CET 2009

C

Code No.: 209101

Important : Please consult your Admit Card / Roll No. Slip before filling your Roll Number on the Test Booklet and Answer Sheet

Roll No. *In Figures* *In Words*

O.M.R. Answer Sheet Serial No.

Signature of the Candidate : _____

Paper : III

Subject : Chemistry

Time : 70 minutes **Number of Questions : 60** **Maximum Marks : 120**

DO NOT OPEN THE SEAL ON THE BOOKLET UNTIL ASKED TO DO SO

INSTRUCTIONS

1. Write your Roll No. on the Question Booklet and also on the OMR Answer Sheet in the space provided and nowhere else.
2. Enter the Subject and Code No. of Question Booklet on the OMR Answer Sheet. Darken the corresponding bubbles with **Black Ball Point / Black Gel pen.**
3. Do not make any identification mark on the Answer Sheet or Question Booklet.
4. To open the Question Booklet remove the paper seal (s) gently when asked to do so.
5. Please check that this Question Booklet contains **60** questions. In case of any discrepancy, inform the Assistant Superintendent within 10 minutes of the start of test.
6. Each question has four alternative answers (A, B, C, D) of which only one is correct. For each question, darken only one bubble (A or B or C or D), whichever you think is the correct answer, on the Answer Sheet with **Black Ball Point / Black Gel pen.**
7. If you do not want to answer a question, leave all the bubbles corresponding to that question blank in the Answer Sheet. No marks will be deducted in such cases.
8. Darken the bubbles in the OMR Answer Sheet according to the Serial No. of the questions given in the Question Booklet.
9. Negative marking will be adopted for evaluation i.e., 1/4th of the marks of the question will be deducted for each wrong answer. A wrong answer means incorrect answer or wrong filling of bubble.
10. For calculations, use of simple log tables is permitted. Borrowing of log tables and any other material is not allowed.
11. For rough work only the sheets marked "Rough Work" at the end of the Question Booklet be used.
12. The Answer Sheet is designed for **computer evaluation**. Therefore, if you do not follow the instructions given on the Answer Sheet, it may make evaluation by the computer difficult. **Any resultant loss to the candidate on the above account, i.e., not following the instructions completely, shall be of the candidate only.**
13. After the test, hand over the Question Booklet and the Answer Sheet to the Assistant Superintendent on duty.
14. In no case the Answer Sheet, the Question Booklet, or its part or any material copied/ noted from this Booklet is to be taken out of the examination hall. Any candidate found doing so would be expelled from the examination.
15. A candidate who creates disturbance of any kind or changes his/her seat or is found in possession of any paper possibly of any assistance or found giving or receiving assistance or found using any other unfair means during the examination will be expelled from the examination by the Centre Superintendent / Observer whose decision shall be final.
16. **Telecommunication equipment such as pager, cellular phone, wireless, scanner, etc., is not permitted inside the examination hall. Use of calculators is not allowed.**

1. Which of the following is an antibiotic ?

(A) Paracetamol (B) Aspirin

(C) Caffeine (D) Penicillin

2. Diazonium salt can be prepared by reacting nitrous acid with :

(A) Toluene (B) Phenol

(C) Aniline (D) Pyridine

3. Friedel-Craft's alkylation proceeds in the presence of :

(A) Lewis acid (B) Lewis base

(C) Peroxides (D) Sodium hydroxide

4. Oils and fats are esters formed from glycerol and :

(A) Sulphonic acids (B) Long chain aliphatic acids

(C) Aromatic acids (D) α-Amino acids

5. Acetaldehyde reacts with CH_3MgI to yield :

(A) Isopropyl alcohol (B) Ethanol

(C) Acetone (D) t-Butyl alcohol

6. The compound $CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_2-\underset{\displaystyle Br}{\underset{|}{CH}}-\overset{\displaystyle O}{\overset{\|}{C}}-CH_3$ has the IUPAC name as :

(A) 3-Bromo-5-methyl-2-hexanone (B) 3-Bromo-2-heptanone

(C) 4-Bromo-2-methyl-5-hexanone (D) 3-Bromo-4-isopropyl-2-butanone

7. Which is the correct statement ?

(A) Ethanol should boil at a temperature lower than that for ethane.

(B) Ethanol is less acidic than phenol

(C) Phenol is more acidic than acetic acid

(D) Ethyne is a non-linear molecule.

8. A carboxylic acid can be converted into the corresponding anhydride using :

(A) $SOCl_2$ (B) SO_2

(C) Conc. H_2SO_4 (D) P_2O_5

9. The first step in the chlorination of methane in the presence of U.V. light is :

(A) Heterolytic fission of chlorine molecule (B) C–H bond cleavage

(C) Homolytic fission of chlorine molecule (D) Formation of a carbocation

10. Which is not a true statement ?

(A) Starch is a polysaccharide

(B) Sucrose is a carbohydrate

(C) Fructose and glucose don't have the same molecular formula

(D) Glucose is a monosaccharide

11. The synthetic resin bakelite can be obtained by using the starting material :

(A) Formic acid (B) Acetic acid

(C) Formamide (D) Formaldehyde

12. Which of the following is not contributing to the environmental pollution ?

(A) Nitrogen (B) Carbon dioxide

(C) Sulphur dioxide (D) Chlorofluorohydrocarbons

13. Enzymes are biocatalysts belonging to a class of compounds known as :

(A) Alkaloids (B) Steroids

(C) Proteins (D) Polyesters

14. Aromatic sulphonic acids are important compounds for producing :

(A) Soaps (B) Rubber

(C) Nylons (D) Detergents

15. Which of the following is most basic ?

(A) $H_2N-\overset{\overset{O}{\|}}{C}-NH_2$ (B) $C_6H_5-NH_2$

(C) $C_2H_5-NH_2$ (D) $C_6H_5-\overset{\overset{O}{\|}}{C}-NH_2$

16. The compound which cannot undergo dehydrohalogenation is :

(A) Methyl bromide (B) n-Butyl Chloride

(C) Ethyl iodide (D) Isopropyl bromide

17. Acetanilide is obtained by a reaction of aniline with :

(A) Acetone (B) Acetamide

(C) Methyl chloride (D) Acetyl chloride

18. Which of the following does not undergo Cannizzaro reaction ?

(A) Acetaldehyde (B) Formaldehyde

(C) Trichloroacetaldehyde (D) Benzaldehyde

19. The number of sigma bonds and pi-bonds in $CH_3-CH=CH_2$ are respectively :

(A) 7, 1 (B) 8, 1

(C) 1, 8 (D) 2, 7

20. Which one is an electrophile ?

(A) $AlCl_3$ (B) $C_2H_5NH_2$

(C) $C\bar{N}$ (D) C_2H_5OH

21. The hybridized orbitals employed to explain the geometry of I_3^- are :

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

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

22. The planar geometry is exhibited by :

(A) ClO_4^- (B) CO_3^{2-}

(C) NI_3 (D) PF_5

23. The largest O–O bond length is expected in the species :

(A) O_2^{2+} (B) O_2^+

(C) O_2^- (D) O_2^{2-}

24. The values of n and m for the spectral lines to be observed in the visible region in the relationship $\bar{\upsilon} = R\left[\frac{1}{n^2} - \frac{1}{m^2}\right]$, correspond to :

(A) n = 1; m = 2, 3, 4.....
(B) n = 1; m = 3, 4, 5.....
(C) n = 2; m = 3, 4, 5.....
(D) n = 2; m = 4, 5, 6.....

25. The weakest base amongst the halide ions is :

(A) F^-
(B) Cl^-
(C) Br^-
(D) I^-

26. Li^+ ions would form the most thermally stable compound with the anion :

(A) CO_3^{2-}
(B) N_3^-
(C) ClO_4^-
(D) NO_3^-

27. The correct sequence representing first ionization energies (in ev) of IInd period elements is represented by :

(A) C < B
(B) Be < B
(C) O < N
(D) N < C

28. The carbide ion [C_3^{4-}], present in Mg_2C_3 is isoelectronic with :

(A) C_2N_2
(B) CO_2
(C) C_2^{2-}
(D) CN^-

29. An element whose hydride when reacted with water would produce H_2 gas is :

(A) CsH
(B) BeH_2
(C) AlH_3
(D) SiH_4

30. The number of ione pairs on oxygen in the complex $Et_2O.BF_3$:

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

31. Which element representing the following configuration will have the highest electron affinity ?

(A) [Ne] $3s^2\ 3p^3$
(B) [Ne] $3s^2\ 3p^4$
(C) [Ne] $3s^2\ 3p^5$
(D) [Ne] $3s^1$

32. Which of the following electronic configurations will represent an orbital of highest energy ?

(A) n = 3; l = 2; m = +1
(B) n = 4; l = 0; m = 0
(C) n = 3; l = 1; m = +1
(D) n = 4; l = 1; m = +1

33. The number of nodal planes in the angular wave function of p_x and d_{xy} orbitals respectively are :

(A) 0, 1
(B) 0, 2
(C) 1, 2
(D) 1, 1

34. When O_2 is ionized to form O_2^+, the electron removed from the M.O. is :

(A) σ^b
(B) π^b
(C) π^*
(D) σ^*

35. What is the oxidation number of S in $H\bar{S}$?

(A) –2
(B) –1
(C) +1
(D) +2

36. Which of the following alkali metal hydroxides is the strongest base ?

(A) LiOH (B) NaOH

(C) KOH (D) CsOH

37. The arrangement representing the correct sequence of increasing ionic size is :

(A) $N_3^- < O^{2-} < F^-$ (B) $F^- < O^{2-} < N_3^-$

(C) $O^{2-} < F^- < N_3^-$ (D) $F^- < N_3^- < O^{2-}$

38. An aqueous solution of borax is :

(A) highly acidic (B) highly basic

(C) mildly acidic (D) mildly basic

39. The highest electronegativity is shown by :

(A) Carbon atom in its ground state configuration

(B) Carbon atom in sp^3 hybridized state

(C) Carbon atom in sp^2 hybridized state

(D) Carbon atom in sp hybridized state

40. Amongst the following, the complex ion with maximum number of unpaired electrons is : [At No. of Mn = 25, Co = 27, Ni = 28, Cu = 29 :

(A) $MnCl_4^{2-}$ (B) $CoCl_4^{2-}$

(C) $NiCl_4^{2-}$ (D) $CuCl_4^{2-}$

41. How many moles of air are in the lungs of an average adult with a lung capacity of 3.8L ? Assume that the person is at 1.00 atm pressure and has a normal body temperature of 37°C.

(A) 0.15 mol (B) 1.5 mol

(C) 15 mol (D) 150 mol

42. The rate of diffusion of a gas is :

(A) directly proportional to its density

(B) directly proportional to its molecular weight

(C) directly proportional to square root of its molecular weight

(D) inversely proportional to square root of its molecular weight.

43. Which of the following statements about the First law of thermodynamics written as $\Delta U = q + w$ for a closed system, is not correct ?

(A) ΔU of a process is independent of the path of a process

(B) q + w is not independent of the path of a process

(C) q is not independent of the path of a process

(D) w is not independent of the path of a process.

44. The enthalpy of solution of $BaCl_2.2H_2O$) is 2.1 kcal and the enthalpy of hydration of $BaCl_2$ (anhydrous) is –7.03 kcal. What is the enthalpy of solution of anhydrous $BaCl_2$?

(A) – 4.93 kcal (B) +9.13 kcal

(C) + 4.93 kcal (D) –9.13 kcal

45. For a reaction to occur spontaneously at a given temperature and pressure :

(A) $\Delta H > 0$ and $\Delta S < 0$ (B) $\Delta H < T\ \Delta S$

(C) $\Delta S < 0$ (D) $\Delta S > 0$

46. The solubility of CaF_2 (mol. wt 80) is 80 mg per litre. Its solubility product value will be :

(A) 1×10^{-9} (B) 2×10^{-9}

(C) 3×10^{-9} (D) 4×10^{-9}

47. Two moles of NH_3 gas are introduced into a previously evacuated 1.0 litre container in which it undergoes dissociation at high temperature

$$2NH_3(g) = N_2(g) + 3H_2(g)$$

At equilibrium 1.0 mole of $NH_3(g)$ is left. The value of equilibrium constant, K_c, is :

(A) 0.75 $mole^2\ litre^{-2}$ (B) 1.00 $mole^2\ litre^{-2}$

(C) 1.50 $mole^2\ litre^{-2}$ (D) 1.70 $mole^2\ litre^{-2}$

48. For the forward reaction in the equation $H_2(g) + F_2(g) = 2HF(g)$, $\Delta H = -536$ kJ/mol H_2 and the energy of activation = 208 kJ/mol H_2. Which of the following conclusions about the reaction is not correct ?

(A) The heat of formation of HF is –268 kJ mol^{-1}

(B) The activation energy for the reverse reactions is 372 kJ per mole of hydrogen fluoride.

(C) At equilibrium, decrease in temperature increases the percentage yield of HF

(D) At equilibrium, an increase in temperature increases the percentage yield of HF

49. The Miller indices of the crystal plane which cut through the crystal axes at (2a, 3b, c) are :

(A) 321 (B) 231

(C) 123 (D) 326

50. Which of the four collegative properties is most often used for molecular mass determination ?

(A) Elevation in boiling point (B) Depression in freezing point

(C) Osmotic pressure (D) None of these

51. The molal depression constant for water is 1.86/mole kg^{-1}. The freezing point of a solution which has 0.05 mole of urea dissolved in 250g of water is :

(A) – 0.372ºC (B) – 0.093ºC

(C) – 0.0372ºC (D) + 0.0372ºC

52. The specific conductance of 0.01 molar acetic acid solution at 300 K is $14.5\times10^{-5}\ \Omega^{-1}cm^{-1}$ and the limiting molar conductance of acetic acid at the same temperature is 290 $\Omega^{-1}cm^2\ mol^{-1}$. The degree of dissociation of acetic acid is :

(A) 5×10^{-1} (B) 5×10^{-2}

(C) 5×10^{-3} (D) 5×10^{-7}

53. Assume that the following reaction occurs in an electrochemical cell $Cd(S) + Cu^{2+} = Cd^{2+} + Cu(S)$. The standard electromotive ε^o for this cell at 25ºC is 0.7416 V. The ΔG^o for the cell reaction at 25ºC will be :

(A) –143.11 $kJmol^{-1}$ (B) +143.11 $kJmol^{-1}$

(C) 1.431 $kJmol^{-1}$ (D) –1.431 $kJmol^{-1}$

54. The ε for the following cell at 25°C, assuming ideal solutions $Zn|Zn^{++}{}_{(ZnSO_4)}(10^{-5}M)||Zn^{++}{}_{(ZnSO_4)}(10^{-4}M)|Zn$ will be :

(A) + 0.059 (B) –0.059

(C) + 0.0296 (D) –0.0296

55. Which of the following statements concerning activation energy is TRUE ?

(A) The activation energy of a forward reaction can never be smaller than that of a backward reaction.

(B) The reaction is fast if the activation energy of a reaction is small.

(C) Reaction rates increase with temperature because the activation energy decreases at high temperature.

(D) The uncatalysed reaction generally has a lower activation energy than the catalysed reaction.

56. Which one of the following statement for order of reaction is not correct ?

(A) Order of the reaction can be determined experimentally

(B) Order of reaction is equal to sum of the powers of concentration terms in differential rate law

(C) It is not affected with the stoichiometric coefficient of the reactants.

(D) Order of the reaction cannot be fractional.

57. The reaction $2NO(g) + 2H_2(g) \rightarrow N_2(g) + 2H_2O(g)$ is first order in H_2 and second order in NO. The rate law is :

(A) Rate = $k[NO]^2[H_2]$ (B) Rate = $k[NO][H_2]$

(C) Rate = $k[NO][H_2]^2$ (D) Rate = $k[NO]^{1/2}[H_2]$

58. Lyophilic sols are :

(A) Irreversible sols (B) They are prepared from inorganic compounds

(C) Coagulated by adding electrolytes (D) Self-stabilizing

59. Emulsion are colloidal systems consisting of two immiscible liquids and stabilized by substance known as emulsifier or emulsifying agent. The function of emulsifier is :

(A) to increase the rate of reaction

(B) to increase the surface tension between water and oil

(C) to act as a catalyst

(D) to lower the interfacial tension between oil and water.

60. For a solution, Freundlich adsorption isotherm is represented as :

(A) $\frac{x}{m} = KC^{1/n}$ (B) $\frac{m}{x} = KC^{1/n}$

(C) $\frac{x}{m} = KC^{n}$ (D) $\frac{m}{x} = KC^{n}$

where x is the weight of gas adsorbed by m gms of adsorbent at an equilibrium conc. of solute C. K and n are characteristic constants.

ROUGH WORK

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