

CHEMICAL SCIENCES

Paper - II

OCT-11/03

Signature of Invigilators

Roll No.

(In figures as in Admit Card)

1.

Roll No.

2.

(in words)

Time Allowed : 75 Minutes]

[Maximum Marks : 100

Instructions for the Candidates

1. Write your Roll Number in the space provided on the top of this page.
2. This paper consists of **fifty (50)** multiple choice type questions. **All** questions are compulsory.
3. Each item has upto four alternative responses marked (A), (B), (C) and (D). The answer should be a capital letter for the selected option. The answer letter should entirely be contained within the corresponding square.

Correct method



Wrong method



OR



4. Your responses to the items for this paper are to be indicated on the ICR Answer Sheet under Paper II only.
5. Read instructions given inside carefully.
6. Extra sheet is attached at the end of the booklet for rough work.
7. You should return the test booklet to the invigilator at the end of paper and should not carry any paper with you outside the examination hall.
8. There shall be no negative marking.
9. Use of calculator or any other electronic devices is prohibited.

પરીક્ષાર્થીઓ માટે સૂચનાઓ :

૧. આ પાનાની ટોચમાં દર્શાવેલી જગ્યામાં તમારો રોલનંબર લખો.
૨. આ પ્રશ્નપત્રમાં બહુવૈકલ્પિક ઉત્તરો ધરાવતા કુલ પચાસ (૫૦) પ્રશ્નો આપેલા છે. બધા જ પ્રશ્નો ફરજિયાત છે.
૩. પ્રત્યેક પ્રશ્ન વધુમાં વધુ ચાર બહુવૈકલ્પિક ઉત્તરો ધરાવે છે. જે (A), (B), (C) અને (D) વડે દર્શાવવામાં આવ્યા છે. પ્રશ્નનો ઉત્તર કેપીટલ સંજ્ઞા વડે આપવાનો રહેશે. ઉત્તરની સંજ્ઞા આપેલ પાનામાં બરાબર સમાઈ જાય તે રીતે લખવાની રહેશે.

ખરી રીત :



ખોટી રીત :



અથવા



૪. આ પ્રશ્નપત્રના જવાબ આપેલ ICR Answer Sheet ના Paper II વિભાગની નીચે આપેલ પાનાઓમાં આપવાના રહેશે.
૫. અંદર આપેલ સૂચનાઓ કાળજીપૂર્વક વાંચો.
૬. આ બુક્લેટની પાછળ આપેલું પાનું રફ કામ માટે છે.
૭. પરીક્ષા સમય પૂરો થઈ ગયા પછી આ બુક્લેટ જે તે નિરીક્ષકને સોંપી દેવી. કોઈપણ કાગળ પરીક્ષા ખંડની બહાર લઈ જવો નહીં.
૮. ખોટા જવાબ માટે નેગેટિવ ગુણાંકન પ્રથા નથી.
૯. કેલ્ક્યુલેટર અને ઈલેક્ટ્રોનિક યંત્રોનો પ્રયોગ કરવાની મનાઈ છે.

CHEMICAL SCIENCES

PAPER - II

Note : This paper contains **FIFTY (50)** multiple-choice questions, each question carrying **TWO (2)** marks. Attempt **All** the questions.

- Which of the following is *not* present in RNA ?
 - Uracil
 - Phosphate
 - Thymine
 - Ribose
- As we go from left to right in a period the atomic volume :
 - First decreases then increases
 - First increases then decreases
 - Increases regularly
 - Remains constant
- Fluoride has the highest electronegativity among ns^2, np^5 group but electron affinity of F is less than Cl because :
 - The atomic number of F is less than that of Cl
 - F being the first member of the family behaves in an unusual manner
 - Cl can accommodate an electron better than F by utilizing its vacant $3d$ orbital
 - High electron density makes addition of electron less favourable than in Cl.

4. Atomic and ionic radii decreases from La(57) to Lu(71) because :
- (A) The mutual shielding effect of $(n-2)f$ electrons is very little
 - (B) Shape of f -subshell is very much diffused
 - (C) Nuclear charge increases
 - (D) All are correct
5. Which is the least ionic compound ?
- (A) KCl
 - (B) NaCl
 - (C) AgCl
 - (D) CaF₂
6. The chemical inertness of nitrogen molecule is due to :
- (A) Its high heat of dissociation
 - (B) Presence of large number of bonding electrons in comparison to antibonding electrons
 - (C) Presence of triple bonds between two N-atoms
 - (D) All are correct
7. The hydrogen bond energy is maximum in :
- (A) NH₃
 - (B) HF
 - (C) H₂O
 - (D) HCl

8. The geometry of $\text{Ni}(\text{CO})_4$ and $\text{Ni}(\text{P}.\text{Ph}_3)_2.\text{Cl}_2$ are :
- (A) Both are square planar
(B) Tetrahedral and square planar respectively
(C) Both are tetrahedral
(D) Square planar and tetrahedral respectively
9. The number of P-O-P bonds in cyclic metaphosphoric acid is :
- (A) Zero (B) Two
(C) Three (D) Four
10. Specify the bond order and magnetic moment of O_2 :
- (A) 1, 1.73 (B) 2, 2.83
(C) 2, 1.73 (D) 2, 1.93
11. The d orbital involved in sp^3d hybridization is :
- (A) d_{xy} (B) d_z^2
(C) d_{zx} (D) $d_{x^2-y^2}$
12. Which substance is reduced in the reaction :
- $$2\text{CuSO}_4 + 4 \text{KI} \rightarrow 2\text{K}_2\text{SO}_4 + \text{Cu}_2\text{I}_2 + \text{I}_2$$
- (A) CuSO_4 (B) KI
(C) Cu_2I_2 (D) I_2

13. Nascent hydrogen is chemically more reactive because it is :

- (A) in the excited state
- (B) in the atomic state
- (C) contained in tiny bubbles under high pressure
- (D) in the molecular state

14. Sodium thiosulphate is prepared by :

- (A) Boiling Na_2SO_3 with S in an acidic medium
- (B) Boiling Na_2SO_3 with S in an alkaline medium
- (C) Reducing Na_2SO_4 solution with H_2S
- (D) Neutralizing $\text{H}_2\text{S}_2\text{O}_3$ solution with NaOH

15. Transition elements form alloys easily because they have :

- (A) Same atomic number
- (B) Similar electronic configuration
- (C) Nearly same atomic size
- (D) None of the above

16. The reagent used in Wolff-Kishner reduction is :

- (A) Zn-Hg/HCl
- (B) $\text{H}_2/\text{Pd-C/BaSO}_4$
- (C) $\text{NH}_2\text{-NH}_2/\text{KOH}$
- (D) Na/EtOH

17. Conversion of 1-pentyne to 2-pentanone requires :

- (A) Aq. H_2SO_4 (B) Aq. HCl
(C) Zn-HCl (D) $Hg(SO_4)_2/H_2SO_4$ (aq.)

18. α -Epoxy esters can be prepared by :

- (A) Claisen reaction (B) Darzens reaction
(C) Reformatsky reaction (D) Dieckmann reaction

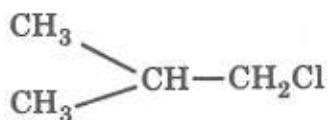
19. The reagent for Birch reduction is :

- (A) Liquid NH_3 (B) Aq. NH_3
(C) Na/Liq. NH_3 (D) Zn/ NH_3

20. In organic synthesis dicyclohexyl carbodiimide (DCC) is used as :

- (A) Dehydrating agent (B) Lewis catalyst
(C) Free radical initiator (D) Methylating agent

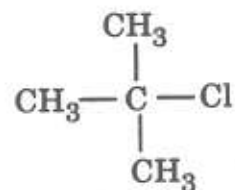
21. Arrange the following halides in decreasing order of reactivity towards S_N^2 reaction :



(I)



(II)



(III)

(A) I > II > III

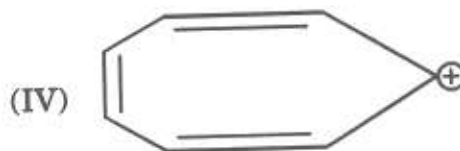
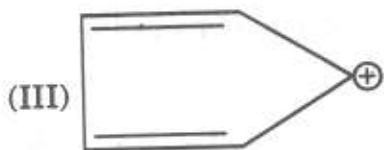
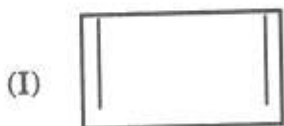
(B) II > I > III

(C) III > II > I

(D) III > I > II

22. The formation of α amino ketone from ketoxime tosylate in the presence of base takes place through :
- (A) Hofmann rearrangement (B) Curtius rearrangement
(C) Schmidt rearrangement (D) Neber rearrangement
23. Mutarotation is observed in :
- (A) Reducing sugar (B) Non-reducing sugar
(C) Starch (D) Cellulose
24. In PMR, the Pople notation for *p*-chloronitrobenzene is :
- (A) A_2B_2 (B) A_2X_2
(C) $AA'XX'$ (D) ABCD
25. In IR spectrum the $C \equiv N$ stretching vibration is observed at :
- (A) $\sim 1100 \text{ cm}^{-1}$ (B) $\sim 2250 \text{ cm}^{-1}$
(C) $\sim 750 \text{ cm}^{-1}$ (D) $\sim 3400 \text{ cm}^{-1}$
26. Pyridine gets aminated with alkali metal amide at :
- (A) 4-position (B) 2-position
(C) 3-position (D) 3 and 5 positions

27. Among the following, the aromatic species is :



(A) II

(B) I

(C) III

(D) IV

28. Propionic acid can be converted to *n*-butyric acid by :

(A) Wittig reaction

(B) Arndt-Eistert reaction

(C) Kolbe-Schmitt reaction

(D) Wurtz reaction

29. Reaction of acetophenone with $\text{Br}_2\text{-NaOH}$ gives :

(A) Phenol

(B) Phenylacetic acid

(C) Benzoic acid

(D) Acetic acid

30. Inversion of configuration is observed in :

(A) S_N^i reaction

(B) S_N^1 reaction

(C) S_N^2 reaction

(D) E_2 reaction

31. Which statement is NOT TRUE about diamond ?
- (A) Carbon is sp^3 hybridized
 - (B) It can not be synthesized from graphite
 - (C) It is the hardest naturally occurring substance
 - (D) It is thermodynamically not a stable form of carbon at room temperature and pressure
32. A colloidal system consisting of a solid dispersion medium and a liquid dispersed phase is :
- (A) Emulsion
 - (B) Gel
 - (C) Sol
 - (D) Solid solution
33. H_3BO_3 belongs to point group :
- (A) C_2
 - (B) C_{3h}
 - (C) D_{3h}
 - (D) D_3
34. The most probable distance of 1s electron from the nucleus in hydrogen atom is ($a_0 =$ Bohr radius) :
- (A) a_0
 - (B) $\frac{3}{2} a_0$
 - (C) $2a_0$
 - (D) $\frac{1}{2} \cdot a_0$
35. The term symbol for the ground state of nitrogen atom is :
- (A) $^4P_{3/2}$
 - (B) $^4S_{1/2}$
 - (C) $^4S_{3/2}$
 - (D) 1S_0
36. Which of the following molecules is having non-zero dipole moment ?
- (A) CH_4
 - (B) BF_3
 - (C) NF_3
 - (D) CO_2

37. A multiplet pattern for nucleus A in NMR spectrum of AMX system is :

(A)

(B)

(C)

(D)

38. For which of the following crystals anion-anion contact may be observed ?

(A) NaF

(B) NaI

(C) CsBr

(D) KCl

39. The temperature coefficient for a reaction is 2. On increasing the temperature by 25°C, the rate of the reaction will increase by nearly :

(A) 50 times

(B) 2 to 3 times

(C) 5 to 6 times

(D) 10 to 12 times

40. Which of the following is *not* an addition polymer ?

(A) PET

(B) PVC

(C) HDPE

(D) PTFE

41. The number of distinct vibrations OBSERVED in the infrared spectra of BF_3 (trigonal planar molecule) is :

(A) 7

(B) 4

(C) 6

(D) 3

42. If $\Delta_f G^\circ$ for CH_3 and C_2H_6 are 159.82 and $109.55 \text{ kJ. mol}^{-1}$, respectively, the K_p for the dissociation of ethane into methyl radical at 1000 K is :
- (A) 1.27×10^{-13} (B) 1.27×10^{13}
(C) 1.062×10^{-11} (D) 1.062×10^{11}
43. Which of the following will *not* favour addition or removal of electrons ?
- (A) C_2 (B) N_2
(C) O_2 (D) F_2
44. Which of the following is *not* a greenhouse gas ?
- (A) Cl_2 (B) CO_2
(C) CO (D) CH_4
45. The coefficient of variance for a result with a mean value of 0.754 and standard deviation 0.0038 is :
- (A) 0.40% (B) 0.50%
(C) 0.60% (D) 1.00%
46. Which of the following is responsible for measurement of pH using a glass electrode ?
- (A) $2\text{H}^+ + 2\text{e} \rightarrow \text{H}_2$
(B) $\text{Ag}^+ + \text{e} \rightarrow \text{Ag}$
(C) Exchange of H^+ between glass membrane and solutions
(D) Exchange of OH^- between glass membrane and solutions

47. One of the reversibility criteria for a reaction in cyclic voltammetry is that the difference between cathodic and anodic peak potentials should be :
- (A) Zero (B) $\frac{59.2}{n}$ mV
(C) $\frac{29.56}{n}$ mV (D) $\frac{118.4}{n}$ mV
48. What is the unit of absorptivity when path length is given in centimeters and concentration is expressed in parts per million :
- (A) $\text{cm}^{-1} \text{mol}^{-1}$ (B) $\text{cm}^{-1} \text{ppm}^{-1}$
(C) $\text{cm}^{-1} \%^{-1}$ (D) $\text{dm}^3 \text{mol}^{-1} \text{cm}^{-1}$
49. Inductively coupled plasma source is normally used in :
- (A) Atomic absorption spectroscopy
(B) Atomic emission spectroscopy
(C) Molecular fluorescence spectroscopy
(D) X-ray photoelectron spectroscopy
50. The correct order in which the following compounds would be eluted from an HPLC column containing a reversed phase packing is :
- (A) Benzene, diethyl ether, *n*-hexane
(B) Benzene, *n*-hexane, diethyl ether
(C) *n*-hexane, diethyl ether, benzene
(D) diethyl ether, benzene, *n*-hexane

ROUGH WORK

ROUGH WORK

ROUGH WORK

SEAL