Signature of Invigilators

1. .....

2. .....

CHEMICAL SCIENCE
Paper II

Roll No. | | | | | |
(In figures as in Admit Card)

Roll No. .....

.....

(In words)

JY—04/3

Name of the Areas/Section (if any).....

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 [A] Wrong Method [A] or [A]
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. One 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.

પરીક્ષાર્થીઓ માટેની સૂચનાઓ :

૧. આ પાનાની ટોચમાં દર્શાવેલી જગ્યામાં તમારો રોલ નંબર લખો.

૨. આ પ્રશ્નપત્રમાં કુલ **પચાસ (50)** બહુવૈકલ્પિક ઉત્તરો ધરાવતા 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 ખાનામાં બરાબર સમાઈ જાય તે રીતે લખવાની રહેશે.

   ખરી રીત : [A] ખોટી રીત : [A] , [A]

૪. આ પ્રશ્નપત્રના જવાબ આપેલ ICR Answer Sheet ના Paper II વિભાગની નીચે આપેલ ખાનાંઓમાં આપવાના રહેશે.

૫. અંદર આપેલ સૂચનાઓ કાળજીપૂર્વક વાંચો.

૬. આ બુકલેટની પાછળ આપેલું પાનું રફ કામ માટે છે.

૭. પરીક્ષા સમય પૂરો થઈ ગયા પછી આ બુકલેટ જે તે નિરીક્ષકને સોંપી દેવી. કોઈપણ કાગળ પરીક્ષા ખંડની બહાર લઈ જવો નહીં.

SEAL

CHEMICAL SCIENCE

PAPER-II

Note : This paper contains **fifty (50)** multiple choice questions, carrying **two (2)** marks each. Attempt *all* questions.

1. During the determination of copper when carried out volumetrically with potassium iodide and, if iron (III) is present as an impurity it leads to :

   (A) Proportional error (B) Personal error

   (C) Instrumental error (D) Huge error

2. Which of the following statement is *correct* ?

   (A) Accuracy is determined by simple replicating the measurements

   (B) Accuracy results are those results obtained in exactly same way

   (C) Accuracy may not describe the reproducibility of the measurement

   (D) Accuracy indicates the closeness of the measurement to its true value or accepted value.

3. In complexometric micro titration of calcium with EDTA with mureoxide as indicator the following results were obtained :

   9.990, 9.985, 9.980, 9.982, 9.973 ml.

   Therefore the value of the standard deviation of the mean is :

   (A) 6.3×10^{-3} (B) 9.9820

   (C) 0.06311 (D) 6.3×10^{3}

4. In quantitative analysis the error which cannot be easily rectified is :

   (A) Determinant error (B) Indeterminant error

   (C) Instrumental error (D) Personal error

5. In the following set of values indicate which is the median value ?

   (A) 22.78 (B) 22.62

   (C) 22.83 (D) 22.84

6. Which of the following is the correct electronic configuration of N_2 :

(A) $(\sigma^b_{1s})^2(\sigma^*_{1s})^2(\sigma^b_{2s})^2(\sigma^*_{2s})^2(\pi^b_{2px})^2(\pi^b_{2py})^2(\sigma^b_{2pz})^2$

(B) $(\sigma^b_{1s})^2(\sigma^b_{2s})^2(\sigma^*_{1s})^2(\sigma^*_{2s})^2(\pi^b_{2px})^2(\pi^b_{2py})^2(\pi^b_{2pz})^2$

(C) $(\sigma^b_{1s})^2(\sigma^*_{1s})^2(\sigma^b_{2s})^2(\sigma^*_{2s})^2(\pi^b_{2pz})^2(\pi^b_{2px})^2(\pi^b_{2py})^2$

(D) $(\sigma^b_{1s})^2(\sigma^*_{1s})^2(\sigma^b_{2s})^2(\sigma^*_{2s})^2(\pi^b_{2py})^2(\pi^b_{2pz})^2(\pi^b_{2px})^2$

7. Which among the following has atomic number 106 according to the recent nomenclature :

(A) Dubnium (B) Hassium

(C) Bohrium (D) Seborgium

8. The positions of lone pairs in ClF_3 are :

(A) one equatorial, one axial (B) Two equatorial

(C) Two axial (D) Three equatorial

9. The correct order of IP of B,C,N and O is :

(A) O > N > C > B (B) O > N > B > C

(C) N > O > C > B (D) O > B > N > O

10. The point group of *trans*–$[Ni(NH_3)_4Cl_2]$ is :

(A) D_{3h} (B) D_{2h}

(C) C_{2v} (D) D_{4v}

11. Oxidation number of Iodine varies from :

(A) –1 to +1 (B) –1 to +7

(C) +3 to +5 (D) –1 to +5

12. The hybridization state of Mn centre in $Mn_2(CO)_{10}$ is :

(A) d^2sp^3 (B) sp^3d^2

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

13. Octahedral Mn(II) complexes exhibit pale colour :

(A) Due to spin Forbidden transition

(B) Strong L–S coupling

(C) Large Δ value

(D) Large molecular distortion

14. The observed magnetic moment of $[Ni(L_3)]^{2+}$ (L = neutral bidentate ligand) at 298 K is 3.21 B.M., which is due to :

(A) μ_s only (B) μ_{L+S}

(C) Excited state contribution (D) μ_J

15. Octahedral Cobalt(III) complexes prefrentially stabilized in low spin configuration, due to :

(A) $\Delta > p$

(B) $\Delta < p$

(C) large gain in CFSE

(D) Jahn Taller effect

16. The "S" bond in $Cr_2 (CH_3COO)_4/(H_2O)_2$ is formed via the overlapping of :

(A) dxy orbitals (B) dz^2 orbitals

(C) dxz orbitals (D) dyz orbitals

17. The structure of $Fe_3(CO)_{12}$ comprises :

(A) No bridging CO group

(B) One bridging CO group

(C) Two CO bridging groups

(D) Three CO bridging groups

18. The correct IUPAC nomenclature of the compound $[CO(NH_3)_4(H_2O)Cl]\ Cl_2$ is :

(A) Aquochlorotetramminecobalt (III) chloride

(B) Tetrammineaquochlorocobalt (III) chloride

(C) Chloroaquotetramminecobalt (III) chloride

(D) Aquotetramminecobalt (III) chloride

19. The lowest energy d–d transition of $[Cr(NH_3)_6]^{3+}$ originates from :

(A) $4\ T_{2g} \rightarrow 4\ A_{2g}$

(B) $4\ T_{2g} \rightarrow 4\ T_{1g}$

(C) $4\ A_{2g} \rightarrow 4\ T_{2g}$

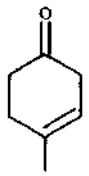
(D) $4\ A_{2g} \rightarrow 4\ T_{1g}$

20. Which of the following compounds is used in the hydrogenation of alkenes/ as a catalyst ?

(A) $(CH_3)_3RhCl$ (B) $(C_2H_5)_3RhCl$

(C) $(C_6H_5)_3RhCl$ (D) $(Ph_3P)_3RhCl$

21. The systematic IUPAC nomenclature for the following compound given below is :



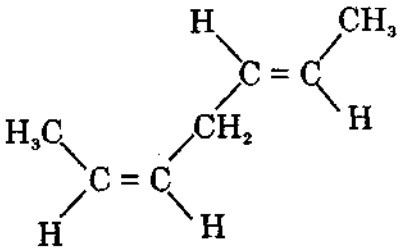
(A) 4 – Methyl cyclohex–3–ene–1–one

(B) 1 – Methyl cyclohex–1–ene–4–one

(C) 4 – Methyl cyclohex–4–ene–1–one

(D) 2 – Methyl cyclohex–1–ene–5–one

22. The correct nomenclature of the following geometrical isomer is :



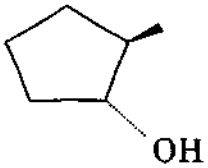
(A) E,Z–heptadiene

(B) Z,E–2,5–heptadiene

(C) Z,Z–2,5–heptadiene

(D) E,E–2,5–heptadiene

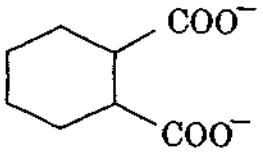
23. The configurations at the carbon atoms 1 and 2 in the compound given below are respectively :



(A) 1R, 2R (B) 1S, 2R

(C) 1R, 2S (D) 1S, 2S

24. The most stable conformation of the following dianion is :



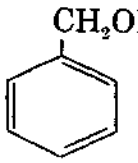
(A) 1a, 2e

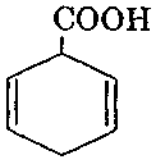
(B) 1e, 2e

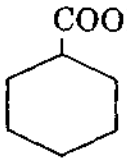
(C) 1e, 2a

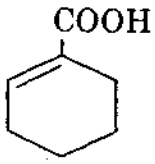
(D) 1a, 2a

25. The product of Birch reduction of benzoic acid is :

(A) 

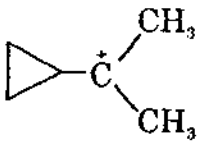
(B) 

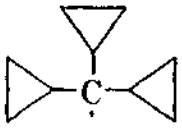
(C) 

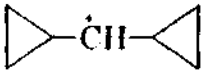
(D) 

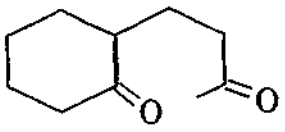
26. The most stable carbocation among the following is :

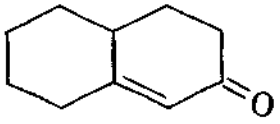
(A) $\dot{C}H_3$

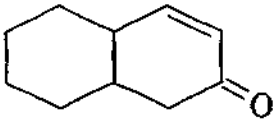
(B) 

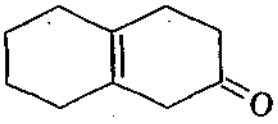
(C) 

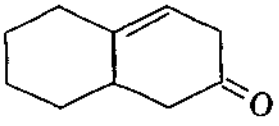
(D) 

27. On aldol condensation followed by dehydration  will produce :

(A) 

(B) 

(C) 

(D) 

28. On Schmidt rearrangement acetophenone will produce :

(A) A nitrile

(B) N–Methyl benzamide

(C) Acetanilide

(D) A mixture of N–methyl benzamide and acetanilide.

29. The conversion of phenol to salicylaldehyde can be achieved by :

(A) Aromatic nucleophilic substitution

(B) Beckmann rearrangement

(C) Reimer–Teimann reaction

(D) Hofmann rearrangement

30. Aniline on nitration in presence of conc. HNO_3 and conc. H_2SO_4 gives one of the following as a major product.

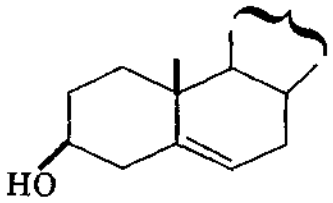
(A) m–Nitro aniline

(B) o–Nitro aniline

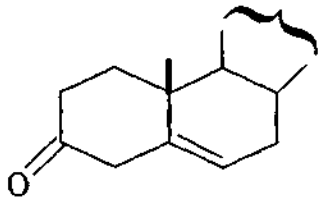
(C) p–Nitro aniline

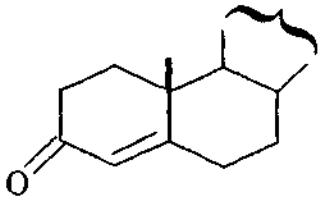
(D) A mixture of o– and p–Nitro anilines.

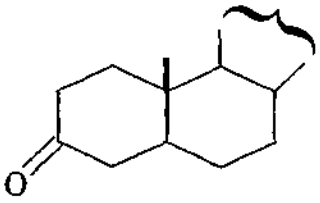
31. On Oppenauer oxidation the following :

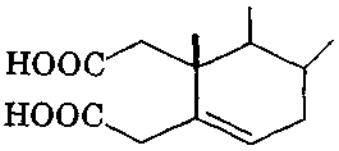


gives

(A) 

(B) 

(C) 

(D) 

32. Reaction of methyl benzoate with CH_3MgBr generates :

(A) α, α – Dimethyl benzyl alcohol

(B) Acetophenone

(C) Methyl –o– methyl benzoate

(D) Benzyl alcohol

33. The two hydrogen atoms attached to C_1 of the following compound are $CH_3–CHCl–CH_2Cl$

(A) Enantiomeric (B) Anomeric

(C) Equivalent (D) Diastereotopic

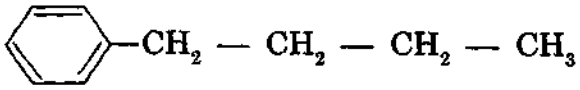
34. The NMR data corresponds to one of the following compounds : Molecular formula $C_{10}H_{14}$.

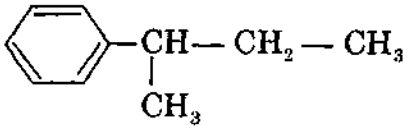
(i) doublet δ 0.88 6H

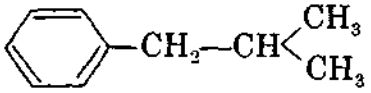
(ii) multiplet δ 1.86 1H

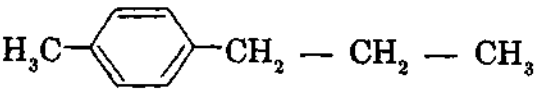
(iii) doublet δ 2.45 2H

(iv) singlet δ 7.12 5H

(A) 

(B) 

(C) 

(D) 

35. Singlet and triplet carbenes can be differentiated through :

(A) IR (B) NMR

(C) UV (D) EPR

36. The n, l, m, quantum number characterizing the 2Pz orbital are :

(A) n = 2, l = 1, m = 0

(B) n = 2, l = 1, m = +1

(C) n = 2, l = 1, m = –1

(D) n = 2, l = 2, m = 0

37. The order in which ionization potentials increase for Li, Be, B and C is :

(A) C > B > Be > Li (B) C > Be > B > Li

(C) C > Li > Be > B (D) Li > Be > B > C

38. Hybridization responsible for geometry of BF_3 is :

(A) sp (B) sp^2

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

39. Electronic confign and bond order of N_2 are :

(A) $1\sigma_g^2\ 1\sigma_u^2\ 2\sigma_g^2\ 2\sigma_u^2\ 1\pi_u^4\ 3\sigma_g^2$ and B.O. = 3

(B) $1\sigma_g^2\ 1\sigma_u^2\ 2\sigma_g^2\ 2\sigma_u^2\ 3\sigma_g^2\ 1\pi_u^4$ and B.O. = 3

(C) $1\sigma_g^2\ 1\sigma_u^2\ 2\sigma_g^2\ 2\sigma_u^2\ 3\sigma_g^2 1\pi_u^4$ and B.O. = 2

(D) $1\sigma_g^2\ 1\sigma_u^2\ 2\sigma_g^2\ 2\sigma_u^2\ 1\pi_u^4\ 3\sigma_g^2$ and B.O. = 2

40. The structure of CsCl and NaCl respectively are :

(A) f.c.c and simple cubic (B) b.c.c and simple cubic

(C) f.c.c and b.c.c (D) b.c.c and f.c.c

41. Electronic Transitions occur in the time scale of :

(A) femto seconds (B) pico seconds

(C) nano seconds (D) micro seconds

42. Vibrational transitions are triggered by :

(A) UV radiation (B) Visible radiation

(C) IR radiation (D) Microwave radiation

43. The best technique for characterizing free radicals is :

(A) IR (B) UV

(C) NMR (D) EPR

44. What is the pH of a solution prepared by dissolving 0.100 mol of NaOH and 0.100 mol of NH_3 in enough water to make a litre ?

(A) 14.0 (B) 13.0

(C) 12.0 (D) 11.0

45. The order of the ligand forming the complexes with class A metal ion (viz alkaline earths) is :

(A) N > P > As > Sb (B) P > As > Sb > N

(C) As > Sb > N > P (D) Sb > N > P > As

46. Choose the equation, which illustrate that H_2SO_4 acts as dehydrating agent.

(A) $C_6H_{12}O_6 \rightarrow 6C + H_2O$

(B) $5H_2SO_4 + 4Zn \rightarrow H_2S + 4Zn^{2+} + SO_4^{2-} + 4H_2O$

(C) $H_2SO_4 + Zn \rightarrow Zn^{2+} + H_2 + SO_4^{2-}$

(D) $H_2SO_4 + ZnCO_3 \rightarrow Zn^{2+} + CO_2 + SO_4^{2-} + H_2O$

47. In the reaction between warm conc H_2SO_4 and KI,

$8I^- + H_2SO_4 + 8H^+_{(aq)} \rightarrow 4I_{2(g)} + H_2S_{(g)} + 4H_2O$

(A) I^- is reduced

(B) H_2S is a reducing agent

(C) H^+ is reducing

(D) H_2SO_4 is a oxidizing agent

48. If the process is both endothermic and spontaneous then :

(A) $\Delta S > 0$ (B) $\Delta S < 0$

(C) $\Delta H < 0$ (D) $\Delta G > 0$

49. Assuming ΔH_{vap} and ΔS_{vap} are approximately constant between 25°C and the normal boiling point of CCl_4. What would be the temperature of normal boiling point ?

(A) 35°C (B) 75°C

(C) 100°C (D) 274°C

50. In an experiment to study the reaction A + 2B → C + 2D, the initial rate $-d[A]/dt$ at t = 0, was found to be 2.6×10^{-2} Ms^{-1}. What is the value of $-d[B]/dt$ at t = 0 in Ms^{-1} ?

(A) 2.6×10^{-2} (B) 5.2×10^{-2}

(C) 1.3×10^{-2} (D) 5.2×10^{-4}

ROUGH WORK

ROUGH WORK

SEAL