COMMON ENTRANCE TEST - 2011

Question Booklet CHEMISTRY

Roll No.

(Enter your Roll Number in the above space)

Booklet No.

Series **A** 210381

Time Allowed : 1.30 Hours   **Max. Marks : 75**

SEAL

INSTRUCTIONS :

1.   Use only BLACK or BLUE Ball Pen.

2.   All questions are COMPULSORY.

3.   Check the BOOKLET thoroughly.

     IN CASE OF ANY DEFECT – MISPRINTS, MISSING QUESTION/S OR DUPLICATION OF QUESTION/S, <u>GET THE BOOKLET CHANGED WITH THE BOOKLET OF THE SAME SERIES</u>. NO COMPLAINT SHALL BE ENTERTAINED AFTER THE ENTRANCE TEST.

4.   Before you mark the answer, fill in the particulars in the ANSWER SHEET carefully and correctly. Incomplete and incorrect particulars may result in the non-evaluation of your answer sheet by the technology.

5.   Write the SERIES and BOOKLET NO. given at the TOP RIGHT HAND SIDE of the question booklet in the space provided in the answer sheet by darkening the corresponding circles.

6.   Do not use any **eraser, fluid pens, blades** etc., otherwise your answer sheet is likely to be rejected whenever detected.

7.   After completing the test, candidates are advised to hand over the OMR ANSWER SHEET to the Invigilator and take the candidate's copy with yourself.

1. When 6.3 g of sodium bicarbonate are added to 30.0 g of acetic acid solution, the residual solution is found to weigh 33.0 g. The mass of carbon dioxide released in the reaction is :

   (1) 3.0 g   (2) 0.91 g   (3) 1.91 g   (4) 3.3 g

2. The de Broglie wavelength of a ball of mass 10 g moving with a velocity of 10 ms^{-1} is [h = 6.626×10^{-34}Js] :

   (1) 6.626×10^{-33} m   (2) 6.626×10^{-29} m

   (3) 6.626×10^{-31} m   (4) 6.626×10^{-36} m

3. Two oxides of a metal contain 36.4% and 53.4% of oxygen by mass respectively. If the formula of the first oxide is M_2O, then that of the second is :

   (1) M_2O_3 (2) MO   (3) MO_2 (4) M_2O_5

4. The electrons identified by quantum numbers n and l, (i) $n = 4, l = 1$ (ii) $n = 4, l = 0$ (iii) $n = 3, l = 2$ and (iv) $n = 3, l = 1$ can be placed in order of increasing energy as :

   (1) (i) < (ii) < (iii) < (iv)   (2) (iv) < (iii) < (ii) < (i)

   (3) (iv) < (ii) < (iii) < (i)   (4) (iv) < (i) < (ii) < (iii)

5. In a volumetric experiment, it was found that a solution of $KMnO_4$ is reduced to $MnSO_4$. If the normality of the solution is 1.0 N, then the molarity of the solution will be :

   (1) 0.5 M   (2) 0.2 M   (3) 1.0 M   (4) 0.4 M

6. A radioactive element $^{238}M_{92}$ emits one alpha particle followed by two beta particles. Then the daughter element formed is :

   (1) an isotope   (2) an isobar   (3) an isotone   (4) an isodiapher

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7. One gram atom of a radioactive isotope ($t_{1/2}$ = 10 hours) that emits alpha particle was placed in a sealed container. The time taken for 0.875 g atom of helium to accumulate in the container is :

(1) 10 hours   (2) 20 hours   (3) 30 hours   (4) 40 hours

8. The equilibrium constant value K_p for the equilibrium $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$ changes with

(1) total pressure   (2) temperature

(3) catalyst   (4) the amounts of H_2 and I_2 present

9. In which one of the following reactions, the yield of the products decreases by increasing the pressure?

(1) $2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g)$ (2) $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$

(3) $PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$ (4) $N_2(g) + O_2(g) \rightleftharpoons 2NO(g)$

10. Among the following, the one which can act as both Bronsted acid as well as Bronsted base is :

(1) H_3PO_4 (2) $AlCl_3$ (3) CH_3COO^- (4) H_2O

11. The pH of the solution formed by mixing 20 mL of 0.05 M H_2SO_4 with 5.0 mL of 0.45 M NaOH at 298 K is :

(1) 6   (2) 2   (3) 12   (4) 7

12. The reaction $A + B \rightarrow C + D + 40$ kJ has an activation energy of 18 kJ. Then the activation energy for the reaction $C + D \rightarrow A + B$ is :

(1) 58 kJ   (2) –40 kJ   (3) –18 kJ   (4) 22 kJ

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13. The unit of rate constant for a zero order reaction is :

 (1) s^{-1} (2) $mol\ Ls^{-1}$ (3) $mol\ L^{-1}s^{-1}$ (4) no unit

14. In a reaction $2A + B \rightarrow A_2B$, the reactant B will disappear at :

 (1) half the rate as A will decrease   (2) the same rate as A will decrease

 (3) twice the rate as A will decrease   (4) half the rate as A_2B will form

15. When a solution containing non-volatile solute is diluted with water :

 (1) its osmotic pressure increases   (2) its boiling point increases

 (3) its freezing point decreases   (4) its vapour pressure increases

16. Which one of the following liquid pairs will exhibit a positive deviation from Raoult's law?

 (1) n-hexane and n-heptane   (2) ethanol and chloroform

 (3) phenol and aniline   (4) chloroform and acetone

17. What happens when blood cells are placed in pure water?

 (1) the fluid in blood cells rapidly moves into water

 (2) the water molecules rapidly move into blood cells

 (3) the blood cells dissolve in water

 (4) no change takes place

18. The Van't Hoff factor 'i' for a dilute aqueous solution of sucrose is :

 (1) zero   (2) 1.0   (3) 1.5   (4) 2.0

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19. Which one among the following pairs does not represent example for intensive property?

(1) temperature and density

(2) pressure and molar volume

(3) molar heat capacity and density

(4) heat capacity and enthalpy

20. Pick out the wrong statement :

(1) The standard free energy of formation of elements is zero

(2) A process that leads to increase in free energy will be spontaneous

(3) A process accompanied by decrease in entropy will be non-spontaneous under normal conditions

(4) Enthalpy of combustion is always negative

21. The values of ΔH and ΔS for a reaction are respectively 30 kJ mol^{-1} and 100 JK^{-1} mol^{-1}. Then the temperature above which the reaction will become spontaneous is :

(1) 300 K   (2) 30 K   (3) 100 K   (4) 300° C

22. The standard enthalpy of formation of $C_2H_4(g)$, CO_2 (g) and $H_2O(l)$ are 52, −394 and −286 kJ mol^{-1} respectively. Then the amount of heat evolved by burning 7g of $C_2H_4(g)$ is :

(1) 1412 kJ   (2) 9884 kJ   (3) 353 kJ   (4) 706 kJ

23. Three Faradays of electricity are passed through molten Al_2O_3, aqueous solution of $CuSO_4$ and molten NaCl taken in three different electrolytic cells. Then the mole ratio of Al, Cu and Na deposited on the cathode will be :

(1) 3 : 4 : 6   (2) 2 : 1 : 6   (3) 3 : 2 : 1   (4) 2 : 3 : 6

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24. In which of the following compounds, carbon exhibits a valency of 4 but oxidation state -2?

    (1) CH_3Cl (2) $CHCl_3$ (3) CH_2Cl_2 (4) HCHO

25. A cell is constituted by coupling the two electrode Sn/Sn^{2+} and Cu/Cu^{2+} :

    If $E°$ (Sn^{2+}, Sn), $E°$ (Cu^{2+}, Cu) and $E°$ (cell) are -0.14 V, 0.34 V and 0.48 V respectively, the correct representation of the cell is :

    (1) $Sn(s) | Sn^{2+} (0.1\,M) \| Cu^{2+} (1.0\,M) | Cu(s)$

    (2) $Sn(s) | Sn^{2+} (1.0\,M) \| Cu^{+} (1.0\,M) | Cu(s)$

    (3) $Sn(s) | Sn^{2+} (1.0\,M) \| Cu^{2+} (1.0\,M) | Cu(s)$

    (4) $Cu(s) | cu^{2+} (1.0\,M) \| Sn^{2+} (1.0\,M) | Sn(s)$

26. Which one of the following is correct?

    (1) Equivalent conductance decreases with dilution

    (2) Specific conductance increases with dilution

    (3) Specific conductance decreases with dilution

    (4) Equivalent conductance increases with increasing concentration

27. Chemically unreactive three different gases A, B and C of molecular masses 16, 32 and 64 are enclosed in a vessel at constant temperature till equilibrium is reached. Which of the following statements is true?

    (1) Gas A will be at the top of the vessel

    (2) Gas C will be at the top of the vessel

    (3) Gas C will be at the bottom of the vessel

    (4) Gases will form homogeneous mixture

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28. Which of the following pair of gases will diffuse at the same rate through a porous plug?

(1) CO, NO_2 (2) NO, C_2H_6 (3) NO_2, CO_2 (4) NH_3, PH_3

29. In zinc blende structure, the coordination number of the cation is :

(1) 4 (2) 6 (3) 8 (4) 12

30. Freundlich adsorption isotherm equation is :

(1) $\log m/x = \log K + 1/n \log p$ (2) $\log x/m = \log K + n \log p$

(3) $\log m/x = \log K + n \log p$ (4) $\log x/m = \log K + 1/n \log p$

31. The best coagulant for the precipitation of $Fe(OH)_3$ is :

(1) Na_2HPO_3 (2) $NaNO_3$ (3) Na_3PO_4 (4) Na_2SO_4

32. Which one of the following is a copolymer formed by condensation polymerization?

(1) Terylene (2) BuNa-S (3) BuNa-N (4) Neoprene

33. The second ionization energies of Li, Be, B and C are in the order :

(1) Li > C > B > Be (2) Li > B > C > Be

(3) B > C > Be > Li (4) Be > C > B > Li

34. Which of the following is the largest in size?

(1) Cl^- (2) S^{2-} (3) Na^+ (4) F^-

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35. The hybridization involved in PCl_5 is :

    (1) sp^3d (2) sp^3d^2 (3) d^2sp^2 (4) sp^3

36. Among the following which one is a linear molecule having zero dipole moment?
    (1) H_2O (2) HCl (3) CO_2 (4) H_2S

37. In which of the following molecules, the central atom has two lone pairs of electrons?
    (1) SF_4 (2) BrF_5 (3) SO_2 (4) XeF_4

38. The bond order of C_2 molecule is :
    (1) 1   (2) 2   (3) 0   (4) 3

39. The correct order of reducing character of alkali metals is :
    (1) $Rb < K < Na < Li$ (2) $Li < Na < K < Rb$
    (3) $Na < K < Rb < Li$ (4) $Rb < Na < K < Li$

40. Among the following, the compound that is readily soluble in water is :
    (1) $BeSO_4$ (2) $CaSO_4$ (3) $SrSO_4$ (4) $BaSO_4$

41. The paramagnetic oxides of nitrogen are :
    (1) dinitrogen monoxide and nitrogen monoxide
    (2) nitrogen monoxide and nitrogen dioxide
    (3) nitrogen dioxide and dinitrogen trioxide
    (4) dinitrogen trioxide and dinitrogen tetroxide

42. The oxyacid of sulphur that contains a lone pair of electrons on sulphur is :
    (1) Sulphurous acid   (2) Sulphuric acid
    (3) Peroxodisulphuric acid   (4) Pyrosulphuric acid

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43. The alloy of copper that contains zinc is :

    (1) Monel metal (2) Bronze   (3) Bell metal   (4) Brass

44. The lanthanide element that has the electronic configuration, $[Xe]\ 4f^7\ 5d^1\ 6s^2$ is :

    (1) Lutetium   (2) Terbium   (3) Ytterbium   (4) Gadolinium

45. All Cu (II) halides are known except the iodide. The reason for is that :
    (1) iodide is a bulky ion
    (2) Cu^{2+} oxidizes iodide to iodine
    (3) Cu^{2+} (aq) has much more negative hydration enthalpy
    (4) Cu^{2+} ion has smaller size

46. The transition metal ion that has 'spin-only' magnetic moment value of 5.96 is :

    (1) Mn^{2+} (2) Fe^{2+} (3) V^{2+} (4) Cu^{2+}

47. Among the following the ambidentate ligand is :

    (1) $H_2NCH_2CH_2NH_2$ (2) CO_3^{2-}

    (3) NO_2^- (4) $C_2O_4^{2-}$

48. Square planar complexes of the type MABXL (where A, B, X and L are unidentates) show :

    (1) two cis and one trans isomer   (2) two trans and one cis isomer

    (3) two cis and two trans isomer   (4) one cis and one trans isomer

49. Among the following, which one is paramagnetic and has tetrahedral geometry?
    (1) $[Ni\,(CN)_4]^{2-}$ (2) $[NiCl_4]^{2-}$ (3) $[Ni(CO)_4]$ (4) $[CoCl_2\,(en)_2]^+$

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50. Zeise's salt is :

(1) $[Fe (C_5H_5)_2]$ (2) $[Pb(C_2H_5)_4]$ (3) $K [PtCl_3(C_2H_4)]$ (4) $[Ni(CO)_4]$

51. The formula of siderite is :

(1) Fe_2O_3 (2) Fe_3O_4 (3) FeS_2 (4) $FeCO_3$

52. The metal used to recover copper from a solution of copper sulphate is :

(1) Na   (2) Fe   (3) Hg   (4) Ag

53. When 'blue vitriol' is heated at 373 K, the product formed is :

(1) $CuSO_4.3H_2O$ (2) $CuO + SO_3$ (3) $CuSO_4.H_2O$ (4) $CuSO_4$

54. Which of the following is a correct name according to IUPAC rules?

(1) 2, 3-Diethylhexane   (2) 3-Ethyl-2-methylpentane

(3) 3, 4-Dimethylpentane   (4) 2-Ethyl-2-methylpentane

55. An alkane with a molecular formula C_6H_{14} reacts with chlorine in the presence of light and heat to give two constitutionally isomeric monochlorides of molecular formula $C_6H_{13}Cl$. What is the most reasonable starting alkane?

(1) n-Hexane   (2) 2,2-Dimethylbutane

(3) 2,3-Dimethylbutane   (4) 3-Methylpentane

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56. Which of the following statements are correct with respect to the effect of trifluoromethyl group (–CF₃), on an electrophilic aromatic substitution?

(a) The CF₃ group will deactivate the ring

(b) The CF₃ group will activate the ring

(c) The CF₃ group will be an ortho, para director

(d) The CF₃ group will be a meta director

(1) (a) and (d)   (2) (a) and (b)   (3) (b) and (c)   (4) (a) and (c)

57. Which one of the following is not aromatic?

(1) Cyclopentadienyl anion   (2) Cycloheptatrienyl cation

(3) Cyclooctatetraene   (4) Thiophene

58. Which of the following compound is chiral?

(1) 3-pentanol   (2) 1-pentanol

(3) 3-methyl-1-butanol   (4) 3-methyl-2-butanol

59. The separation of racemic mixture into the pure enantiomers is termed as :

(1) Racemisation   (2) Resolution

(3) Equilibration   (4) Isomerisation

60. Which one among the following is most reactive towards electrophilic substitution reaction?

(1) Aniline   (2) Nitrobenzene (3) Benzoic acid   (4) Acetanilide

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61. Which of the following is most acidic?

    (1) Methane   (2) Ethane   (3) Ethyne   (4) Ethene

62. Chloroform on heating with silver powder gives :

    (1) Ethene   (2) Ethyne   (3) Methane   (4) Ethane

63. 1-chlorobutane on reaction with alcoholic potash gives :

    (1) 1-butanol   (2) 2-butene   (3) 1-butene   (4) 2-butanol

64. The decreasing order of acidity among the compounds, ethanol (I) 2, 2, 2-trifluoroethanol (II), trifluroacetic acid (III) and acetic acid (IV) is :

    (1) III > II > IV > I   (2) IV > III > II > I

    (3) I > II > III > IV   (4) III > IV > II > I

65. Phenol on heating with alcoholic KOH and chloroform undergoes :

    (1) Reimer Tiemann reaction   (2) Kolbe reaction

    (3) Gattermann reaction   (4) Cannizzaro reaction

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66. Which of the esters shown, after reduction with $LiAlH_4$ and aqueous workup, will yield two molecules of only a single alcohol?

(1) $C_6H_5COOC_6H_5$

(2) $CH_3CH_2COOCH_2CH_3$

(3) $C_6H_5COOCH_2C_6H_5$

(4) CH_3COOCH_3

67. What are the products of the following reaction?

$$C_6H_5OCH_2CH_2OH \xrightarrow[\text{Heat}]{\text{excess HBr}} ?$$
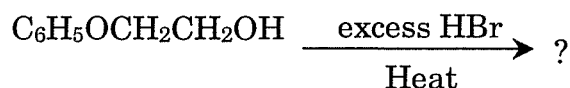
(1) $C_6H_5OH + BrCH_2CH_2Br$

(2) $C_6H_5OH + HOCH_2CH_2OH$

(3) $C_6H_5Br + HOCH_2CH_2OH$

(4) $C_6H_5OH + BrCH_2CH_2OH$

68. Ethyl methyl ketone on treatment with a solution of sodium hypochlorite gives chloroform and :

(1) Sodium ethanoate

(2) Sodium propanoate

(3) Sodium methanoate

(4) Sodium ethoxide

69. The compound that gives both iodoform and Fehling's tests is :

(1) Ethanol   (2) Propanone   (3) 2-Butanol   (4) Ethanal

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70. Mendius reaction converts an alkyl cyanide to :

(1) a primary amine   (2) an aldehyde

(3) a ketone   (4) an oxime

71. Which one of the following is a secondary amine?

(1) 2-Butanamine   (2) N-Methylpiperidine

(3) N-Methyl-2-pentanamine   (4) p-Anisidine

72. Which one of the following amines cannot be prepared by Gabriel's synthesis?

(1) Butylamine   (2) Isobutylamine

(3) 2-Phenylethylamine   (4) N-Methylbenzylamine

73. The weakest base among the following is :

(1) Dimethylamine   (2) Aniline

(3) Methylamine   (4) Ethylamine

74. Which one of the following is not an aldose?

(1) Glucose   (2) Ribose   (3) Fructose   (4) Mannose

75. Which one of the following is not a greenhouse gas?

(1) Methane   (2) Ozone   (3) Carbon dioxide   (4) Nitrogen

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