

BOOKLET CODE

Invigilator's Signature

ENTRANCE EXAMINATION – 2014
M. Sc. Chemistry

TIME: 2 HOURS

MAXIMUM MARKS: 100

HALL TICKET NUMBER:

BOOKLET CODE:

INSTRUCTIONS

1. Write your **HALL TICKET NUMBER** and the **BOOKLET CODE** in the space provided above and also on the **OMR ANSWER SHEET** given to you.
2. Make sure that pages numbered from 1 - 20 are present (excluding ⁴ pages assigned for rough work).
3. There are 100 questions in this paper. All questions carry equal marks.
4. **There is negative marking. Each wrong answer carries -0.33 mark.**
5. Answers are to be marked on the OMR answer sheet following the instructions provided on it.
6. Hand over the OMR answer sheet at the end of the examination to the Invigilator.
7. In case of a tie, the marks obtained in the first 25 questions (**PART A**) will be used to determine the order of merit.
8. No additional sheets will be provided. Rough work can be done in the space provided at the end of the booklet.
9. Calculators are allowed. Cell Phones are not allowed.
10. Useful constants are at the beginning, before PART A in the question paper.
11. Candidate should write and darken the correct Booklet Code in the OMR Answer Sheet, without which such OMR cannot be evaluated. The defaulting candidates in marking the Booklet Code in the OMR shall not have any claim on their examination and University shall not be held responsible.

Useful Constants:

Rydberg constant = 109737 cm^{-1} ; Faraday constant = 96500 C ; Planck constant = $6.625 \times 10^{-34} \text{ J s}$;
 Speed of light = $2.998 \times 10^8 \text{ m s}^{-1}$; Boltzmann constant = $1.380 \times 10^{-23} \text{ J K}^{-1}$; Gas constant = $8.314 \text{ J K}^{-1} \text{ mol}^{-1}$;
 Mass of electron = $9.109 \times 10^{-31} \text{ kg}$; Mass of proton = $1.672 \times 10^{-27} \text{ kg}$; Charge of electron = $1.6 \times 10^{-19} \text{ C}$;
 $1 \text{ D} = 3.336 \times 10^{-30} \text{ Cm}$; $1 \text{ bar} = 10^5 \text{ N m}^{-2}$; RT/F (at 298.15 K) = 0.0257 V .

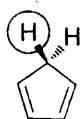
PART - A

- The Perovskite structure has the formula $A^{II}B^{IV}O_3$. The A cations form a primitive cubic close packing with the oxide ions occupying the centres of the faces and B cations at the body centre. The total number of ions of A, B and O in the unit cell are, respectively,
 (A) 1, 1 and 3 (B) 2, 2 and 6 (C) 2, 1 and 3 (D) 1, 2 and 3
- The effective nuclear charge for the outermost electron in chlorine ($Z = 17$) according to Slater's rules is
 (A) 7.2 (B) 17 (C) zero (D) 6.1
- The de Broglie wavelength of an α particle of mass $6.68 \times 10^{-27} \text{ kg}$ ejected from radium at a speed of $1.5 \times 10^7 \text{ ms}^{-1}$ is
 (A) $9.6 \times 10^{-3} \text{ pm}$ (B) $5.6 \times 10^{-3} \text{ pm}$ (C) $4.6 \times 10^{-3} \text{ pm}$ (D) $6.6 \times 10^{-3} \text{ pm}$
- 1.0 g of steam at 100°C and 4 g of ice at 0°C are mixed in a thermally insulated container. The final temperature of the mixture is close to (latent heat of fusion and vapourization of water are 336 and 2268 J/g, respectively)
 (A) 100°C (B) 0°C (C) 32°C (D) 64°C
- Identify the most appropriate reagent for the conversion of acetophenone into ethylbenzene
 (A) LiAlH_4 (B) $\text{BH}_3 \cdot \text{SMe}_3$ (C) Zn(Hg)/HCl (D) LiBH_4

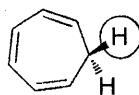
6. Hydrazoic acid is extensively used in
- (A) Beckmann rearrangement (B) Schmidt rearrangement
(C) Curtius rearrangement (D) Hoffmann rearrangement
7. Kinetic energy of the electrons emitted when violet light of wavelength 4000 \AA falls on potassium (work function 2.2 eV) is approximately
- (A) 0.9 eV (B) 90 eV (C) 9.0 eV (D) 900 eV
8. A box contains 5 red, 4 blue and 5 green balls. If three balls are drawn at random, the probability that all three are green is
- (A) 2.75×10^{-2} (B) 5.75×10^{-4} (C) 7.25×10^{-4} (D) 5.27×10^{-4}
9. A reducing sugar among the following is
- (A) sucrose (B) trehalose
(C) lactose (D) methyl α -D-glucopyranoside
10. The species among NO_2^- , $[\text{PtCl}_4]^{2-}$, ClF_3 and PF_5 for which VSEPR theory does not predict the correct geometry is
- (A) NO_2^- (B) $[\text{PtCl}_4]^{2-}$ (C) ClF_3 (D) PF_5
11. Increase in the boiling point of Xe relative to Ne is mostly a result of
- (A) increase in instantaneous dipole-induced dipole interactions.
(B) increase in dipole-induced dipole interactions.
(C) increase in dipole-dipole interactions.
(D) increase in induced dipole-induced dipole interactions.

12. 100 g of benzene is mixed with 100 g of toluene at 20 °C and 1 atm., assuming ideal behavior the entropy of mixing is
(A) 5.0 cal/K (B) 5.76 cal/K (C) 7.65 cal/K (D) 3.24 cal/K
13. Which of the following statements is always true for a reaction in which there is only expansion work?
(A) $\Delta U = q_p$ (B) $\Delta H = q_p$ (C) $\Delta U = 0$ (D) $\Delta H = 0$
14. In Kiliani-Fischer synthesis of monosaccharides, the products are generally
(A) enantiomers (B) diastereomers (C) mesomers (D) racemic
15. 1,2-Dibromoethane on reaction with alcoholic KOH followed by treatment with NaNH_2 gives
(A) $\text{HC}\equiv\text{CH}$ (B) CH_3CHO (C) $\text{BrCH}_2\text{CH}_2\text{OH}$ (D) $\text{HOCH}_2\text{CH}_2\text{OH}$
16. The angle between the vectors $\mathbf{A} = 2\mathbf{i} + 3\mathbf{j} + 7\mathbf{k}$ and $\mathbf{B} = 7\mathbf{i} + 2\mathbf{j} + 3\mathbf{k}$ is
(A) 60° (B) 60.48° (C) 48.60° (D) 84.60°
17. $\lim_{x \rightarrow \infty} x^3 e^{-x} =$
(A) $+\infty$ (B) 0 (C) $-\infty$ (D) 3
18. In an atom, how many electrons can have quantum numbers $n = 3$, $m_l = 0$, $m_s = \frac{1}{2}$?
(A) 1 (B) 3 (C) 4 (D) 6

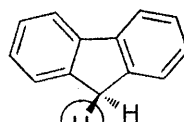
19. Reaction of Cu metal with conc. HNO_3 will produce $\text{Cu}(\text{NO}_3)_2$ and
 (A) H_2 (B) N_2 and H_2O (C) H_2 and NO_2 (D) NO_2 and H_2O
20. Which of the following changes with time for a first order reaction?
 (i) rate of reaction, (ii) rate constant, (iii) half-life, (iv) concentration of reactant
 (A) (i) and (iii) only (B) (iii) only
 (C) (i) and (ii) only (D) (i) and (iv) only
21. van der Waals constant 'b' for a certain gas is 4.42×10^{-2} litre / mole. How near can the centres of two molecules approach each other?
 (A) 4.272 \AA (B) 2.535 \AA (C) 1.636 \AA (D) 3.272 \AA
22. The most appropriate reagent used for the differentiation of 2-pentanone and 3-pentanone is
 (A) $\text{K}_2\text{Cr}_2\text{O}_7/\text{H}_2\text{SO}_4$ (B) $\text{Zn-Hg}/\text{HCl}$ (C) MnO_2 (D) I_2/NaOH
23. Arrange the following compounds in the increasing order of the acidity of circled hydrogens



(I)



(II)



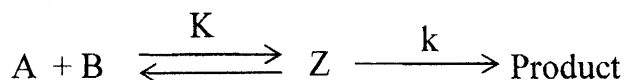
(III)

- (A) $\text{III} < \text{II} < \text{I}$ (B) $\text{II} < \text{I} < \text{III}$ (C) $\text{I} < \text{II} < \text{III}$ (D) $\text{II} < \text{III} < \text{I}$

24. $\int_0^{\infty} x e^{-x^2} dx =$
- (A) 0 (B) 2 (C) 1/2 (D) 1
25. Angle between the lines $y = x + 3$ and $\sqrt{3}y = x + 3$ is
- (A) 0° (B) 15° (C) 30° (D) 45°

PART - B

26. Magnetic measurements indicate that $[\text{Co}(\text{OH}_2)_6]^{2+}$ has three unpaired electrons. Therefore the hybridization of the metal orbitals in $[\text{Co}(\text{OH}_2)_6]^{2+}$ is
- (A) sp^3d (B) dsp^3 (C) sp^3d^2 (D) d^2sp^3
27. Consider the violet colored complex, $[\text{Cr}(\text{OH}_2)_6]\text{Cl}_3$ and the yellow colored complex, $[\text{Cr}(\text{NH}_3)_6]\text{Cl}_3$. Which of the following statements is false?
- (A) The two complexes absorb their complementary colors.
- (B) Δ_{oct} values for $[\text{Cr}(\text{OH}_2)_6]^{3+}$ and $[\text{Cr}(\text{NH}_3)_6]^{3+}$ are calculated directly from the energies of the violet light and the yellow light, respectively.
- (C) Δ_{oct} values for $[\text{Cr}(\text{OH}_2)_6]^{3+}$ is less than Δ_{oct} values for $[\text{Cr}(\text{NH}_3)_6]^{3+}$.
- (D) both complexes are paramagnetic and each metal ion has three unpaired electrons.
28. Consider the following reaction scheme involving an equilibrium followed by a rate determining step. The apparent rate constant for the formation of the product is given by

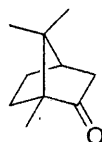


- (A) K (B) k/K (C) kK (D) $k+K$

29. Which of the following is **not true** about the critical point (P_c , T_c) in the P-V diagram?

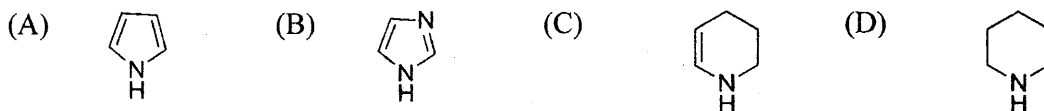
- (A) Gas, liquid and solid states exist in equilibrium at the critical point.
- (B) Density of a liquid and its vapor become equal at the critical point.
- (C) Interface between a liquid and its vapor disappears at the critical point.
- (D) An ideal gas system cannot exhibit a critical point.

30. The maximum number of stereoisomers that the following molecule can have is

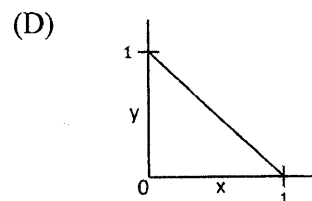
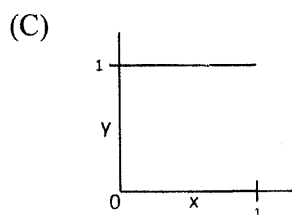
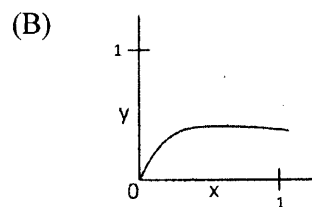
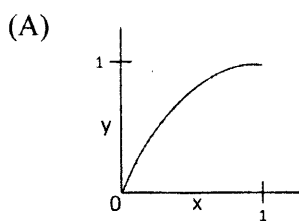


- (A) One
- (B) Two
- (C) Three
- (D) Four

31. The least basic amine among the following is



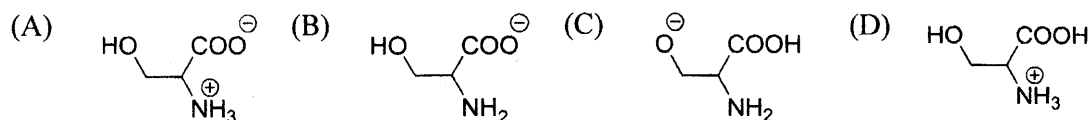
32. Graph of the function $y^2 = x$, $0 \leq x \leq 1$ is



33. There are 5 boxes. Only one ball can be put in each box. The number of ways in which 1 red and 1 blue ball can be put into these boxes is n and the number of ways in which 2 red balls can be put into these boxes is m . The value of n/m is
- (A) 10 (B) 5 (C) 2 (D) 1
34. Most enzymes are
- (A) proteins (B) carbohydrates
(C) lipids (D) nucleic acids
35. Which of the following vitamin contains cobalt (Co^{+2}) ion?
- (A) Vitamin B₆ (B) Vitamin B₁₂
(C) Folic acid (D) Biotin
36. When crystal field splitting Δ_{oct} is 10 Dq and the pairing energy is P, the crystal field stabilization energy (CFSE) for the diamagnetic octahedral $[\text{Co}(\text{NH}_3)_6]^{3+}$ is
- (A) 24 Dq (B) 18 Dq
(C) 24 Dq + 3P (D) 24 Dq + 2P
37. Color of the flame in the test for Barium is
- (A) golden yellow (B) crimson red (C) apple green (D) intense blue
38. Which of the following is **not true** about the viscosity of fluids?
- (A) The viscosity of gas increases with increase in temperature
(B) The viscosity of liquid decreases with increase in temperature.
(C) The viscosity of gas is independent of pressure.
(D) The viscosity of gas is independent of temperature.

39. Acetic acid associates in benzene to form dimer. 1.65 gm acetic acid when dissolved in 100 gm benzene raised the boiling point of the solvent by 0.36°C . Calculate the degree of association of acetic acid in benzene. [Given $K_b = 2.6$]
- (A) 70 % (B) 90 % (C) 50 % (D) 100 %
40. The C-C bond length in benzene is
- (A) equal to C-C bond length in ethylene.
(B) longer than C-C bond length in ethylene.
(C) equal to C-C bond length in ethane.
(D) longer than C-C bond length in ethane.
41. Robinson annulation is
- (A) modified version of aldol reaction.
(B) aldol condensation followed by Michael addition.
(C) Michael addition followed by aldol condensation.
(D) two consecutive Michael addition reactions.
42. If $\frac{dx}{dt} = \frac{-1}{1+t}$ and $x = 0$ at $t = 0$, then $t =$
- (A) $e^{-x} - 1$ (B) $e^x - 1$ (C) $1 + e^x$ (D) $1 - e^x$
43. A thin wire is bent into an equilateral triangle. Another wire of same length is bent into a square. Ratio of the areas, equilateral triangle / square is
- (A) $3/4$ (B) $\sqrt{3}/4$ (C) $4/\sqrt{3}$ (D) $4/3\sqrt{3}$
44. Extra nuclear DNA in cells is found in
- (A) mitochondria (B) endoplasmic reticulum
(C) ribosomes (D) lysosomes

45. Which of the following represents serine at pH = 2?



46. The Ziegler-Natta catalyst is responsible for the conversion of

- (A) benzene to phenol. (B) ethylene to ethylene oxide.
(C) acetylene to acetaldehyde. (D) ethylene to polyethylene.

47. Oxygen formation in photosynthesis is catalyzed by

- (A) iron containing enzyme. (B) magnesium containing enzyme.
(C) manganese containing enzyme. (D) cobalt containing enzyme.

48. At STP, 1 kmole of a gas occupies 22.4 m^3 . The molecular density (in molecules/ m^3) at STP is

- (A) 6.02×10^{26} (B) 3×10^{10} (C) 2.7×10^{25} (D) 10^7

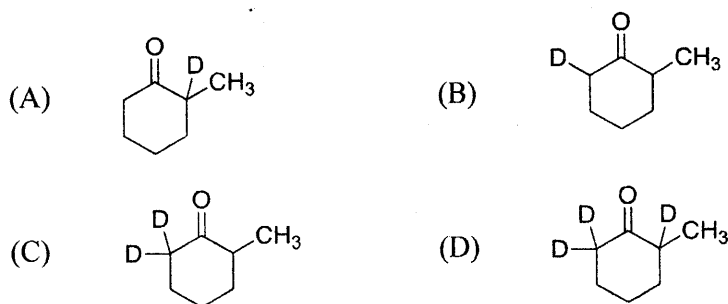
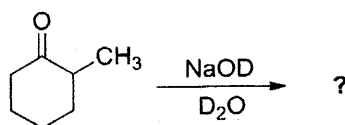
49. The Joule-Thomson process is

- (A) isothermal (B) isobaric
(C) isochoric (D) isenthalpic

50. Ozonolysis of one mole of 5-methyl-1,3-cyclopentadiene will produce

- (A) two moles of glyceraldehydes.
(B) one mole of 1,3-propanedial and one mole of methylglyoxal.
(C) one mole of glyoxal and one mole 2-methyl-1,3-propanedial.
(D) 0.5 mole of glycerol and 0.5 mole of glyoxal.

51. The product in the following reaction is



52. The unit vectors along the Cartesian axes are \mathbf{i} , \mathbf{j} , \mathbf{k} . A vector normal to the plane formed by the three points with Cartesian coordinates, $(0, 0, 0)$, $(2, 1, 0)$, $(1, 1, 1)$ is

- (A) $\mathbf{i} + \mathbf{j} + \mathbf{k}$ (B) $-\mathbf{i} - \mathbf{j} + \mathbf{k}$ (C) $\mathbf{i} - 2\mathbf{j} + \mathbf{k}$ (D) $\mathbf{i} + 2\mathbf{j} - \mathbf{k}$

53. The value of the determinant $\begin{vmatrix} 0 & 1 & 0 \\ 1 & 0 & 1 \\ 0 & 1 & 0 \end{vmatrix}$ is

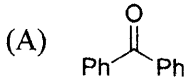
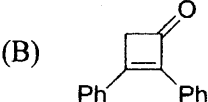
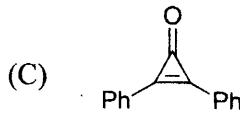
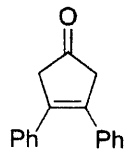
- (A) 0 (B) 1 (C) 2 (D) 3

54. Among the three allotropes of an element, one is a good electrical conductor, the second one is known to be one of the hardest materials and the third one has a molecular form with an icosahedral structure. The element is

- (A) boron (B) carbon (C) silicon (D) sulfur

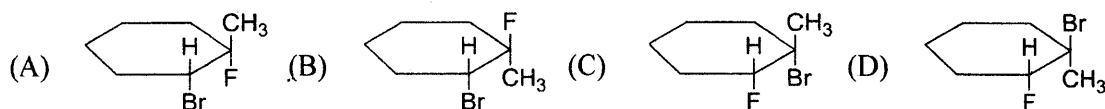
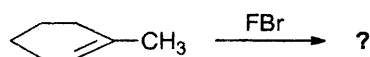
55. The most abundant noble gas in air is

- (A) neon (B) helium (C) xenon (D) argon

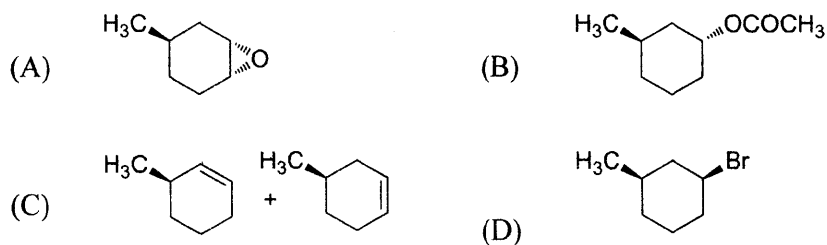
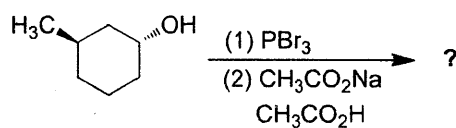
56. When 8.3 g of a compound containing N, H, and O was decomposed at 1000 K. 3 litres each of N_2 and water and 1.5 litres of O_2 were obtained. Empirical formula of the compound is
- (A) N_2HO (B) NH_2O (C) NHO_2 (D) NHO
57. A perfect gas expands reversibly at a constant temperature of 298 K so that its volume doubles. What is the change in the molar internal energy of the gas?
- (A) +2.27 kJ/mol (B) 0 J/mol (C) +1.72 kJ/mol (D) -2.27 kJ/mol
58. The carbonyl stretch frequencies in IR spectrum will follow the order
- (A) $CH_3COCH_3 > CH_3COOCH_3 > CH_3CONH_2$
 (B) $CH_3COOCH_3 > CH_3COCH_3 > CH_3CONH_2$
 (C) $CH_3CONH_2 > CH_3COCH_3 > CH_3COOCH_3$
 (D) $CH_3COOCH_3 > CH_3CONH_2 > CH_3COCH_3$
59. Molecule with the highest dipole moment among the following is
- (A)  (B)  (C)  (D) 
60. Solution of the differential equation, $\frac{d^2y}{dx^2} = y$, $y(0) = 0$ is
- (A) e^{ix} (B) e^{-ix} (C) $\sin x$ (D) $\cos x$
61. In trigonal-bipyramidal polyhedron the number of vertices, trigonal faces and number of edges are
- (A) 5, 6 and 9, respectively. (B) 9, 6 and 5, respectively.
 (C) 5, 9 and 6, respectively. (D) 6, 9 and 5, respectively.

62. A 50 mL sample of water containing both Ca^{2+} and Mg^{2+} is titrated with 16.54 mL of 0.01104 M EDTA in an ammonia buffer of $\text{pH} = 10$. Another 50 mL sample is treated with NaOH to precipitate $\text{Mg}(\text{OH})_2$ and then titrated at $\text{pH} = 13$ with 9.26 mL of the same EDTA solution. Calculate the amount of CaCO_3 and MgCO_3 in the sample in terms of ppm. [At. Wt of Ca = 40 and Mg = 24]
- (A) 205 ppm Ca and 136 ppm Mg (B) 136 ppm Ca and 205 ppm Mg
(C) 182 ppm Ca and 102 ppm Mg (D) 9.13 ppm Ca and 1.69 ppm Mg
63. While calculating the molecular weight of KSCN from atomic weights, a chemist accidentally recorded the atomic weight of potassium as 39.10 and that of sulfur as 32.60. The other weights were recorded correctly. Calculate the absolute error made in calculating the molecular weight of KSCN. [Atomic weights: K = 39.01, S = 32.06, C = 12.01, N = 14.00]
- (A) 97.18 (B) 97.63 (C) + 0.63 (D) +71.7
64. Daniel cell is a
- (A) reversible electrochemical cell. (B) irreversible electrochemical cell.
(C) reversible electrolytic cell. (D) irreversible electrolytic cell.
65. The angle of contact between the wall of a glass capillary tube of length 10 cm and a liquid is 90° . If the capillary tube is dipped vertically in the liquid, then the liquid
- (A) will rise in the tube.
(B) will get depressed in the tube.
(C) will rise up to 10cm in the tube and will overflow.
(D) will neither rise nor fall in the tube.

66. The major product obtained in the following reaction is



67. The major product formed in the following reaction sequence is



68. Sum of the series $\sum_{n=0}^{\infty} nx^{(n-1)}$ for $x = 0.5$ is

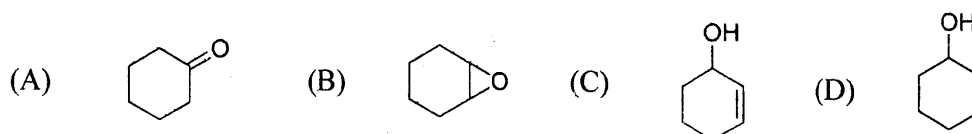
(A) 1 (B) 2 (C) 3 (D) 4

69. If $\frac{d}{dx} f(x) = g(x)$ and $h(x) = x^2$, then $\frac{d}{dx} f(h(x)) =$

(A) $2xg(x^2)$ (B) $g(x^2)$ (C) $2xg(x)$ (D) $x^2g(x^2)$

70. 50.00 mL of a 0.10 M acetic acid was taken in a 100 mL conical flask and exactly two drops of a dilute solution of phenolphthalein (color transition range: 8.8 – 10.0) were added to it. The solution was titrated by incremental addition of 0.10 M NaOH solution from a burette. Calculate the pH at which the mixture in the conical flask is neutralized. (K_a for acetic acid = 1.75×10^{-5})
- (A) 5 (B) 7 (C) 8.73 (D) -7
71. The dodecaborate ion, $[B_{12}H_{12}]^{2-}$ is a
- (A) arachno borane. (B) closo borane.
(C) nido borane. (D) linear borane.
72. The standard enthalpy of vaporization of water at its normal boiling point (100 °C) is 40.7 kJ/mol. The entropy (J/K/mol) and internal energy (kJ/mol) change are respectively,
- (A) 109 and 40.7 (B) 109 and 37.6
(C) 407 and 40.7 (D) 407 and 2.26
73. The general reason for the elevation of the boiling point of a solvent when a nonvolatile solute is dissolved in it, is the
- (A) attractive interaction between the solvent and solute molecules.
(B) repulsive interaction between the solvent and solute molecules.
(C) increase in entropy.
(D) enthalpy change associated with the dissociation.
74. The sequence of reagents that will accomplish the synthesis of *p*-toluidine (4-aminotoluene) from benzene is
- (A) (i) CH_3Cl , $AlCl_3$ (ii) HNO_3 , H_2SO_4 (iii) H_2
(B) (i) CH_3Cl , $AlCl_3$ (ii) HNO_3 , H_2SO_4 (iii) Fe, HCl (iv) NaOH
(C) (i) HNO_3 , H_2SO_4 (ii) Fe, HCl (iii) NaOH (iv) CH_3Cl , $AlCl_3$
(D) (i) HNO_3 , H_2SO_4 (ii) CH_3Cl , $AlCl_3$ (iii) Fe, HCl (iv) NaOH

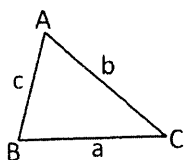
75. The molecule at a different oxidation level in the following set of compounds is



76. Given that $A \cup B = A$ and $A \cap B = \varphi$ (null set), we can conclude that

- (A) B is a null set (B) A is the universal set
(C) $B \subset A$ (D) $A \subset B$

77. In the plane triangle shown below; a, b, c denote edge length and A, B, C denote angles. It is given that $a = b$. For such a triangle, which one of the following statements is always true?



- (A) $A = B$ (B) $A + B = 90$ (C) $A + B = C$ (D) $c < a$

78. The amount of $^{14}_6\text{C}$ isotope in a piece of wood is found to be $1/6$ of that present in a fresh piece of wood. Calculate the age of the wood. Half-life of $^{14}_6\text{C} = 5577$ years.

- (A) 14419 years (B) 10085 years (C) 40340 years (D) 15500 years

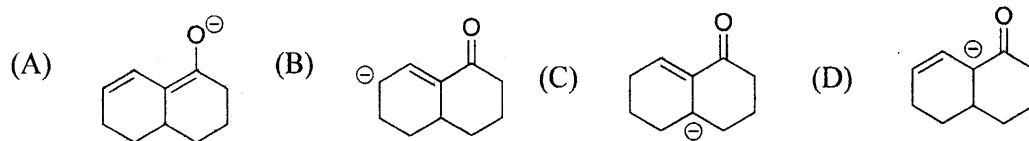
79. Which of the following is **not** an essential criterion for gravimetric analysis?

- (A) Reaction should be quantitative.
(B) Product should precipitate easily.
(C) Precipitate should possess colour.
(D) Particle size of precipitate should be big.

85. Consider the following functions: e^{x^2} , e^{ix} , e^{-x} and $\sin x$. Which one of the following statements is true?
- (A) e^{x^2} and e^{ix} are even functions.
(B) $\sin x$ is the only periodic functions in the list.
(C) e^{-x} and $\sin x$ are odd functions.
(D) e^{ix} is a periodic function.
86. To which of the following spinel class does Fe_3O_4 belong to?
- (A) extended (B) netted (C) normal (D) inverse
87. Using IUPAC nomenclature name the following complex $[(\text{NH}_3)_3\text{Pt}(\text{SCN})\text{Pt}(\text{NH}_3)_3]\text{Cl}_3$
- (A) hexaammine- μ -thiocyanatodiplatinum(II) chloride
(B) hexaammine- μ -thiocyanatodiplatinum(IV) chloride
(C) μ -thiocyanato-bis-triamminedi platinum(II) chloride
(D) μ -thiocyanato-bis-triamminedi platinum(IV) chloride
88. pH of the solution prepared by mixing 50 mL of 0.3 M NaOH and 50 mL of 0.1 M HCl would be
- (A) 0 (B) 1 (C) 13 (D) 14
89. In an X-ray diffraction experiment X rays of 0.1 nm reflected from a crystal surface at 30° . The interplane distance would be
- (A) 0.05 nm (B) 0.1 nm (C) 0.2 nm (D) 0.5 nm
90. Among the following reactions the one which will not result in C-C bond formation is
- (A) Reimer-Tiemann reaction
(B) Friedel-Crafts reaction
(C) Wurtz reaction
(D) Cannizzaro reaction

91. The most stable cation among the following is
(A) FH_2^+ (B) OH_3^+ (C) NH_4^+ (D) CH_5^+
92. The bond order and bond type in the C_2 molecule are, respectively
(A) 2; one sigma bond and one pi bond
(B) 3; one sigma bond and two pi bonds
(C) 2; two pi bonds
(D) 2; two sigma bonds
93. The number of unpaired electrons in the complex $[\text{CoF}_6]^{3-}$ is
(A) three (B) four (C) zero (D) one
94. The paramagnetic molecule among the following is
(A) CO (B) NO_2 (C) CO_2 (D) N_2O
95. The interplanar distance between (100) planes of simple cubic is 0.3 nm. The distance between the (122) planes would be
(A) 0.1 nm (B) 0.2 nm (C) 0.3 nm (D) 0.9 nm
96. The molecular shape of IF_5 is
(A) octahedral (B) tetrahedral
(C) square-pyramidal (D) trigonal-bipyramidal
97. Which of the following is true for an electrolytic cell?
(A) An electric current is produced by a chemical reaction.
(B) A nonspontaneous reaction is forced to occur.
(C) Electrons flow towards the anode.
(D) Electrons flow through the salt bridge.

98. The structure which is not a resonance structure of others in the following is



99. Among the following the compound which would **not** be considered aromatic in its behavior is



100. The decreasing order of acid strength among trichloroacetic acid (I), trifluoroacetic acid (II), acetic acid (III) and formic acid (IV) is

- (A) I > II > III > IV
 (B) I > III > II > IV
 (C) II > I > IV > III
 (D) II > IV > III > I