Test Paper : **III**

Test Subject : **CHEMICAL SCIENCE**

Test Subject Code : **K-2715**

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 SCIENCE

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 ನಿಮಗೆನೀಡಲಾಗುವುದು. ಮೊದಲ5 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 ಕೂಡಲೆ5 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, **ಪತ್ರಿಕೆIII ಪುಸ್ತಿಕೆಯೊಳಗೆ ಕೊಟ್ಟಿರುವ OMR ಉತ್ತರ ಹಾಳೆಯಲ್ಲಿ ಮಾತ್ರವೇ ಸೂಚಿಸತಕ್ಕದ್ದು.** OMR ಉತ್ತರ 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 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 oval 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 ovals in OMR Answer 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 soon after the examination.
11. **Use only Blue/Black Ball point pen.**
12. **Use of any calculator 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 SCIENCE

PAPER – III

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

1. For a particle in a one-dimensional box of length L, in the region $0 \le x \le \frac{1}{4}$, the probability of the state is given by $p = \frac{1}{4} - \frac{\sin\left(\frac{n\pi}{2}\right)}{2\pi}$ Then the probability for the particle in the state n = 2 and n = 1 are respectively

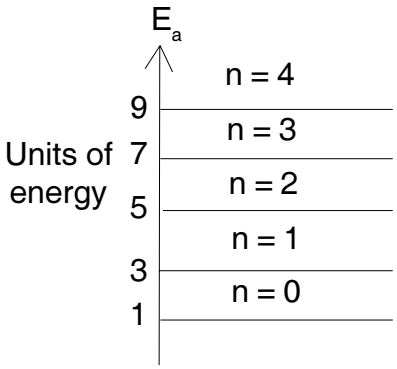
(A) 0.125 and 0.25

(B) 0.375 and 0.0908

(C) 0.25 and 0.0908

(D) 0.75 and 0.25

2. The figure shown in the energy level diagram corresponding to



(A) Particle in a box

(B) Particle tunneling

(C) Harmonic oscillator

(D) Hydrogen atom

3. The selection rules for hydrogenic atom are

(A) $\Delta l = \pm 1 \quad \Delta m_l = 0, \pm 1$

(B) $\Delta l = \pm 1 \quad \Delta m_l = \pm 1/2$

(C) $\Delta l = 0 \quad \Delta m_l = \pm 1/2$

(D) $\Delta l = \pm 1 \quad \Delta m_l = -1/2$

4. The hybrid state assume by N in piperidine is

(A) sp (B) sp^2

(C) sp^3 (D) dsp^2

5. Choose the correct statement (s)

i) Bosons are particles with half integral spin.

ii) Symmetry number of NH_3 is 3.

iii) The stiffer the bond, the greater is the force constant.

iv) An aerosol is a dispersion of a liquid in a gas

(A) ii, iii and iv are correct

(B) i and ii are correct

(C) i is correct

(D) iii and iv are correct

6. For ketones the more intense band near 180 nm is due to

(A) $\sigma \rightarrow \sigma^*$ transition

(B) $\pi \rightarrow \pi^*$ transition

(C) $n \rightarrow \pi^*$ transition

(D) $\sigma \rightarrow \pi^*$ transition

7. Which of the following molecules would show both microwave and infrared spectra ?

i) Br_2

ii) HBr

iii) CS_2

iv) H_2

(A) (i)

(B) (iii) and (i)

(C) (iv) and (iii)

(D) (ii)

8. The number of translational, rotational and vibrational degrees of freedom of CO_2 are

(A) 3, 3, 3

(B) 3, 2, 4

(C) 1, 2, 3

(D) 3, 2, 1

9. A compound shows a proton-NMR peak at 240 Hz down-field from the TMS peak in a spectrometer operating at 60 MHz. What is the value of chemical shift in δ scale.

(A) 6 ppm (B) 4 ppm

(C) 8 ppm (D) 2 ppm

10. ΔH and ΔE for the reaction $Fe_2O_3(s) + 3H_2(g) \rightarrow 2\,Fe(s) + 3\,H_2O(l)$ at constant temperature are related as

(A) $\Delta H = \Delta E$

(B) $\Delta H = \Delta E - RT$

(C) $\Delta H = \Delta E - 3RT$

(D) $\Delta H = \Delta E + 3RT$

11. In a calorimeter experiment the percentage transmission of light for 0.004 molar solution is 80, if a 2 cm cell is used. Then, the molar absorptivity '$\in$' is

(A) 24.25 lit mol^{-1} cm^{-1}

(B) 12.125 lit mol^{-1} cm^{-1}

(C) 20000 lit mol^{-1} cm^{-1}

(D) 10000 lit mol^{-1} cm^{-1}

12. For a reaction $A + B^2 + C^{-½} \xrightarrow{k}$ product (p) the expression for the rate of reaction is

(A) Rate of reaction = $k[A]\,[B]^2\,[C]$

(B) Rate of reaction = $k[A]\,[B]\,[C]$

(C) Rate of reaction = $k\,[A]\,[B]^2\,[C]^{½}$

(D) Rate of reaction = $\dfrac{k[A][B]^2}{[C]^{1/2}}$

13. The standard enthalpy of sublimation of ice at 0°C from its standard enthalpy of fusion at 0°C (6.01 kJ mol^{-1}) and the standard enthalpy of vaporization of water at 0°C (45.07 kJ mol^{-1}) is equal to

(A) 39.06 kJ mol^{-1}

(B) 25.04 kJ mol^{-1}

(C) 51.08 kJ mol^{-1}

(D) 100.16 kJ mol^{-1}

14. Pick out the insulating oxide (s)

i) NiO

ii) ZnO

iii) Al_2O_3

iv) SiO_2

(A) (iii) and (iv) only

(B) (i) only

(C) (ii) only

(D) (i) and (iv) only

15. For polymethyl acrylate sample in benzene solution at 30°C, the flow time is 312.8 sec. If the flow time for solvent is 216 sec, then the reduced viscosity for 0.1235 g/dl polymer solution is

(A) 0.4481 dl/g

(B) 1.4481 dl/g

(C) 2.998 dl/g

(D) 3.629 dl/g

16. Choose the wrong statement

(A) Thermochemistry is the study of energy changes that occur during chemical reactions

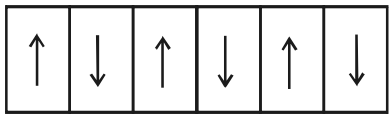
(B) Gibbs-Duhem equation :

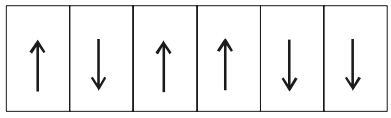
$$\sum n_J d\mu_J = 0$$

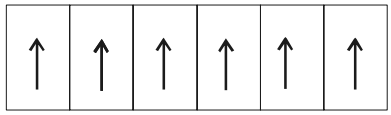
(C) Linear momentum, p = mv

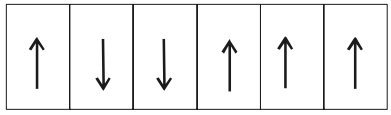
(D) Catalysts are substances that accelerate reactions and undergo net chemical change

17. CrO_2 is a ferromagnetic material. Which one of the following alignment of magnetic dipoles exist ?

(A) 

(B) 

(C) 

(D) 

18. The quantum yield of

$H_2(g) + Cl_2(g) \xrightarrow{h\nu} 2\,HCl(g)$ is 10^6. In a given time, 0.04×10^{-4} Einsteins of radiant energy of λ, 480 nm is absorbed. Then the number of moles of HCl (g) formed is

(A) 4 (B) 4×10^2

(C) 40 (D) 2

19. Match the following :

List – I (Acid)	List – II (pKa)
i) HF	a) 9.31
ii) CH_3COOH	b) 6.37
iii) HCN	c) 3.45
iv) H_2CO_3	d) 4.76

(A) i-c; ii-d; iii-a; iv-b

(B) i-a; ii-b; iii-d; iv-c

(C) i-b; ii-a; iii-c; iv-d

(D) i-d; ii-a; iii-c; iv-b

20. If $E^\circ_{Cu^{2+}/Cu} = 0.34$ V and $E^\circ_{Ag^+/Ag} = 0.80$ V, what is the emf of the cell at 298 K ?
Cu/Cu^{2+} (0.01 M) || Ag (0.01 M)/Ag

(A) 0.40 V

(B) 1.14 V

(C) 0.80 V

(D) 0.46 V

21. The conversion of ozone to molecular oxygen is catalyzed by

i) Nitrogen oxides

ii) Chlorine atoms

iii) Nichoel

iv) H_2O_2

(A) (i) and (ii) are correct

(B) (iii) is correct

(C) (iv) is correct

(D) (i) and (iv) are correct

22. ^{14}C have radioactivity of 1 Curie with disintegration constant , $(\lambda) = 4.4 \times 10^{-12}$ sec^{-1}. Then, the weight of ^{14}C is

(A) 1.2×10^{-1}g

(B) 0.9×10^{-1}g

(C) 0.19×10^{-1}g

(D) 1.9×10^{-1}g

23. Match the following :

List – I (Ions)	List – II ($E_{½}$/V at 298 K)
i) Zn^{2+}	a) – 0.398
ii) ed^{2+}	b) – 1.00
iii) Pb^{2+}	c) – 0.60
iv) Cu^{2+}	d) + 0.04

(A) i – a; ii – b ; iii – d; iv – c

(B) i – d; ii – c ; iii – a; iv – b

(C) i – c; ii – d ; iii – a; iv – b

(D) i – b; ii – c ; iii – a; iv – d

24. The rate constant for backward and forward reactions are 2×10^4 sec and 2×10^3 sec respectively. Then the relaxation time for this fast reaction is

(A) 10 sec

(B) 4.55×10^{-5} sec

(C) 2×10^{-4} sec

(D) 22000 sec

25. The adsorption of a gas on a solid surface was found to follow Langmuir isotherm with K = 3.76 kPa^{-1}at a temperature of 25°C. Then the pressure of gas required to achieve a tractional surface coverage of 10% is

(A) 27 pa

(B) 29.6 pa

(C) 38 pa

(D) 270 pa

26. Arrange the following in the decreasing order of Gold number

(A) Gelatin > Haemoglobin > Gum Arabic > Potato starch

(B) Potato starch > Haemoglobin > Gum Arabic > Gelatin

(C) Potato starch > Gum Arabic > Haemoglobin > Gelatin

(D) Potato starch > Gum Arabic > Gelatin > Haemoglobin

27. The alkali metal ion with least ionic mobility in aqueous solution is

(A) Li^+

(B) Na^+

(C) Rb^+

(D) Cs^+

28. The reduced ionization energy within a given family of nontransition elements is due to

(A) increase in size

(B) increase in shielding

(C) combined effect of increased size and shielding

(D) combined effect of increased size and decreased shielding

29. Match the following :

(Complex)	**(Hybridization)**
i) $[P + Cl_4]^{2-}$	a) sp^3
ii) $[Ni(CO)_4]$	b) dsp^2
iii) $[Fe(CO)_5]$	c) d^2sp^3
iv) $[Cr(CO)_6]$	d) dsp^3

(A) i – b; ii – a; iii – d; iv – c

(B) i – a; ii – b; iii – c; iv – d

(C) i – c; ii – d; iii – b; iv – a

(D) i – c; ii – b; iii – d; iv – a

30. In which case, an electron from bonding molecular orbital is removed ?

(A) O_2 to O_2^+

(B) N_2 to N_2^-

(C) N_2 to N_2^+

(D) O_2 to O_2^-

31. How would nitric acid behave when dissolved in acetic acid ?

(A) As a weak acid

(B) As a strong acid

(C) As a weak base

(D) As a strong base

32. Which of the following species is amphiprotic ?

(A) H_2CO_3

(B) H_2SO_4

(C) HCl

(D) H_2O

33. The shortest known S–N bond with a bond length of 141.6 pm is present in

(A) $N_4 S_4 F_4$

(B) NSF_3

(C) $N_4S_4H_4$

(D) $(SN)_x$

34. XeO_2F_2 is hydrolysed to give

(A) $XeOF_2$ and HF

(B) XeO_2F^+ and HF

(C) XeO_3 XeF_2 and HF

(D) XeO_3 and HF

35. The correct order of crystal field splitting strength of the following ligands is

(A) $CO > en > H_2O > Cl^-$

(B) $H_2O > en > Cl^- > CO$

(C) $en > Cl^- > CO > H_2O$

(D) $CO > Cl^- > en > H_2O$

36. The ground state term symbol for d^9_{oct} and d^1tet configurations respectively is

(A) $^2T_{2g}$

(B) $^2E_{2g}$

(C) $^5T_{2g}$

(D) $^4A_{2g}$

37. The correct trans directing series is

(A) $Br^- > Cl^- > NH_3 > OH^- > Py > H_2O$

(B) $Br^- > Cl^- > H_2O > Py > NH_3 > OH^-$

(C) $Br^- > Cl^- > OH^- > H_2O > Py > NH_3$

(D) $Br^- > Cl^- > Py > NH_3 > OH^- > H_2O$

38. The separation of lanthanides by ion exchange method is based on

(A) oxidation state of the ion

(B) size of the hydrated ions

(C) basicity of lanthanides

(D) solubility of their nitrates

39. Why are magnetic moments of trivalent lanthanide ions not much affected by ligands in comparison to those of 3d-transition metals ?

(A) lanthanides are similar in properties

(B) lanthanides show high coordination number

(C) lanthanides are heavier than 3d-transition metals

(D) f-electrons are more deeply seated than d-electrons

40. Hydroformylation reactions are catalyzed by

(A) $TiCl_4$ and $AlEt_3$

(B) $Ni(CO)_4$

(C) $Co_2(CO)_8$

(D) $CaCl_2$ and NaOEt

41. The structure of $Fe_3(CO)_{12}$ shows

(A) No bridging and two terminal CO groups

(B) One bridging and eleven terminal CO groups

(C) Two bridging and ten terminal CO groups

(D) Three bridging and nine terminal CO groups

42. STYx code of B_5H_{11} is

(A) 3 2 0 3

(B) 3 2 1 3

(C) 3 2 2 1

(D) 4 2 3 1

43. The eluting power of the following solvents is

(A) Ethylacetate > Ethanol > Acetone

(B) Acetone > Ethylacetate > Ethanol

(C) Ethylacetate > Acetone > Ethanol

(D) Ethanol > Ethylacetate > Acetone

44. The use of dynamic inert atmosphere in thermogravimetric analysis

(A) decreases decomposition temperature

(B) increases decomposition temperature

(C) increases weight loss

(D) reduces rate of decomposition

45. Considering the two complexes (a) $[Ni(H_2O)_6]^{2+}$ and (b) $[Ni(NH_3)_6]^{2+}$, the correct statement is

(A) Complex (a) is diamagnetic while complex (b) is paramagnetic

(B) Complex (a) is paramagnetic while complex (b) is diamagnetic

(C) Both are paramagnetic

(D) Both are diamagnetic

46. The ligand system present in vitamin B_{12} is

(A) Porphyrin

(B) Crown ether

(C) Corrin

(D) Haem

47. What is not true about ferredoxins ?

(A) Reduction potential is from 0 to 0.5 V

(B) Generate hydrogen from acid solutions

(C) Involved in oxidation of NH_3

(D) It is Fe – 3 protein

48. The false statement for a polarographic method is

(A) Dropping mercury electrode is used as the working electrode

(B) O_2 is removed

(C) Residual current is made zero by adding supporting electrolyte

(D) Diffusion current is proportional to concentration of electro active species

49. Ordinary chlorine consists of 75.4% of ^{35}Cl isotope and 24.6% of ^{37}Cl isotope. Calculate its atomic weight.

(A) 35.492

(B) 37.242

(C) 37.585

(D) 34.492

50. Sulphurous smog is also called as

(A) Photochemical smog

(B) London smog

(C) Los Angeles smog

(D) Urban smog

51. Consider the fission of $^{236}_{92}U$ represented by the overall reaction

$$^{236}_{92}U \rightarrow ^{94}_{40}Zr + ^{140}_{58}Ce + 6\,^{0}_{-1}e^{-} + 2\,_{0}n^{1}$$

The total energy released in the fission reaction is around

[Given : $^{236}U = 236.0457$,

$^{94}Zr = 93.90610$, $^{140}Ce = 139.9054$,

$^{0}_{-1}e = 0.00055$, $^{1}_{0}n = 1.00867$].

(A) 200 MeV

(B) 20 MeV

(C) 2 MeV

(D) 20 eV

52. The use of moderator in thermal reactors is

a) to enhance the efficiency of thermal reactors

b) to increase the fuel efficiency

c) to slow down some of the fast neutrons

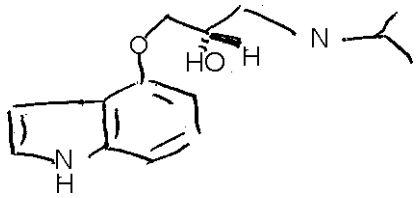
(A) 'a' and 'b' are correct

(B) only 'b' is correct

(C) only 'a' is correct

(D) only 'c' is correct

53. The IUPAC name of the compound having following structure is



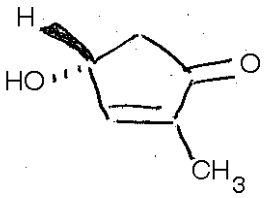
(A) S – 1– ((1H – indol – 4 – yl) oxy) – 3 – (isopropyl – amino) – propan – 2 – ol

(B) R – 1 – ((1H – indol – 4 – yl) oxy) – 3 – (isopropyl – amino) – propan – 2 – ol

(C) S – 3 – ((1H – indol – 4 – yl) oxy) – 1– (isopropyl – amino) – propan – 2 – ol

(D) R – 3 – ((1H – indol – 4 – yl) oxy) – 1– (isopropyl – amino) – propan – 2 – ol

54. The stereochemical descriptions for the chiral centre and define in the compound given below are



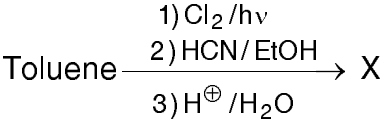
(A) (4R, 2R)

(B) (4S, 2S)

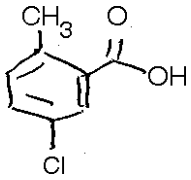
(C) (4S, 2R)

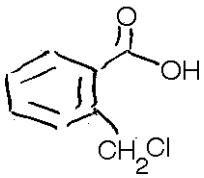
(D) (4R, 2Z)

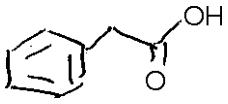
55. In the following transformation, identify the product .

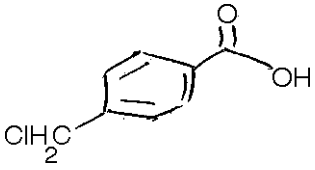


X is

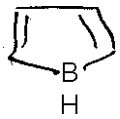
(A) 

(B) 

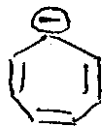
(C) 

(D) 

56. Which of the following are aromatic ?

i) 

ii)

iii) 

iv)

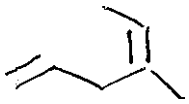
(A) (i) and (ii) are aromatic

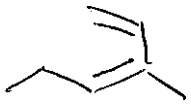
(B) (ii) and (iv) are aromatic

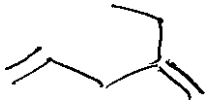
(C) (i), (ii) and (iii) are aromatic

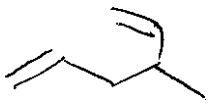
(D) (ii), (iii) and (iv) are aromatic

57. Which are among the following (i – iv) will not undergo into [3, 3] sigmatropic shift upon heating ?

i) 

ii) 

iii) 

iv) 

(A) (i) and (ii)

(B) (ii) and (iii)

(C) (iii) and (iv)

(D) (i), (ii) and (iii)

58. Identify the most stable reaction that makes simultaneously carbon-carbon and carbon-oxygen bonds.

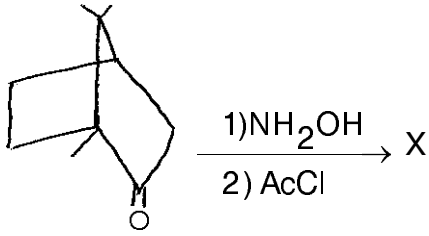
(A) Darzen's reaction

(B) Diel's Alder reaction

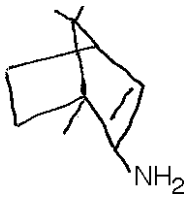
(C) Baeyer Villiger reaction

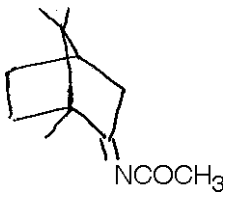
(D) Aldol condensation

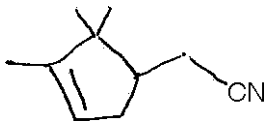
59. Write the major product formed in the following reaction

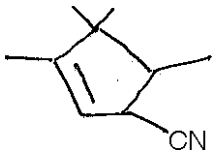


X is

(A) 

(B) 

(C) 

(D) 

60. The number of nodes present in the highest occupied molecular orbital of 1, 3, 5 – hexatriene in its excited state is

(A) Four

(B) Three

(C) One

(D) Five

61. Naphthalene has electrophilic substitution taking place at the α - carbon atom because

(A) HOMO has its shortest coefficient at this atom

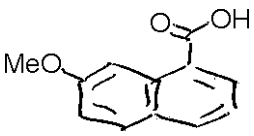
(B) HOMO has its largest coefficient at this atom

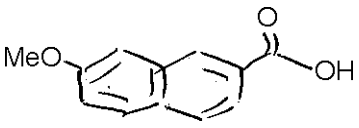
(C) LUMO has its shortest coefficient at this atom

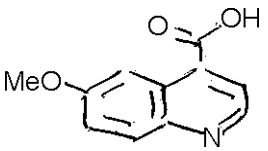
(D) LUMO has its largest coefficient at this atom

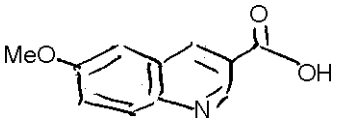
62. The major product in the following reaction is

$$\text{Quinine} \xrightarrow[H_2SO_4]{CrO_3} ?$$

(A) 

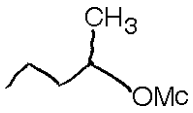
(B) 

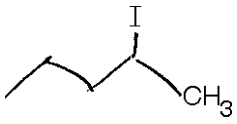
(C) 

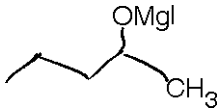
(D) 

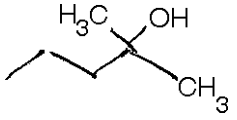
63. In the following transformation using Grignard reagent the product is

$$\text{Pentane} - 2 - \text{one} \xrightarrow[2)\ H_2O]{1)\ CH_3MgI} ?$$

(A) 

(B) 

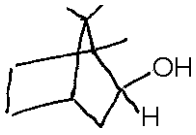
(C) 

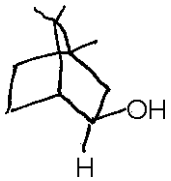
(D) 

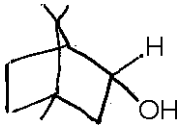
64. Identify the major product in the following reaction

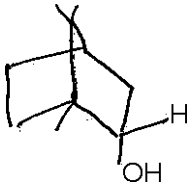
$$\text{Camphor} \xrightarrow[THF]{LiAlH_4} X$$

X is

(A) 

(B) 

(C) 

(D) 

65. Kuhn-Roth method is used in the structural determination of β-carotenes. This method gives information about.

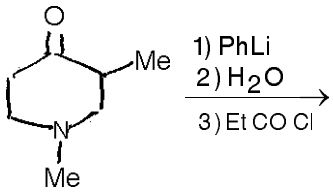
(A) Total number of double bonds

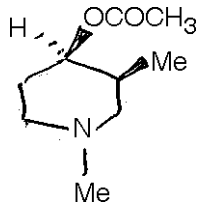
(B) Number of conjugated double bonds

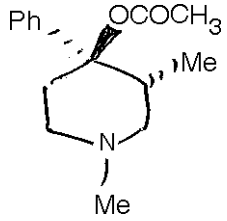
(C) Number of ring residues

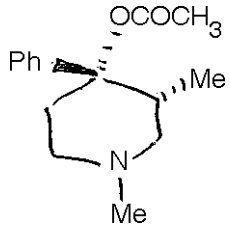
(D) Number of methyl side chains

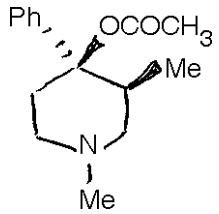
66. Write the major product formed in the following

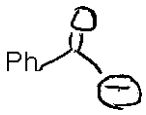


(A) 

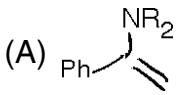
(B) 

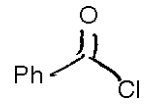
(C) 

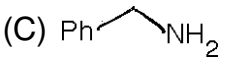
(D) 

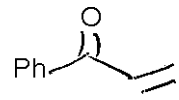
67. The synthetic equivalent of the synthon 

is

(A) 

(B) 

(C) 

(D) 

68. The reaction of ethylacetoacetate with phenylhydrazine gives an intermediat. This intermediate on reaction with dimethyl sulphate gives the product. The product is...

(A) 2,4 – Dimethyl – 1 – Phenylpyrazole – 5 – one

(B) 2, 3 – Dimethyl – 1–Phenylpyrazole – 5 – one

(C) 1, 2, 3 – Trimethylpyrazole – 5 – one

(D) 1, 3, 4 – Trimethylpyrazole – 5 – one

69. 2 – (chloromethyl) thiirane on reaction with sodium hydroxide generates

(A) 2 – (chloromethyl) oxirane

(B) 3 – chloro – 2 – hydroxypropanethiol

(C) 3 – Hydroxy thietane

(D) 2 – Hydroxy thietane

70. Match the following drugs with respect to the system present in the structure.

i) Ornidazole	a) Acridine
ii) Quinacrine	b) Furan
iii) Nifurtimox	c) Imidazole
iv) Metrofonate	d) No heterocycle

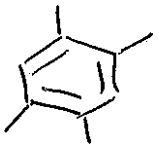
(A) i – c ; ii – d ; iii – b; iv – a

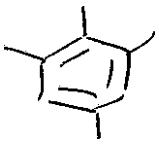
(B) i – c ; ii – a ; iii – b; iv – d

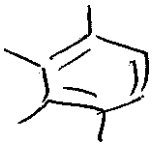
(C) i – b ; ii – d ; iii – a; iv – c

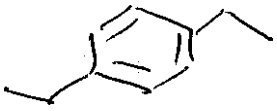
(D) i – b ; ii – a ; iii – d; iv – c

71. An organic compound having molecular formula $C_{10}H_{14}$ exhibited two singlets in the ^{1}HNMR and three signals in the ^{13}CNMR spectrum. The compound has the following structure.

(A) 

(B) 

(C) 

(D) 

72. What is the expected (m + 1) relative intensity in the mass spectrum of C_{60} compound ?

(A) 33.33%

(B) 6.66%

(C) 66.6%

(D) 60.0%

73. On catalytic hydrogenation, Vitamin-A_1 is converted into

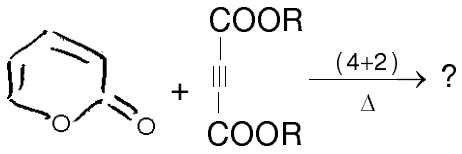
(A) Tetrahydrovitamin-A_1

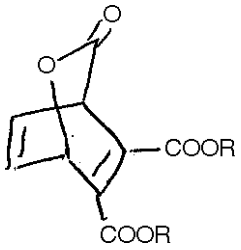
(B) Perhydrovitamin-A_1

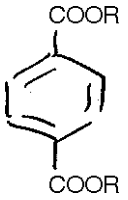
(C) Dihydrovitamin-A_1

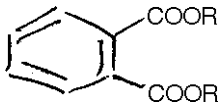
(D) Octahydrovitamin-A_1

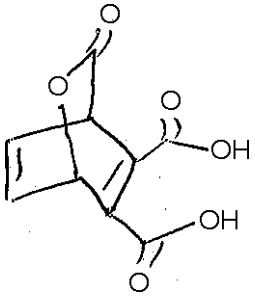
74. Major stable product formed in the following reaction is



(A) 

(B) 

(C) 

(D) 

75. The rearrangement of acylcarbene to ketene is called

(A) Hofmann rearrangement

(B) Schmidt rearrangement

(C) Curtius rearrangement

(D) Wolff rearrangement

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Space for Rough Work

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