B_2$

(C) $A_2 + B_1$

(D) $3A_1 + B_2$

16. Which of the following platinum amine complex is used in cancer chemotherapy ?

(A) Cis – $Pt(NH_3)_2Cl_2$

(B) trans – $Pt(NH_3)_2Cl_2$

(C) $[Pt(NH_3)_3Cl]^+$

(D) $[Pt(NH_3)_4]^{2+}$

17. Which of the following substance is completely transparent in the infrared region ?

(A) KBr

(B) $NaClO_4$

(C) $MgSO_4$

(D) $BaCl_2$

18. Which isomer of Pt-amine complex is used in cancer chemotherapy ?

(A) trans – $[Pt(NH_3)_2Cl_2]$

(B) $[Pt(NH_3)_3Cl]^+$

(C) $[Pt(NH_3)_4]^{2+}$

(D) Cis – $[Pt(NH_3)_2Cl_2]$

19. Lux-Flood definition of acids and bases will hold good in explaining the acid-base behaviour of

(A) Molten solids

(B) Molten liquids

(C) Liquids

(D) Gases

20. Liquid sulfur, an important and stable allotropic modification of sulfur contain _____ in an unit cell.

(A) 4 S atoms

(B) 2 S atoms

(C) 6 S atoms

(D) 8 S atoms

21. Ions such as H^+, Na^+, K^+ and Ca^{2+} are often transported actively across membranes by integral proteins called

(A) Channels

(B) Ion-exchangers

(C) Ion-pumps

(D) Molecular motion

22. Number of pentagons and hexagons in C_{60} are

(A) 12 and 20

(B) 20 and 30

(C) 10 and 20

(D) 18 and 30

23. Which of the following is used as a NMR shift reagent ?

(A) TMS

(B) $[Eu(fod)_3]$

(C) $[Eu(acac)_3]$

(D) $[La(acac)_3]$

24. Number of lone pairs of electrons present in SF_4, CF_4 and XeF_4 are

(A) 1, 0, 2

(B) 2, 0, 2

(C) 1, 0, 1

(D) 0, 0, 2

25. The symmetry species of the normal modes of H_2O are

(A) $2A_1 + B_2$

(B) $A_1 + B_1$

(C) $A_2 + B_1$

(D) $3A_1 + 2B_2$

26. Which of the following is incorrect about the de Broglie relationship ?

(A) $h = \lambda P$

(B) $E = \frac{hC}{\lambda}$

(C) $\lambda = \frac{h}{mC}$

(D) $E_{kinetic} = \frac{2h\upsilon}{\lambda}$

27. According to the Schrodinger's wave equation, the wave function (ψ_n) of a particle in one dimensional box is

(A) $\psi_n = A \cdot \sin\left(\frac{n\pi x}{a}\right)$

(B) $\psi_n = A \cdot a \sin(n\pi x)$

(C) $\psi_n = A \cdot \sin\left(\frac{n\pi}{a}\right)$

(D) $\psi_n = A \cdot x \sin(n\pi a)$

28. Indicate which of the following function is acceptable as wave functions ?

(A) $\psi = x$

(B) $\psi = e^x$

(C) $\psi = e^{-x}$

(D) $\psi = e^{-x^2}$

29. In time independent perturbation theory, the perturbation is

(A) Always present and unvarying

(B) Not present and unvarying

(C) Always present and varying

(D) Not present and varying

30. Using molecular orbital theory, predict bond order and bond length of O_2

(A) $5/2$ and 149

(B) 2 and 121

(C) 2 and 149

(D) $5/2$ and 135

31. Which of the combination of the following atomic orbitals give molecular orbitals ?

(A) s and p_z

(B) p_x and p_x

(C) p_y and d_{yz}

(D) p_y and d_{xy}

32. The wave function for the bonding molecular orbital for a heteronuclear diatomic XY molecule. Assuming that the electron on an average spends 70% of its time on nucleus X and 30% of its time on nucleus Y is

(A) $\psi_{MO} = 0.70\,\phi_x + 0.30\,\phi_y$

(B) $\psi_{MO} = 0.84\,\phi_x + 0.55\,\phi_y$

(C) $\psi_{MO} = 0.30\,\phi_x + 0.70\,\phi_y$

(D) $\psi_{MO} = 0.55\,\phi_x + 0.84\,\phi_y$

33. Predict the normal modes of vibration of HCl, CO_2, SO_2

(A) 1, 3, 3

(B) 1, 2, 2

(C) 1, 4, 3

(D) 1, 2, 3

34. Compare the C = O and C = C stretching vibrations and their absorption in aldehyde and alkene.

(A) C = C shows stronger absorption than C = O

(B) C = O shows stronger absorption than C = C

(C) Both C = C and C = O shows same absorption

(D) Both C = C and C = O do not show absorption

35. If B = 10 cm^{-1}, give the rotational energy of the molecule in cm^{-1} for the rotational quantum numbers J = 0, 1, 2, 3

(A) 0, 20, 60 and 120 cm^{-1}

(B) 120, 60, 20 and 0 cm^{-1}

(C) 20, 60, 120 and 0 cm^{-1}

(D) 60, 120, 20 and 0 cm^{-1}

36. Infrared absorption frequencies of C – Cl in halides, C = O in esters and N – H in amines are observed at

(A) 3500 – 3100, 1750 – 1730 and 3500 – 3100 cm^{-1}

(B) 700 – 600, 1750 – 1730 and 3500 – 3100 cm^{-1}

(C) 1300 – 1000, 2980 – 2850 and 2280 – 2240 cm^{-1}

(D) 2280 – 2240, 2980 – 2850 and 1300 – 1000 cm^{-1}

37. Which one of the following equations represents Maxwell relations ?

i. $\left(\frac{\delta T}{\delta V}\right)_S = \left(\frac{\delta P}{\delta S}\right)_V$

ii. $\left(\frac{\delta T}{\delta P}\right)_S = \left(\frac{\delta V}{\delta S}\right)_P$

iii. $\left(\frac{\delta V}{\delta T}\right)_P = \left(\frac{\delta S}{\delta P}\right)_T$

(A) only i is Maxwell relation

(B) only ii is Maxwell relation

(C) only iii is Maxwell relation

(D) all the three equations are Maxwell relation

38. Calculate the molar entropy change in the units of J deg^{-1} mol^{-1} for the reversible process.

$H_2O_{(l)} \rightleftharpoons H_2O_{(g)}$, $\Delta H = 2269.4\ Jg^{-1}$

1 at, 100°C 1 at, 100°C

(A) 109.5 J deg^{-1} mol^{-1}

(B) 2269.4 J deg^{-1} mol^{-1}

(C) 373.0 J deg^{-1} mol^{-1}

(D) 100.0 J deg^{-1} mol^{-1}

39. The ionic strength of 0.2 molar $BaCl_2$ is

(A) 0.2

(B) 0.4

(C) 0.6

(D) 0.8

40. The Boltzmann distribution gives the numbers of molecules in each state of a system at any temperature : $Ni = Ne^{-\beta\epsilon_i/q}$, where

(A) $\beta = \frac{1}{T}$

(B) $\beta = \frac{1}{RT}$

(C) $\beta = \frac{T}{R}$

(D) $\beta = RT$

41. Nernst equation for potential of hydrogen electrode is

(A) $E_{H^+,H_2} = E^\circ_{H^+,H_2} - \frac{RT}{nF} \ln \frac{(a_{H_2})^{1/2}}{a_{H^+}}$

(B) $E_{H^+,H_2} = E^\circ_{H^+,H_2} - \frac{RT}{nF} \ln \frac{a_{H_2}}{a_{H^+}}$

(C) $E_{H^+,H_2} = E^\circ_{H^+,H_2} - \frac{RT}{nF} \ln \frac{a_{H^+}}{(a_{H_2})^{1/2}}$

(D) $E_{H^+,H_2} = E^\circ_{H^+,H_2} - \frac{RT}{nF} \ln \frac{a_{H^+}}{a_{H_2}}$

42. The E°_{cell} of an aluminium-air battery is 2.73 volts and it involves a 12 electron process. The free energy change (ΔG°) of the battery in KJ is

(A) 31.61 KJ

(B) 316.13 KJ

(C) 3161.34 KJ

(D) – 3161.34 KJ

43. For a reaction, the rate constants at 17°C and 37°C are 24.4×10^{-5} and 48.8×10^{-5} lit. mol^{-1} sec^{-1} respectively. The activation energy for the reaction will be

(A) 3.1 K cals

(B) 6.2 K cals

(C) 12.4 K cals

(D) 24.8 K cals

44. The efficiency of an enzyme in catalysing a reaction is due to its capacity

(A) To form a strong enzyme substrate complex

(B) To decrease the bond energy of all substrate molecules

(C) To change the shape of the substrate molecule

(D) To lower the activation energy of the reaction

45. What will be the effect of increase in ionic strength on the rate constant of the reaction ?

$PtCl_4^{2-} + OH^- \rightarrow Products$

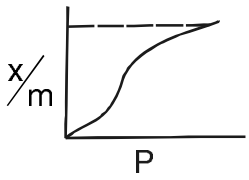
(A) The rate constant does not change

(B) The rate constant decreases

(C) The rate constant increases

(D) The rate constant initially decreases and then increases

46. The adsorption isotherm shown in the figure represents



(A) Monolayer

(B) Physical adsorption accompanied by capillary condensation

(C) Multilayer adsorption on porous materials

(D) Multilayer adsorption on non-porous materials

47. Glass is

(A) Crystalline solid

(B) Supercooled liquid

(C) Liquid crystal

(D) All above

48. The kinetic chain length (r) in polymerization is given by

(A) $\frac{\text{No. of monomer units consumed}}{\text{No. of activated centres produced}}$

(B) $\frac{\text{No. of activated centres produced}}{\text{No. of monomer units consumed}}$

(C) $\text{No. of monomer units consumed} + \text{No. of activated centres produced}$

(D) $\text{No. of monomer units consumed} - \text{No. of activated centres produced}$

49. The following table gives the data deviation :

x_i	$x_i - \bar{x}$
29.9	0.325
30.1	0.525
28.5	1.075
29.8	0.225

What will be the standard deviation ?

(A) 1.021

(B) 0.728

(C) 0.512

(D) 0.529

50. The results of an analysis are 36.97 g compared with the accepted value of 37.06 g. What is the relative error in parts per thousand ?

(A) – 2.4 ppt

(B) 0.09 ppt

(C) 2.4 ppt

(D) – 0.09 ppt

51. Match the following :

a	Carbene	p	Ph_3C
b	Nitrene	q	$:CCl_2$
c	Free radical	r	$Ph-\ddot{N}$
d	Diradical	s	$Ph\dot{C}H-\dot{C}H.Ph$

(A) a – p, b – q, c – r, d – s

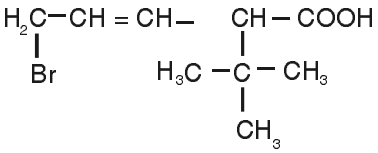
(B) a – q, b – r, c – p, d – s

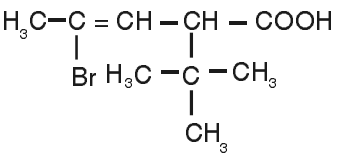
(C) a – r, b – r, c – q, d – s

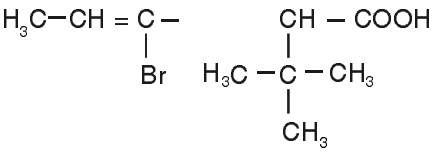
(D) a – s, b – q, c – r, d – p

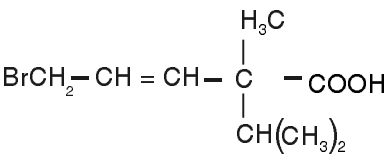
52. Choose the correct structure for the following Nomenclature.

5-bromo-2-test.butyl-3-pentanoic-acid

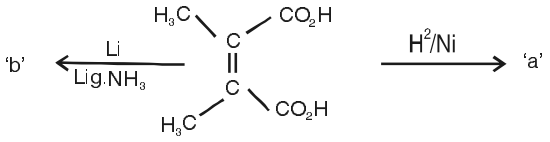
(A) 

(B) 

(C) 

(D) 

53. Identify the stereochemistry of the products a and b for the following reactions.



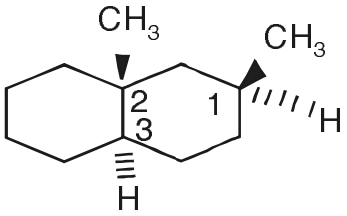
(A) Both a and b meso

(B) Both a and b de

(C) 'a' is meso 'b' is de

(D) 'a' is de 'b' is meso

54. The absolute configuration of R and S to each labelled (1, 2, 3) chiral centers in the following compound is



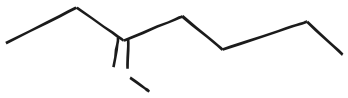
(A) R, R, S

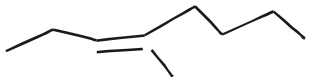
(B) S, S, R

(C) S, R, R

(D) R, S, S

55. Determine the double bond stereochemistry E or Z for the following molecules a and b.

a) 

b) 

(A) a : E, b : E

(B) a : Z, b : Z

(C) a : E, b : Z

(D) a : Z, b : E

56. Which of the following compounds does not under go mutarotation ?

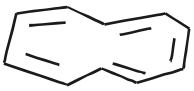
(A) Glucose

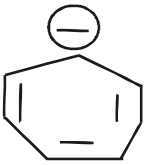
(B) Sucrose

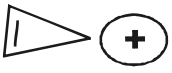
(C) Ribose

(D) Fructose

57. Predict the aromaticity in the following structures.

a) 

b) 

c) 

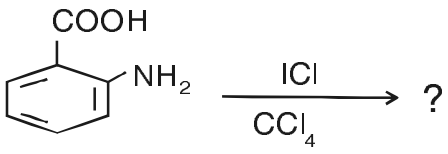
(A) a : Aromatic, b and c : Antiaromatic

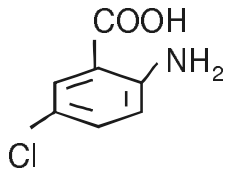
(B) a : Antiaromatic, b and c : Aromatic

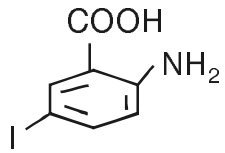
(C) a and c : Aromatic, b : Antiaromatic

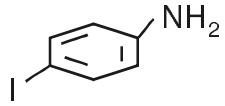
(D) a and b : Aromatic, c : Antiaromatic

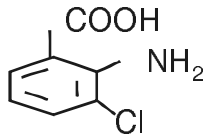
58. Predict the product of the following reaction.



(A) 

(B) 

(C) 

(D) 

59. The organolithium compounds do not give

(A) Deprotonation

(B) Conjugate additions

(C) Hydroxy compounds

(D) Both A and C

60. Addition reactions of alkenes are characterised by

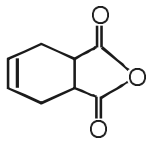
(A) Addition of two groups across a double bond

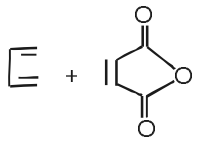
(B) Breaking of a π – bond

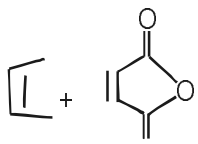
(C) Breaking of a σ – bond

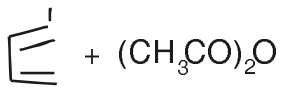
(D) Both A and B

61. The synthon/s got from the retrosynthetic analysis of the following molecule 'a' is/ are

a) 

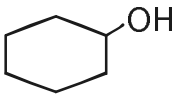
(A) 

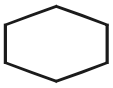
(B) 

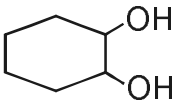
(C) 

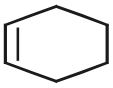
(D) Both A and C

62. Reaction of cyclohexanone with propane 1, 3-dithiol followed by reduction with H_2/RaNey Ni gives

(A) 

(B) 

(C) 

(D) 

63. Rearrangements are likely to occur in which of the following types ?

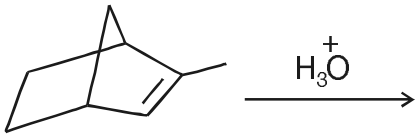
(A) S_N1

(B) E_1

(C) E_2

(D) Both A and B

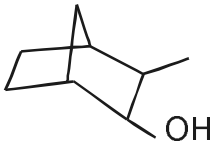
64. Expected major product of the following reaction is



(A) 

(B) 

(C) 

(D) 

65. To which of the following does thymine forms hydrogen bonds in DNA ?

(A) Thymine

(B) Adenine

(C) Cytosine

(D) Guanine

66. 1, 5-Hydrogen shift under thermal condition is

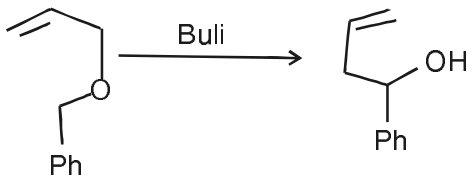
(A) Suprafacial

(B) Antarafacial

(C) Both suprafacial and antarafacial

(D) Thermally forbidden

67. The following reaction is an example of



(A) 1, 3 – sigmatropic reaction

(B) 3, 3 – sigmatropic reaction

(C) 1, 5 – sigmatropic reaction

(D) 2, 3 – sigmatropic reaction

68. Phenyl hydrozone of cyclohexanone on treatment with Bf_3/HoAC at 65° gives

(A) Indole

(B) Carbazole

(C) Pyrrole

(D) Tetrahydrocarbazole

69. Reaction of ethylacetoacetate with α -chloroacetone in pyridine gives

(A) Pyrrole derivative

(B) Pyridine derivative

(C) Furan derivative

(D) Indole derivative

70. Identify which of the following terms refers to regions of ordered structure with in a protein

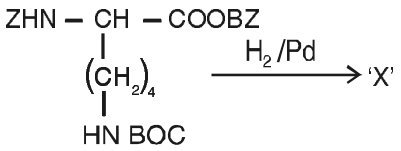
(A) 1° structure

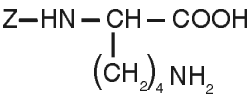
(B) 2° structure

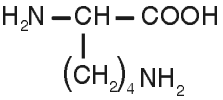
(C) 3° structure

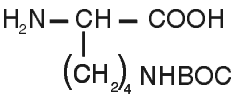
(D) quaternary structure

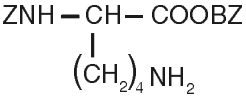
71. Choose the correct structure of 'X' in the following deprotonation reaction.



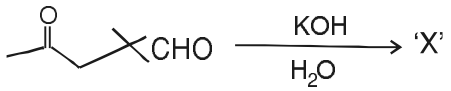
(A) 

(B) 

(C) 

(D) 

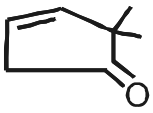
72. In the following reaction the spectral data for 'X' is

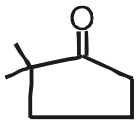


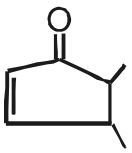
The structure of X is Ir – 1710 cm^{-1}

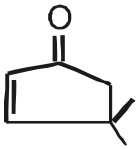
^{1}HNMR data

δ 7.3 (1H d) 5.5 Hz
ppm 6.8 (1H d) 5.5 Hz
2.1 (2H s)
1.15 (6H s)

(A) 

(B) 

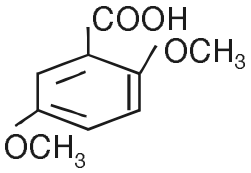
(C) 

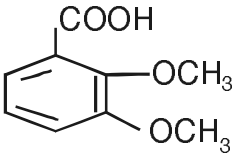
(D) 

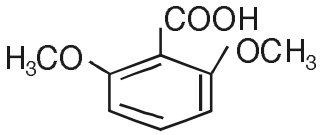
73. The – CH proton in 1, 1-Dichloro-ethane appears as a quartet at δ 5.8 ppm on a 80 MHz NMR with J = 6 Hz. The line position of the quartet in 'Hz' is

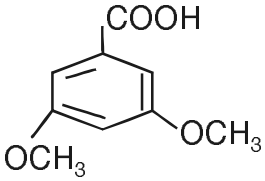
(A) 452, 458, 464 and 470
(B) 461, 467, 473 and 479
(C) 456, 461, 467 and 473
(D) 458, 464, 470 and 476

74. The ^{1}H NMR data for the isomer of dimethoxy benzoic acid is δ 3.85 (6H, s) 6.63 (1H, t, J = 2 Hz)
ppm 7.17 (2H, d, J = 2 Hz) The isomer is

(A) 

(B) 

(C) 

(D) 

75. The structure of the compound $C_{10}H_{12}O$ with mass spectral $m/_2$ values at 15, 43, 65, 57, 91, 105 and 148 is

(A) $CH_3CH_2COCH_2C_6H_5$

(B) $CH_3COCH_2CH_2C_6H_5$

(C) $C_6H_5CH_2CH_2CH_2CHO$

(D) $CH_3CH_2\overset{\overset{O}{\|}}{C}-C_6H_5$

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Space for Rough Work