

Test Paper : III
Test Subject : CHEMICAL SCIENCE
Test Subject Code : K-2713

Test Booklet Serial No. : _____
OMR Sheet No. : _____
Roll No.

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(Figures as per admission card)

Name & Signature of Invigilator/s

Signature : _____
Name : _____

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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

- ಈ ಪುಟದ ಮೇಲ್ಭಾಗದಲ್ಲಿ ಒದಗಿಸಿದ ಸ್ಥಳದಲ್ಲಿ ನಿಮ್ಮ ರೋಲ್ ನಂಬರನ್ನು ಬರೆಯಿರಿ.
- ಈ ಪತ್ರಿಕೆಯು ಬಹು ಆಯ್ಕೆ ವಿಧದ ಎಪ್ಪತ್ತೈದು ಪ್ರಶ್ನೆಗಳನ್ನು ಒಳಗೊಂಡಿದೆ.
- ಪರೀಕ್ಷೆಯ ಪ್ರಾರಂಭದಲ್ಲಿ ಪ್ರಶ್ನೆಪುಸ್ತಕವನ್ನು ನಿಮಗೆ ನೀಡಲಾಗುವುದು. ಮೊದಲ 5 ನಿಮಿಷಗಳಲ್ಲಿ ನೀವು ಪುಸ್ತಕವನ್ನು ತೆರೆಯಲು ಮತ್ತು ಕೆಳಗಿನಂತೆ ಕಡ್ಡಾಯವಾಗಿ ಪರೀಕ್ಷಿಸಲು ಕೋರಲಾಗಿದೆ.
(i) ಪ್ರಶ್ನೆಪುಸ್ತಕದ ಪ್ರವೇಶಾವಕಾಶ ಪಡೆಯಲು, ಈ ಹೊದಿಕೆ ಪುಟದ ಅಂಚಿನ ಮೇಲಿರುವ ಪೇಪರ್ ಸೀಲನ್ನು ಹರಿಯಿರಿ. ಸ್ವಿಚ್ ಸೀಲ್ ಇಲ್ಲದ ಪ್ರಶ್ನೆಪುಸ್ತಕ ಸ್ವೀಕರಿಸಬೇಡಿ. ತೆರೆದ ಪುಸ್ತಕವನ್ನು ಸ್ವೀಕರಿಸಬೇಡಿ.
(ii) ಪುಸ್ತಕಿಯಲ್ಲಿನ ಪ್ರಶ್ನೆಗಳ ಸಂಖ್ಯೆ ಮತ್ತು ಪುಟಗಳ ಸಂಖ್ಯೆಯನ್ನು ಮುಖಪುಟದ ಮೇಲೆ ಮುದ್ರಿಸಿದ ಮಾಹಿತಿಯೊಂದಿಗೆ ತಾಳೆ ನೋಡಿರಿ. ಪುಟಗಳು/ಪ್ರಶ್ನೆಗಳು ಕಾಣೆಯಾದ, ಅಥವಾ ದ್ವಿಪ್ರತಿ ಅಥವಾ ಅನುಕ್ರಮವಾಗಿಲ್ಲದ ಅಥವಾ ಇತರ ಯಾವುದೇ ವ್ಯತ್ಯಾಸದ ದೋಷಪೂರಿತ ಪುಸ್ತಕಿಯನ್ನು ಕೂಡಲೇ ನಿಮಿಷದ ಅವಧಿ ಒಳಗೆ, ಸಂವೀಕ್ಷಕರಿಂದ ಸರಿ ಇರುವ ಪುಸ್ತಕಿಗೆ ಬದಲಾಯಿಸಿಕೊಳ್ಳಬೇಕು. ಆ ಬಳಿಕ ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆಯನ್ನು ಬದಲಾಯಿಸಲಾಗುವುದಿಲ್ಲ, ಯಾವುದೇ ಹೆಚ್ಚು ಸಮಯವನ್ನೂ ಕೊಡಲಾಗುವುದಿಲ್ಲ.
- 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	C	D
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(C) ಸರಿಯಾದ ಉತ್ತರವಾಗಿದ್ದಾಗ.
- ಪ್ರಶ್ನೆಗಳಿಗೆ ಉತ್ತರಗಳನ್ನು, ಪತ್ರಿಕೆ III ಪುಸ್ತಕಿಯೊಳಗೆ ಕೊಟ್ಟಿರುವ OMR ಉತ್ತರ ಹಾಳೆಯಲ್ಲಿ ಮಾತ್ರವೇ ಸೂಚಿಸತಕ್ಕದ್ದು. OMR ಉತ್ತರ ಹಾಳೆಯಲ್ಲಿನ ಅಂಡಾಕೃತಿ ಹೊರತುಪಡಿಸಿ ಬೇರೆ ಯಾವುದೇ ಸ್ಥಳದಲ್ಲಿ ಗುರುತಿಸಿದರೆ, ಅದರ ಮೌಲ್ಯಮಾಪನ ಮಾಡಲಾಗುವುದಿಲ್ಲ.
- OMR ಉತ್ತರ ಹಾಳೆಯಲ್ಲಿ ಕೊಟ್ಟ ಸೂಚನೆಗಳನ್ನು ಜಾಗರೂಕತೆಯಿಂದ ಓದಿರಿ.
- ಎಲ್ಲಾ ಕರಡು ಕೆಲಸವನ್ನು ಪುಸ್ತಕಿಯ ಕೊನೆಯಲ್ಲಿ ಮಾಡತಕ್ಕದ್ದು.
- ನಿಮ್ಮ ಗುರುತನ್ನು ಬಹಿರಂಗಪಡಿಸಬಹುದಾದ ನಿಮ್ಮ ಹೆಸರು ಅಥವಾ ಯಾವುದೇ ಚಿಹ್ನೆಯನ್ನು, ಸಂಗತವಾದ ಸ್ಥಳ ಹೊರತು ಪಡಿಸಿ, OMR ಉತ್ತರ ಹಾಳೆಯ ಯಾವುದೇ ಭಾಗದಲ್ಲಿ ಬರೆದರೆ, ನೀವು ಅನರ್ಹತೆಗೆ ಬಾಧ್ಯರಾಗಿರುತ್ತೀರಿ.
- ಪರೀಕ್ಷೆಯು ಮುಗಿದನಂತರ, ಕಡ್ಡಾಯವಾಗಿ OMR ಉತ್ತರ ಹಾಳೆಯನ್ನು ಸಂವೀಕ್ಷಕರಿಗೆ ನೀವು ಹಿಂತಿರುಗಿಸಬೇಕು ಮತ್ತು ಪರೀಕ್ಷಾ ಕೊಠಡಿಯ ಹೊರಗೆ OMR ನ್ನು ನಿಮ್ಮೊಂದಿಗೆ ಕೊಂಡೊಯ್ಯ ಕೂಡದು.
- ಪರೀಕ್ಷೆಯ ನಂತರ, ಪರೀಕ್ಷಾ ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆಯನ್ನು ಮತ್ತು ನಕಲು OMR ಉತ್ತರ ಹಾಳೆಯನ್ನು ನಿಮ್ಮೊಂದಿಗೆ ತೆಗೆದುಕೊಂಡು ಹೋಗಬಹುದು.
- ನೀಲಿ/ಕಪ್ಪು ಬಾಲ್ ಪಾಯಿಂಟ್ ಪೆನ್ ಮಾತ್ರವೇ ಉಪಯೋಗಿಸಿರಿ.
- ಕ್ಯಾಲ್ಕುಲೇಟರ್ ಅಥವಾ ಲಾಕ್ ಟೇಬಲ್ ಇತ್ಯಾದಿಯ ಉಪಯೋಗವನ್ನು ನಿಷೇಧಿಸಲಾಗಿದೆ.
- ಸರಿ ಅಲ್ಲದ ಉತ್ತರಗಳಿಗೆ ಋಣ ಅಂಕ ಇರುವುದಿಲ್ಲ.

Instructions for the Candidates

- Write your roll number in the space provided on the top of this page.
- This paper consists of seventy five multiple-choice type of questions.
- 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 this cover page. Do not accept a booklet without sticker-seal and do not accept an 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.
- 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	C	D
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where (C) is the correct response.
- 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.
- Read the instructions given in OMR carefully.
- Rough Work is to be done in the end of this booklet.
- 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.
- 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.
- You can take away question booklet and carbon copy of OMR Answer Sheet soon after the examination.
- Use only Blue/Black Ball point pen.**
- Use of any calculator or log table etc., is prohibited.**
- There is no negative marks for incorrect answers.**



CHEMICAL SCIENCE
PAPER – III

Total Number of Pages : 16

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

- Which of the following is used as a NMR shift reagent ?
(A) $[\text{Eu}(\text{fod})_3]$
(B) TMS
(C) $[\text{Eu}(\text{acac})_3]$
(D) $[\text{La}(\text{acac})_3]$
- Coordination number of Ce^{4+} in $[\text{Ce}(\text{NO}_3)_6]^{2-}$ is
(A) 6
(B) 12
(C) 4
(D) 10
- Ilmanite is an ore of _____
(A) Fe
(B) Cr
(C) Ti
(D) Mn
- Van Arkel-de Boer method is used to prepare ultra pure _____
(A) Titanium
(B) Zinc
(C) Nickel
(D) Gold
- XeF_6 contains _____
(A) Six bond pairs
(B) Six bond pairs and a lone pair
(C) Six bond pairs and two lone pairs
(D) Six bond pairs and 3 lone pairs
- Number of theoretical plates in the column resulting in the chromatographic peak with $t_R = 52.3$ mm and $w_b = 9.0$ mm is
(A) 64.3
(B) 54
(C) 55
(D) 60
- Paper chromatography is a special case of _____ partition chromatography.
(A) Solid-liquid
(B) Solid-Solid
(C) Liquid-Liquid
(D) Solid-gas
- Match the following metals in I with appropriate biomolecules in II.

I	II
A) Fe	i) Carboxypeptidase
B) Co	ii) Hemocyanin
C) Zn	iii) Vitamin B ₁₂
	iv) Nitrogenase

(A) A – (ii)
B – (iii)
C – (i)
(B) A – (ii)
B – (iv)
C – (iii)
(C) A – (iv)
B – (ii)
C – (iii)
(D) A – (i)
B – (iii)
C – (iv)



9. Metalloenzymes responsible for the removal of hydrogen peroxide are
- (A) Catalase and peroxidase
 - (B) Peroxidase and nitrogenase
 - (C) Nitrogenase and carboxypeptidase
 - (D) Peroxidase and carboxypeptidase
10. The presence of hydridic hydrogen with carbon monoxide in metal complexes can be detected by infrared spectroscopy using
- (A) Deuterium
 - (B) Reducing agent
 - (C) Oxidizing agent
 - (D) CO_2
11. The $t_{1/2}$ of a nucleide with a disintegration constant of 0.0228 is _____
- (A) 30.2 day^{-1}
 - (B) 30.394 day^{-1}
 - (C) 36.7 day^{-1}
 - (D) 40.2 day^{-1}
12. Which of the following will act as an acid in liquid SO_2 according to solvent system concept ?
- (A) K_2SO_3
 - (B) HCl
 - (C) Na_2SO_3
 - (D) SOCl_2
13. The structure of $[\text{Co}(\text{H})(\text{N}_2)(\text{PPh}_3)_3]$ is _____
- (A) Oh
 - (B) TBP
 - (C) Square pyramidal
 - (D) Distorted Oh
14. Catalyst used in Ziegler-Natta polymerization is
- (A) $\text{TiCl}_4 + \text{Fe}(\text{C}_2\text{H}_5)_3$
 - (B) $\text{TiCl}_4 + \text{Br}(\text{C}_2\text{H}_5)_3$
 - (C) $\text{TiCl}_4 + \text{Cr}(\text{C}_2\text{H}_5)_3$
 - (D) $\text{TiCl}_4 + \text{Al}(\text{C}_2\text{H}_5)_3$
15. Number of valence electrons present in $[\text{Fe}(\text{CO})_3(\text{COT})]$ is
- (A) 18
 - (B) 20
 - (C) 16
 - (D) 15
16. Number of bridging carbonyls present in $\text{Cp}_2\text{Fe}_2(\text{CO})_4$ is
- (A) 4
 - (B) 3
 - (C) 2
 - (D) 1



17. Total number of 3C-2e bonds present in pentaborane-9 is
(A) 3
(B) 4
(C) 5
(D) 2
18. The electronic spectrum of $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$ shows a maximum at 20300 cm^{-1} (Given $1 \text{ kJmol}^{-1} = 83.7 \text{ cm}^{-1}$) Δ_0 in Joules/mol is _____
(A) 248
(B) 243
(C) 200
(D) 250
19. The number of microstates for p^2 and d^1 systems are
(A) 10 and 12
(B) 10 and 10
(C) 15 and 10
(D) 15 and 12
20. Shape memory alloy contains _____
(A) Ti and Ni
(B) Ti and Fe
(C) Fe and Cr
(D) Cr and Ni
21. NQR cannot be used for liquids and gases because the electric field gradient will become.
(A) +Ve
(B) -Ve
(C) 1
(D) zero
22. The number of ^{31}P NMR signals for facial $[\text{IrCl}_3(\text{PPh}_3)_3]$ isomer is _____
(A) 1
(B) 2
(C) 4
(D) 3
23. Inorganic benzene is
(A) $\text{B}_3\text{N}_3\text{H}_9$
(B) $\text{B}_3\text{N}_3\text{H}_6$
(C) $\text{B}_3\text{N}_3\text{H}_{12}$
(D) $\text{P}_3\text{N}_3\text{Cl}_6$
24. Reduction of tetrasulfur tetranitride with metallic potassium yields
(A) S_3N_3^-
(B) S_2N_2
(C) $(\text{SN})_x$
(D) S_4N_2



25. Molten iodine conducts electricity

because of the formation of

- (A) I_3^-
- (B) I_3^+
- (C) $I_3 + I_2$
- (D) $I_3^+ + I_3^-$

26. The radial and angular wave function gives

- (A) Shape, orientation and energy, size of the orbitals respectively
- (B) Energy, size and shape, orientation of the orbitals respectively
- (C) Energy and size of orbitals respectively
- (D) Shape and orientation of orbitals respectively

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

- (A) $E_n = \frac{n^2 h^2}{ma^2}$
- (B) $E_n = \frac{n^2 h^2}{4ma}$
- (C) $E_n = \frac{nh}{8ma^2}$
- (D) $E_n = \frac{n^2 h^2}{8ma^2}$

28. Perturbation theory is a technique that gives _____

- (A) Approximate solution to Schrodinger wave equation
- (B) Correct solution to Schrodinger wave equation
- (C) Does not deal with Schrodinger wave equation
- (D) None of the above

29. In a singlet multiplicity, the value of S is

- (A) 0
- (B) 1
- (C) 2
- (D) 3

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

- (A) $\frac{1}{2}$ and 112
- (B) $\frac{3}{2}$ and 112
- (C) $\frac{5}{2}$ and 112
- (D) $\frac{3}{2}$ and 121



31. Which of the d orbital contribute to σ orbital in a diatomic molecule ?
- (A) d_{xy}
(B) d_{zx}
(C) both d_{xy} and d_{zx}
(D) d_z^2
32. Zero point vibrational energy of the bonded atoms is
- (A) D_0
(B) $D_0 = D_e - \frac{1}{2}\hbar w$
(C) D_e
(D) $D_0 = \frac{1}{2}\hbar w$
33. Predict the normal modes of vibration of O_2 , H_2O , CO_2
- (A) 1, 4, 4
(B) 3, 4, 1
(C) 1, 4, 3
(D) 1, 3, 4
34. $\sigma \rightarrow \sigma^*$, $\pi \rightarrow \pi^*$ and $n \rightarrow \pi^*$ transitions are observed in the regions of
- (A) Visible, uv, uv-visible
(B) Far uv, near uv and visible, visible
(C) Near uv, Far uv, uv – visible
(D) Near uv, Visible, Far uv
35. The 250 MHz, 1H NMR spectrum of X shows a signal at 525 Hz upfield of TMS, what is its chemical shift in ppm ?
- (A) 2.10 ppm
(B) -2.10 ppm
(C) 2 ppm
(D) -2 ppm
36. The expected absorption band frequencies of O – H stretching, C – H stretching and C – O stretching vibrations of ethanol are observed at
- (A) 3400, 3600 – 2500 and 1200 cm^{-1}
(B) 3600 – 2500, 3400 and 1200 cm^{-1}
(C) 2980 – 2850, 3400 and 1200 cm^{-1}
(D) 3400, 2980 – 2850 and 1200 cm^{-1}
37. Which one of the following equation represents Maxwell relations ?
- i) $\left(\frac{\partial T}{\partial V}\right)_S = -\left(\frac{\partial P}{\partial S}\right)_V$
ii) $\left(\frac{\partial T}{\partial P}\right)_S = \left(\frac{\partial V}{\partial S}\right)_P$
iii) $\left(\frac{\partial V}{\partial T}\right)_P = -\left(\frac{\partial S}{\partial P}\right)_T$
- (A) Only (i) is Maxwell relation
(B) Only (ii) is Maxwell relation
(C) Only (iii) is Maxwell relation
(D) All the three equation are Maxwell relations



38. The partition function is defined as

$$q = \sum_J e^{-\beta \epsilon_J} \text{ and is an indication of}$$

- _____
- (A) The number of thermally accessible states at the temperature of interest
 - (B) The number of thermally accessible states at 273°K
 - (C) The number of thermally accessible states at 25°C
 - (D) The number of thermally inaccessible states at 25°C

39. The ionic strength of 0.1 molal KCl

- (A) 0.1
- (B) 0.2
- (C) 0.4
- (D) 1

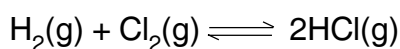
40. For distinguishable independent

molecules we write $Q = q^N$.

For indistinguishable independent molecules it is _____

- (A) $Q = Nq$
- (B) $Q = e^{-q^N}$
- (C) $Q = \frac{q^N}{N!}$
- (D) $Q = \frac{N!}{q^N}$

41. For the following reaction



ΔG° is -262 KJ. The equilibrium

constant K for the reaction at 298K is

- (A) 8.279×10^{46}
- (B) 8.279×10^{44}
- (C) 8.279×10^{40}
- (D) 8.279×10^{45}

42. The standard reduction potential of the electrodes Fe^{3+}/Fe and Fe^{2+}/Fe are -0.035 and -0.440V respectively.

The _____ electrode gets oxidised more easily.

- (A) Fe to Fe^{2+}
- (B) Fe to Fe^{3+}
- (C) Fe^{2+} to Fe
- (D) Fe^{3+} to Fe

43. The characteristics of Arrhenius equation

$$k = A \cdot \text{Exp} \left(\frac{-E_a}{RT} \right) \text{ means}$$

- (A) Larger the activation energy higher is the value of rate constant
- (B) Larger the activation energy smaller is the value of rate constant
- (C) Activation energy does not show any dependence on rate constant
- (D) None of the above



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

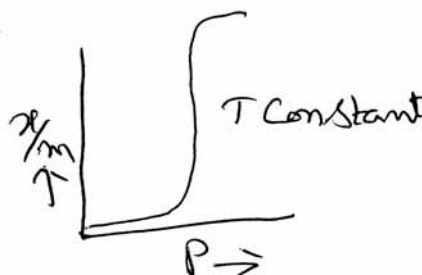


- (A) The rate constant does not change
- (B) The rate constant increases
- (C) The rate constant decreases
- (D) The rate constant initially increases and then decreases

45. 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

46. The adsorption isotherm shown in the figure represents _____



- (A) Monolayer adsorption
- (B) Physical adsorption accompanied by capillary condensation
- (C) Unimolecular adsorption
- (D) Chemical adsorption accompanied by capillary condensation

47. Amorphous solids are

- (A) Solid substances in real sense
- (B) Liquids in real sense
- (C) Super cooled liquids
- (D) Substances with definite M.P.

48. Molecular weight of a polymer obtained by viscosity method is _____

- (A) Weight average molecular weight
- (B) Number average molecular weight
- (C) Viscosity average molecular weight lies between \overline{M}_n and \overline{M}_w
- (D) Viscosity average molecular weight lies between \overline{M}_n and \overline{M}_z



49. The closeness of a result to its true or accepted value is _____

- (A) Precision
- (B) Accuracy
- (C) Median
- (D) Both (A) and (C)

50. Calculate the mean and the standard deviation of the following set of analytical results :

15.67, 15.69 and 16.03 g.

- (A) 15.80 and 0.20 g
- (B) 1.580 and 2.0 g
- (C) 158.0 and 20 g
- (D) 15.80 and 2.0 g

51. Match the following :

List – 1

- a) Wagner-Meerwein rearrangement
- b) Favorski rearrangement
- c) Hunsdiecker reaction
- d) Simon-Smith reaction

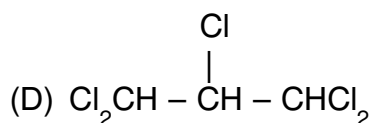
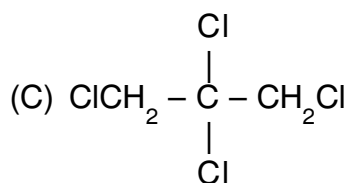
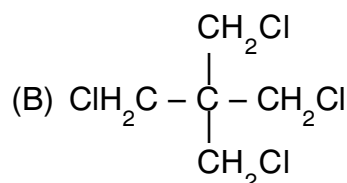
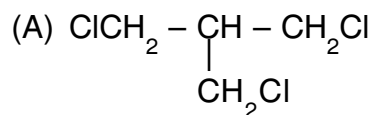
List – 2

- i) Carbenes
- ii) Free radicals
- iii) Carbocations
- iv) Carbanion

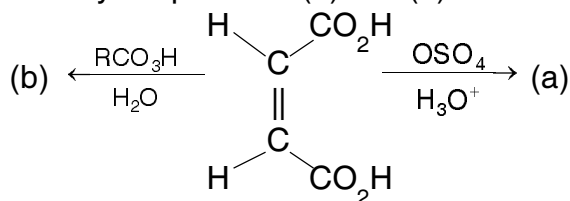
Codes :

- (A) a – iii, b – iv, c – ii, d – i
- (B) a – ii, b – iii, c – iv, d – i
- (C) a – i, b – iii, c – iv, d – ii
- (D) a – iv, b – i, c – ii, d – iii

52. The structure of the compound 1, 3-dichloro-2, 2-bis (chloromethyl) propane



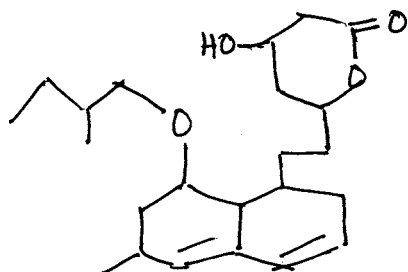
53. Identify the products (a) and (b)



- (A) Both (a) and (b) mesotartaric acid
- (B) (a) – mesotartaric acid
(b) – dl-tartaric acid
- (C) (a) – dl-tartaric acid
(b) – mesotartaric acid
- (D) Both (a) and (b) are dl-tartaric acid



54. Identify the number of stereogenic centers in the following compound



- (A) 4
- (B) 5
- (C) 6
- (D) 7

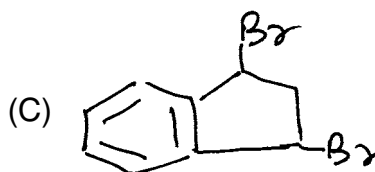
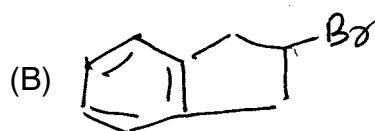
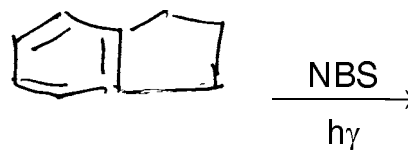
55. How many discrete dimethylcyclopropanes are possible ?

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

56. Identify the factor which is comparatively insignificant in affecting the magnitude of the specific optical rotation

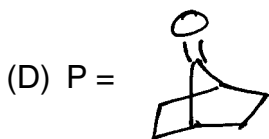
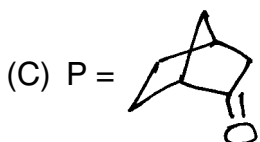
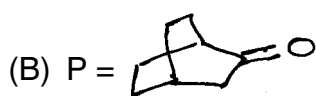
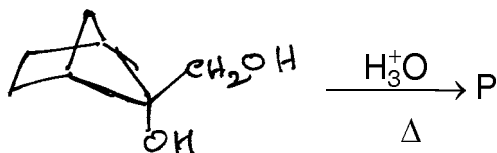
- (A) Concentration of the substance
- (B) Temperature
- (C) Purity of the sample
- (D) Length of the sample tube

57. The product of the following reaction is

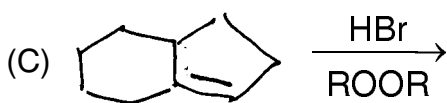
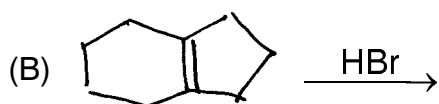
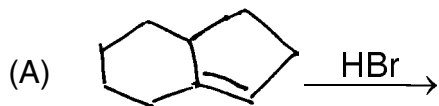
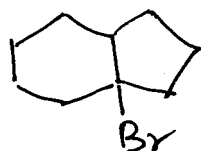




58. The product obtained in the following reaction is



59. Identify the reactions which produce the molecule shown below



(D) Both (A) and (B)

60. Photolysis of $PhCOCHN_2$ in methanol gives

- (A) Methylphenyl acetate
- (B) Phenylacetic acid
- (C) α -Phenylpropionic acid
- (D) β -Phenylpropionic acid

61. Match the following :

- | | |
|--------------------|-----------------|
| i) Pomeranz-Fritsh | a) Pyridine |
| ii) Friendlander | b) Quinoline |
| iii) Madelang | c) Isoquinoline |
| iv) Hantzsh | d) Indole |
- (A) i – c, ii – b, iii – d, iv – a
(B) i – b, ii – c, iii – d, iv – a
(C) i – b, ii – c, iii – a, iv – d
(D) i – a, ii – c, iii – b, iv – d

62. Thermolysis of $PhCON_3$ followed by hydrolysis gives

- (A) Benzoic acid
- (B) Acetanilide
- (C) Aniline
- (D) Benzaldehyde

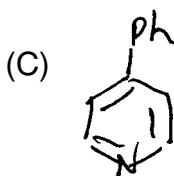
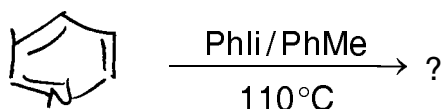
63. Which of the following is not a metal catalyst for the hydrogenation of alkene ?

- (A) Pd
- (B) Pt
- (C) Na
- (D) Ni



64. The hydroboration-oxidation reaction of alkenes can be characterised as
- (A) Anti-Markovnikov Anti-addition of water
 - (B) Anti-Markovnikov Syn-addition of water
 - (C) Markovnikov Syn-addition of water
 - (D) Markovnikov Anti-addition of water

65. Predict the product of the following reaction



- (D) Both (A) and (B)

66. The most commonly observed hydrogen shift under thermal conditions is
- (A) 1, 3-suprafacial hydrogen shift
 - (B) 1, 5-suprafacial hydrogen shift
 - (C) 1, 5-Antarafacial hydrogen shift
 - (D) 1, 7-Antarafacial hydrogen shift

67. Hexa-1, 3, 5-triene system on Thermal electrocyclic ring closure shows
- (A) Conrotatory process
 - (B) Suprafacial process
 - (C) Antarafacial process
 - (D) Dis-rotatory process

68. The reaction of O-Phenylene diamine with formic acid gives
- (A) Indole
 - (B) Benzopyrazole
 - (C) Isatin
 - (D) Benzoimidazole

69. Indole reacts with the intermediate generated from dichloromethane and methyllithium to give
- (A) Isoquinoline
 - (B) Quinoline
 - (C) Pyridine
 - (D) Benzimidazole

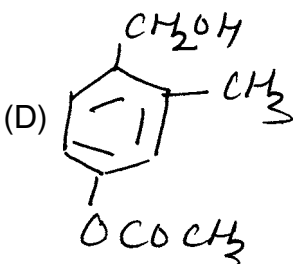
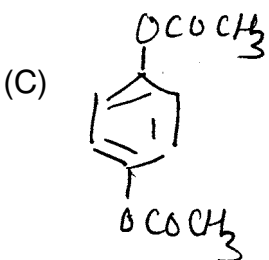
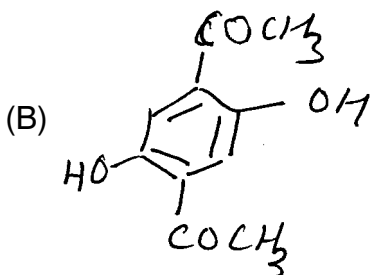
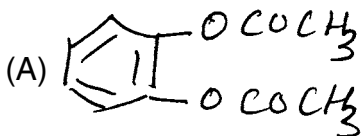
70. The role played by the nuclear RNA in the synthesis of proteins is
- (A) It catalyses the process
 - (B) It provides the genetic blue print for the protein
 - (C) It translate the genetic code to a specific aminoacid
 - (D) It modifies the m-RNA, prior to protein synthesis



71. An example of all transoid terpene is

- (A) Squalene
- (B) α -Pinene
- (C) Zingiberene
- (D) Bisbolene

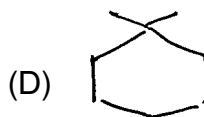
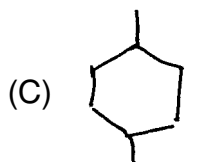
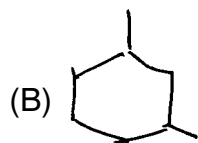
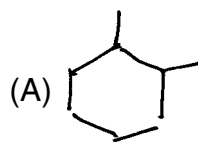
72. A compound with molecular formula $C_{10}H_{10}O_4$ exhibiting $\bar{\nu}_{max}$ 1720 cm^{-1} in its IR spectrum and two doublets and one singlet in its $^1\text{H-NMR}$ spectrum. The compound is



73. A compound with molecular formula $C_3H_5ClF_2$ gives two signals in its PMR spectrum at δ 1.75 (3H, t) and 3.6 (2H, t). The structure of the compound is

- (A) $\text{CH}_3 - \text{CH}_2 - \text{CF}_2\text{Cl}$
- (B) $\text{FCH}_2 - \text{CHCl} - \text{CH}_2\text{F}$
- (C) $\text{CH}_3 - \text{CF}_2 - \text{CH}_2\text{Cl}$
- (D) $\text{FCH}_2 - \text{CHF} - \text{CH}_2\text{Cl}$

74. The PMR and CMR spectra of an analyte gave four absorptions each. Which among the following compounds is the analyte ?



75. In the mass spectrum of CHCl_3 , the ratio of peaks at m/z 118, 120, 122 and 124 is

- (A) 27 : 9 : 1 : 27
- (B) 27 : 27 : 9 : 1
- (C) 1 : 9 : 27 : 27
- (D) 27 : 9 : 27 : 1



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