Series - C

Question Booklet No.

811771

COMMON ENTRANCE TEST - 2013
QUESTION BOOKLET
CHEMISTRY (Code - 02)

Maximum Time Allowed : 1½ hours
Negative Marking : 0.2

No. of Questions : 75
Maximum Marks : 75

Roll No. | | | | | | |

Answer Sheet No. | | | | | | |

INSTRUCTIONS

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY

1. **Check the booklet thoroughly :** In case of any defect - Misprint, Missing Question(s) or duplication of question(s)/ Page(s) get the booklet changed with the booklet of the same series from the Room Invigilator. No complaint shall be entertained after the entrance test.
2. Write your Roll Number and Answer Sheet No. in the space provided on the Question Booklet and on the OMR Answer Sheet. Incomplete and/or incorrect particulars will result in the non-evaluation of your answer sheet.
3. Strictly follow the instructions given by Centre Supervisor / Room Invigilator and those given on the Question Booklet.
4. Candidates are not allowed to carry any papers, notes, books, calculators, mobile phones, scanning devices etc. in the Examination Hall. Any candidate found using or in possession of such unauthorized material or indulging in copying or impersonation or adopting unfair means / reporting late / without Admit Card will be debarred from the Written Test.
5. Use ONLY blue/black ball point pen for darkening the circles on the OMR Answer Sheet. Use of eraser, whitener (fluid) and cutting on the OMR Answer Sheet is not allowed.
6. The test is of objective type containing multiple choice questions (MCQs). Each objective question is followed by four responses. Choose the correct/best response and mark your response on the OMR Answer Sheet and not in the Question Booklet.
7. Completely darken the CIRCLE so that the number inside the CIRCLE is not visible as shown in the example below.

Correct Method

Wrong Methods

8. Darken ONLY ONE CIRCLE for each answer. If you darken more than one circle, it will be treated as a wrong answer.
9. Mark answer only in the space provided. DO NOT make any stray mark anywhere on the OMR Answer Sheet. DO NOT fold or wrinkle the OMR Answer Sheet. Rough work MUST NOT be done on the answer sheet. Use your question booklet for this purpose.
10. Candidates are provided carbonless OMR Answer Sheet (optical mark reader answer sheet) having original copy and candidate's copy. After completing the examination candidates are directed to fold at perforation at the top of sheet, tear it to separate original copy and candidate's copy and then hand over the original copy of OMR Answer Sheet to the Room Invigilator and take candidate's copy with them.

SEAL

DO NOT OPEN THE SEAL OF THIS BOOKLET UNTIL TOLD TO DO SO

1306/02

1. Which of the following is a colligative property ?
   1. Lowering of vapour pressure
   2. Osmotic pressure
   3. Boiling point
   4. Change in entropy

2. Vant Hoff factor for $Ca(NO_3)_2$ is
   1. 1 2. 2
   3. 3 4. 4

3. What will be the freezing point of a 1% solution of glucose in water, given that molal depression constant for water is 1.84 K kg mol^{-1}
   1. 272.898 K 2. 0.102º C
   3. 273 K 4. 0.108º C

4. If ΔH and ΔS are positive for a reaction, the reaction will be spontaneous only when
   1. $T\Delta S = \Delta H$ 2. $T\Delta S > \Delta H$
   3. $T\Delta S < \Delta H$ 4. $T\Delta S$ is negative

5. Calculate the enthalpy change for the reaction
   $C_2H_4(g) + H_2(g) \longrightarrow C_2H_6(g)$
   using the data given below :
   $C_2H_4(g) + 3O_2(g) \longrightarrow 2CO_2(g) + 2H_2O(l)$ $\Delta H = -1415$ kJ
   $C_2H_6(g) + \frac{7}{2}O_2(g) \longrightarrow 2CO_2(g) + 3H_2O(l)$ $\Delta H = -1566$ kJ
   $H_2(g) + \frac{1}{2}O_2(g) \longrightarrow H_2O(l)$ $\Delta H = -286$ kJ
   1. - 437 kJ 2. 135 kJ
   3. - 135 kJ 4. none of these

6. In thermodynamics, a quantity whose value simply depends upon the initial and final state of the system is called
   1. a thermodynamic quantity
   2. a state function
   3. an adiabatic quantity
   4. a path function

7. All naturally occurring processes proceed spontaneously in a direction which leads to
   1. increase in enthalpy of system
   2. decrease in entropy of system
   3. decrease in free energy of system
   4. increase in free energy of system

8. When an electrolytic solution conducts electricity, the current is carried by
   1. the electrons
   2. cations and anions
   3. neutral molecules
   4. the atoms of the electrolyte

9. An electrochemical cell has two half cell reactions as,
   $A^{2+} + 2e^- \longrightarrow A$ $E^0_{A^{2+}/A} = 0.34$ V
   $X \longrightarrow X^{2+} + 2e^-$ $E^0_{X^{2+}/X} = -2.37$ V
   The cell voltage will be
   1. 2.71 V 2. 2.03 V
   3. - 2.71 V 4. - 2.03 V

10. In the electrolysis of dilute H_2SO_4 using platinum electrode
    1. H_2 is liberated at cathode
    2. O_2 is produced at cathode
    3. Cl_2 is obtained at cathode
    4. NH_3 is produced at anode

11. When a solution of sodium hydroxide is added to acetic acid solution, the conductivity of the resulting solution will
    1. increase 2. remain unchanged
    3. decrease 4. become zero

12. The behaviour of a real gas approaches ideal behaviour at
    1. low temperature, low pressure
    2. high temperature, high pressure
    3. low temperature, high pressure
    4. high temperature, low pressure

13. Which of the following is **not** the postulate of the kinetic theory of gases ?
    1. Gas molecules are in a permanent state of random motion
    2. Pressure of gas is due to molecular impacts on the walls
    3. The molecules are perfectly elastic
    4. The molecular collisions are elastic

14. When a cation leaves its normal position in the crystal and moves to some interstitial space, the defect in the crystal is known as
    1. schottky defect
    2. F-centre
    3. frenkel defect
    4. non-stoichiometric defect

15. Fog is a colloidal system of
    1. gas in liquid 2. liquid in gas
    3. gas in gas 4. gas in solid

16. The purification of a colloidal solution could be done by
    1. sedimentation
    2. ultrafiltration
    3. filtration
    4. precipitation

17. Bakelite is a product of the reaction between
1. formaldehyde and NaOH
2. aniline and urea
3. phenol and methanal
4. phenol and chloroform

18. How does electron affinity change when we move from left to right in a period in the periodic table ?
1. It increases
2. It decreases
3. It remains unchanged
4. It first increases and then decreases

19. Which of the following statements is **not** correct ?
1. Ionization energy increases on going down a group in the periodic table
2. Among alkaline earth metals, reducing character increases down the group
3. Fluorine is the most electronegative element
4. Metallic character increases on going down a group in the periodic table

20. Which of the following species has a trigonal planar shape ?
1. $:CH_3^-$
2. CH_3^+
3. BF_4^-
4. SiH_4

21. Which of the following will have maximum dipole moment ?
1. NF_3
2. NH_3
3. CH_4
4. PCl_3

22. Which of the following forces is the strongest ?
1. Hydrogen bonding
2. Dipole-dipole forces
3. van der Waal's forces
4. Co-ordinate bonding

23. Which of the following statements is correct ?
1. sp^3 hybrid orbitals have equal s and p character
2. The bond angle decreases with the decrease of s character of a hybridized orbital
3. Resonance decreases the stability of a molecule
4. Resonance is due to delocalization of sigma electrons

24. Which of the following is the correct order of increasing oxidizing character of oxoacids of chlorine ?
1. $HClO_3 < HClO_4 < HClO_2 < HClO$
2. $HClO_4 < HClO_3 < HClO_2 < HClO$
3. $HClO < HClO_4 < HClO_3 < HClO_2$
4. $HClO < HClO_2 < HClO_3 < HClO_4$

25. Which of the following oxides of group 16 has the highest boiling point ?
1. H_2O
2. H_2S
3. H_2Se
4. H_2Te

26. The +1 oxidation state of thallium is more stable than its +3 oxidation state because of
1. its atomic size
2. its ionization potential
3. inert pair effect
4. diagonal relationship

27. Which of the following statements is **false** regarding alkali metals ?
1. Alkali metals are soft and can be cut with the help of knife
2. Alkali metals do not occur in free state in nature
3. Alkali metals are highly electropositive elements
4. Alkali metal hydrides are covalent in character

28. Among the following outer most configurations of transition metals, which shows the highest oxidation state ?
1. $3d^3\,4s^2$
2. $3d^5\,4s^1$
3. $3d^5\,4s^2$
4. $3d^2\,4s^2$

29. The tendency of transition metals to form stable complexes is due to their
1. low ionization energies
2. variable oxidation states
3. strong electro positive nature
4. high charge/size ratio and vacant d orbitats

30. The transition metal ions are generally paramagnetic in nature because
1. they have coloured salts
2. they have one or more unpaired d electrons
3. they have one or more paired s electrons
4. they are reducing agents

31. The most common oxidation state of lanthanides is
1. +4
2. +3
3. +6
4. +2

32. Specify the co-ordination number of cobalt in $[Co\,(CN)\,(H_2O)\,(en)^2]^{2+}$
1. 6
2. 4
3. 0
4. 3

33. Which of the following complexes is square planar and diamagnetic ?
1. $[Ni\,Cl_4]^{2-}$
2. $[Ni\,(CN)_4]^{2-}$
3. $[Cr\,(NH_3)_6]^{3+}$
4. $[Cu\,Cl_4]^{2-}$

34. Which type of isomerism is exhibited by $[Pt(NH_3)_2Cl_2]$?
1. Co-ordination isomerism
2. Linkage isomerism
3. Optical isomerism
4. Geometrical isomerism

35. Ethylene diamine tetra acetate ion is a
1. unidentate ligand
2. bidentate ligand
3. pentadentate ligand
4. hexadentate ligand

36. Which of the following is an ore of zinc ?
1. Galena
2. Pyrolusite
3. Sphalerite
4. Magnetite

37. The impurities associated with the ore after mining are collectively called
1. flux
2. slag
3. minerals
4. gangue

38. During extraction of iron, the iron obtained at the bottom of blast furnace is known as
1. steel
2. wrought iron
3. cast iron
4. none of these

39. Select the molecule which has only one π-bond
1. $CH \equiv CH$
2. $CH_2 = CH - CHO$
3. $CH_3 - CH = CH_2$
4. $CH_3 - CH = CH - COOH$

40. Which of the following groups is ortho and para directing ?
1. - COCl
2. - CHO
3. - OH
4. $-COCH_3$

41. Amongst the given cations, the most stable carbonium ion is
1. $^+CH_3$
2. $(CH_3)_3{}^+C$
3. $CH_3{}^+CH_2$
4. $(CH_3)_2{}^+CH$

42. The hybridization of carbon atoms in C–C single bond of $HC \equiv C-CH = CH_2$ is
1. $sp^3 - sp^2$
2. $sp^2 - sp^3$
3. $sp - sp^2$
4. $sp^3 - sp^3$

43. The number of optical isomers of the compound $CH_3CHBrCHBrCOOH$ is
1. 0
2. 1
3. 3
4. 4

44. Electrolysis of an aqueous solution of sodium ethanoate gives
1. Methane
2. Ethane
3. Butane
4. Methyl ethanoate

45. Which of the following compounds will exhibit cis-trans (geometrical) isomerism ?
1. 2-Butene
2. 2-Butyne
3. 2-Butanol
4. 1-Butanol

46. The reaction given below is an example of which of the following ?

$$2CH_3Br + 2Na \xrightarrow{\text{dry ether}} C_2H_6 + 2NaBr$$

1. Reimer Tiemann reaction
2. Wurtz reaction
3. Hoffman bromamide reaction
4. Aldol condensation

47. Chlorobenzene can be prepared by reacting aniline with
1. hydrochloric acid in the presence of nitrous acid
2. cuprous chloride in the presence of aluminium chloride
3. chlorine in the presence of aluminium chloride
4. nitrous acid followed by heating with cuprous chloride

48. Phenol on treatment with conc. HNO_3 gives
1. o-nitrophenol
2. p-nitrophenol
3. o- and p-nitrophenol
4. 2, 4, 6-trinitrophenol

49. Which of the following compounds will be formed when methoxy benzene is reacted with HBr ?
1. Phenol and bromo methane
2. Methanol and bromo benzene
3. Phenol and Methanol
4. Bromobenzene and bromo methane

50. When ethanol and I_2 are heated in the presence of Na_2CO_3, the yellow crystals obtained are of
1. C_2H_5I
2. CH_3I
3. CHI_3
4. CH_2I_2

51. Identify B in the following series of reaction

$$CH_3CHO \xrightarrow{CH_3Mgx} A \xrightarrow{HOH} B$$

1. 2-propanol
2. 1-propanol
3. ethanol
4. none of these

52. Which of the following compounds has maximum acidic character ?
1. Dichloroacetic acid
2. Acetic acid
3. Trichloro acetic acid
4. Triflouro acetic acid

53. Which of the following would contain the same number of atoms as 20 grams of calcium ?
[At. masses : Ca = 40, Mg =24, C = 12]
1. 24 grams of Magnesium
2. 12 grams of carbon
3. 24 grams of carbon
4. 12 grams of magnesium

54. 100 ml of 1 N H_2SO_4 is mixed with 100 ml of 1 M NaOH solution. The resulting solution will be
1. highly acidic
2. neutral
3. highly basic
4. slightly acidic

55. The bond order of N_2^+ on the basis of molecular orbital theory is [At. number of N = 7]
1. 3
2. 2.5
3. 2
4. 1.5

56. What is the total number of electrons that can have the values n = 2, l = 1, s = 1/2 in the electronic configuration $1s^2\ 2s^2\ 2p^3$?
1. 1
2. 3
3. 5
4. 7

57. Calculate the wavelength associated with an electron moving with a velocity of 10^6 m/sec
(mass of $e^- = 9.1 \times 10^{-31}$ kg, $h = 6.6 \times 10^{-34}$ kg m^2 sec^{-1})
1. 6.2×10^{-8} m
2. 7.25×10^{-8} m
3. 6.25 Aº
4. none of these

58. Which of the following pairs is **not** correctly matched?

1. Hund's rule	In orbitals of equivalent energy electron spins remain unpaired if possible
2. Pauli's exclusion principle	No two electrons can have all the four quantum numbers identical
3. Zeeman effect	The effect of magnetic field on the atomic spectra
4. Uncertainty principle	It is impossible to determine the position of an electron

59. The orbital diagram in which Aufbau principle is violated is

1. 2s: ↿⇂ 2p: ↿⇂ 1 ☐
2. 2s: ↿⇂ 2p: 1 1 1
3. 2s: 1 2p: ↿⇂ 1 1
4. 2s: ↿⇂ 2p: ↿⇂ ↿⇂ 1

60. The $[OH]^-$ in a solution is 1 mol L^-. The pH of the solution is
1. 1
2. 0
3. 14
4. 10^{-14}

61. The solubility of $Fe(OH)_3$ is x mol L^{-1}. Its K_{sp} would be
1. $9x^3$
2. $3x^4$
3. $27x^4$
4. $9x^4$

62. In which of the following reactions, increase in pressure will favour the forward reaction ?
1. $PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$
2. $2NO(g) + O_2(g) \rightleftharpoons 2NO_2(g)$
3. $C(s) + H_2O(g) \rightleftharpoons CO(g) + H_2(g)$
4. $2HI(g) \rightleftharpoons H_2(g) + I_2(g)$

63. Which of the following is a lewis acid ?
1. BF_4^-
2. OH^-
3. $AlCl_3$
4. RNH_2

64. According to Collision theory of reaction rates increase in the temperature of a reaction will increase the rate of the reaction because of
1. increase in the velocity of the reacting molecules
2. increase in the number of collisions
3. increase in the number of molecules having the activation energy (threshold energy)
4. none of these

65. Consider the reaction
$2N_2O_5(g) \rightarrow 4NO_2(g) + O_2(g)$
The rate law for this reaction is Rate = k $[N_2O_5]$
Which of the following statements is true regarding the above reaction ?
1. Its order is 1 and molecularity is 1
2. Its order is 1 and molecularity is 2
3. Its order is 2 and molecularity is 2
4. Its order is 2 and molecularity is 1

66. A catalyst is a substance which
1. increases the rate of forward reaction in a reversible reaction
2. increases the rate of both forward and backward reaction in a reversible reaction
3. does not influence a reversible reaction
4. increases the rate of backward reaction in a reversible reaction

67. Which of the following solutions will have the highest boiling point ?
1. 1 M glucose solution
2. 1 M sodium nitrate solution
3. 1 M barium chloride solution
4. 1 M aluminium chloride solution

68. Identify Z in the following sequence

$$CH_3CH_2I \xrightarrow{KCN} X \xrightarrow{H_3O^+/H_2O} Y \xrightarrow[\Delta]{H_3O^+/H_2O} Z$$

1. CH_3COCl
2. CH_3CONH_2
3. CH_3COOH
4. CH_3CH_2COOH

69. Treatment of aniline with bromine water produces
1. 2, 4, 6-tribromoaniline
2. a mixture of ortho and para bromoaniline
3. Bromobenzene
4. N-bromoaniline

70. Among the following, the least reactive aldehyde is
1. HCHO
2. C_6H_5CHO
3. CH_3CHO
4. C_2H_5CHO

71. Propanal on reaction with lithium aluminium hydride gives
1. 1-Propanol
2. 2-Propanol
3. Ethanol
4. Butanol

72. Nucleic acids are polymers of
1. nucleotides
2. nucleosides
3. nuclei of heavy metals
4. proteins

73. Which of the following enzymes helps in digestion of proteins ?
1. Invertase
2. Trypsin
3. Tyrosinase
4. Urease

74. $C_6H_5COCl \xrightarrow{NH_3} X \xrightarrow{P_2O_5} Y \xrightarrow[H_2]{Ni} Z$

The end product in the above sequence of reactions is
1. benzoic acid
2. aniline
3. benzyl amine
4. benzonitrile

75. Which of the following is least reactive to nitration ?
1. Benzene
2. Nitrobenzene
3. Chlorobenzene
4. Aniline