

Part - B (Chemistry)

46. With respect to the conformers of ethane, which of the following statements is **true**?

- (1) Bond angle remains same but bond length changes
- (2) Bond angle changes but bond length remains same
- (3) Both bond angle and bond length change
- (4) Both bond angles and bond length remains same

Ans: [4]

47. Which of the following pairs of compounds is isoelectronic and isostructural?

- (1) BeCl_2 , XeF_2
- (2) TeI_2 , XeF_2
- (3) IBr_2^- , XeF_2
- (4) IF_3 , XeF_2

Ans: [BONUS, 3]

48. HgCl_2 and I_2 both when dissolved in water containing I^- ions the pair of species formed is

- (1) HgI_2 , I_3^-
- (2) HgI_2 , I^-
- (3) HgI_4^{2-} , I_3^-
- (4) Hg_2I_2 , I^-

Ans: [3]

49. Mixture of chloroxylenol and terpineol act as

- (1) analgesic
- (2) antiseptic
- (3) antipyretic
- (4) antibiotic

Ans: [2]

50. Which is the **incorrect** statement?

- (1) $\text{FeO}_{0.98}$ has non stoichiometric metal deficiency defect
- (2) Density decreases in case of crystals with Schottky's defect
- (3) NaCl(s) is insulator, silicon is semiconductor, silver is conductor, quartz is piezo electric crystal
- (4) Frenkel defect is favoured in those ionic compounds in which sizes of cation and anions are almost equal

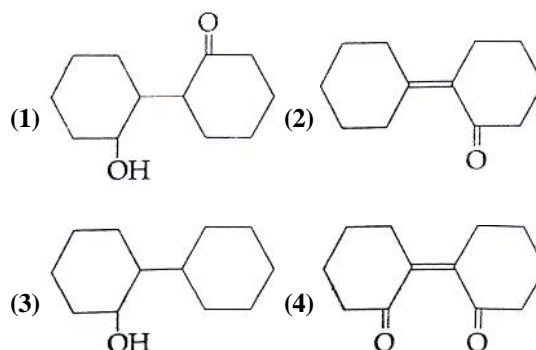
Ans: [4]

51. Concentration of the Ag^+ ions in a saturated solution of $\text{Ag}_2\text{C}_2\text{O}_4$ is $2.2 \times 10^{-4} \text{ mol L}^{-1}$. Solubility product of $\text{Ag}_2\text{C}_2\text{O}_4$ is

- (1) 2.42×10^{-8}
- (2) 2.66×10^{-12}
- (3) 4.5×10^{-11}
- (4) 5.3×10^{-12}

Ans: [4]

52. Of the following which is the product formed when cyclohexanone undergoes aldol condensation followed by chating?



Ans: [2]

53. The species, having bond angles of 120° is

- (1) PH_3
- (2) ClF_3
- (3) NCl_3
- (4) BCl_3

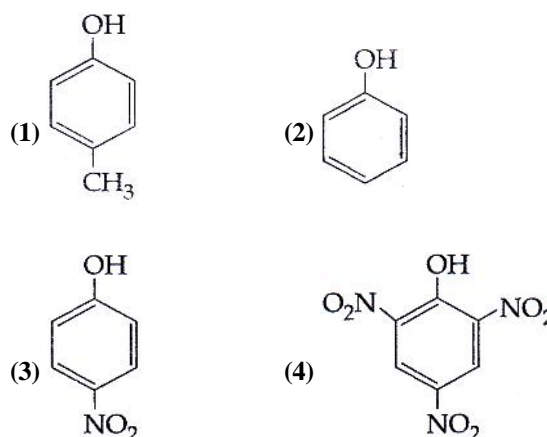
Ans: [4]

54. If molality of the dilute solution is doubled, the value of molal depression constant (K_f) will be

- (1) doubled
- (2) halved
- (3) tripled
- (4) unchanged

Ans: [4]

55. Which one is the most acidic compound?



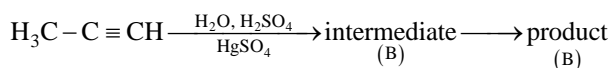
Ans: [4]

56. It is because of inability of ns^2 electrons of the valence shell to participate in bonding that

- (1) Sn^{2+} is reducing while Pb^{4+} is oxidising
 (2) Sn^{2+} is oxidising while Pb^{4+} is reducing
 (3) Sn^{2+} and Pb^{2+} are both oxidising and reducing
 (4) Sn^{4+} is reducing while Pb^{4+} is oxidising

Ans: [1]

57. Predict the correct intermediate and product in the following reaction:



- (1) A: $H_3C-C(=CH_2)SO_4$ B: $H_3C-C(=O)-CH_3$
 (2) A: $H_3C-C(OH)=CH_2$ B: $H_3C-C(=O)SO_4$
 (3) A: $H_3C-C(=O)-CH_3$ B: $H_3C-C \equiv CH$
 (4) A: $H_3C-C(OH)=CH_2$ B: $H_3C-C(=O)-CH_3$

Ans: [4]

58. Which one of the following statements is **not** correct?

- (1) Catalyst does not initiate any reaction
 (2) The value of equilibrium constant is changed in the presence of a catalyst in the reaction at equilibrium
 (3) Enzymes catalyse mainly bio-chemical reactions
 (4) Coenzymes increase the catalytic activity of enzyme

Ans: [2]

59. Which one is the **wrong** statement?

- (1) de-Broglie's wavelength is given by $\lambda = \frac{m}{mv}$, where m = mass of the particle, v = group velocity of the particle
 (2) The uncertainty principle is $\Delta E \times \Delta t \geq \frac{h}{4\pi}$
 (3) Half filled and fully filled orbitals have greater stability due to greater exchange energy, greater symmetry and more balanced arrangement
 (4) The energy of 2s orbital is less than the energy of

2p orbital in case of Hydrogen like atoms

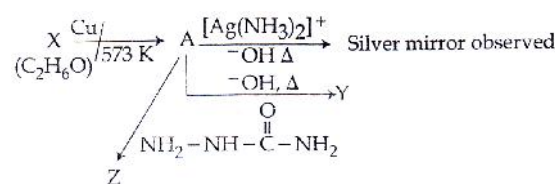
Ans: [4]

60. A gas is allowed to expand in a well insulated container against a constant external pressure of 2.5 atm from an initial volume of 2.50 L to a final volume of 4.50 L. The change in internal energy ΔU of the gas in joules will be

- (1) 1136.25 J (2) -500 J
 (3) -505 J (4) +505 J

Ans: [3]

61. Consider the reaction:



Identify A, X, Y and Z

- (1) A - Methoxymethane, X - Ethanoic acid, Y - Acetate ion, Z - hydrazine
 (2) A - Methoxymethane, X - Ethanol, Y - Ethanoic acid, Z - Semicarbazide
 (3) A - Ethanal, X - Ethanol, Y - But-2-enal, Z - Semicarbazone
 (4) A - Ethanol, X - Acetaldehyde, Y - Butanone, Z - Hydrazone

Ans: [3]

62. Which one is the **correct** order of acidity?

- (1) $CH_2 = CH_2 > CH_3 - CH = CH_2 > CH_3 - C \equiv CH > CH \equiv CH$
 (2) $CH \equiv CH > CH_3 - CH \equiv CH > CH_2 = CH_2 > CH_3 - CH_3$
 (3) $CH \equiv CH > CH_2 = CH_2 > CH_3 - C \equiv CH > CH_3 - CH_3$
 (4) $CH_3 - CH_3 > CH_2 = CH_2 > CH_3 - C \equiv CH > CH \equiv CH$

Ans: [2]

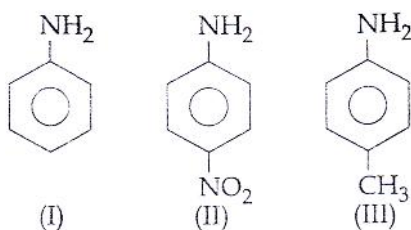
63. In the electrochemical cell:

$\text{Zn}|\text{ZnSO}_4(0.01\text{M})||\text{CuSO}_4(1.0\text{M})|\text{Cu}$, the emf of this Daniel cell is E_1 . When the concentration of ZnSO_4 is changed to 1.0 M and that of CuSO_4 changed to 0.01 M, the emf changes to E_2 . From the followings, which one is the relationship between E_1 and E_2 ? (Given, $\frac{RT}{F} = 0.059$)

- (1) $E_1 = E_2$ (2) $E_1 < E_2$
 (3) $E_1 > E_2$ (4) $E_2 = 0 \neq E_1$

Ans: [3]

64. The correct increasing order of basic strength for the following compounds is



- (1) $\text{II} < \text{III} < \text{I}$ (2) $\text{III} < \text{I} < \text{II}$
 (3) $\text{III} < \text{II} < \text{I}$ (4) $\text{II} < \text{I} < \text{III}$

Ans: [4]

65. In which pair of ions both the species contain S – S bond?

- (1) $\text{S}_2\text{O}_7^{2-}$, $\text{S}_2\text{O}_3^{2-}$ (2) $\text{S}_4\text{O}_6^{2-}$, $\text{S}_2\text{O}_3^{2-}$
 (3) $\text{S}_2\text{O}_7^{2-}$, $\text{S}_2\text{O}_8^{2-}$ (4) $\text{S}_4\text{O}_6^{2-}$, $\text{S}_2\text{O}_7^{2-}$

Ans: [2]

66. The correct order of the stoichiometries of AgCl formed when AgNO_3 in excess is treated with the complexes: $\text{CoCl}_3 \cdot 6\text{NH}_3$, $\text{CoCl}_3 \cdot 5\text{NH}_3$, $\text{CoCl}_3 \cdot 4\text{NH}_3$ respectively is

- (1) 1 AgCl , 3 AgCl , 2 AgCl
 (2) 3 AgCl , 1 AgCl , 2 AgCl
 (3) 3 AgCl , 2 AgCl , 1 AgCl
 (4) 2 AgCl , 3 AgCl , 1 AgCl

Ans: [3]

67. Match the interhalogen compounds of column I with the geometry in column II and assign the correct code.

Column I	Column II
(a) XX'	(i) T-shape
(b) XX_3	(ii) Pentagonal bipyramidal
(c) XX_5	(iii) Linear
(d) XX_7	(iv) Square-pyramidal
	(v) Tetrahedral

Code:

- | | | | | |
|-----|-------|-------|-------|------|
| | (a) | (b) | (c) | (d) |
| (1) | (iii) | (iv) | (i) | (ii) |
| (2) | (iii) | (i) | (iv) | (ii) |
| (3) | (v) | (iv) | (iii) | (ii) |
| (4) | (iv) | (iii) | (ii) | (i) |

Ans: [2]

68. The reason for greater range of oxidation states in actinoids is attributed to

- (1) the radioactive nature of actinoids
 (2) actinoid contraction
 (3) 5f, 6d and 7s levels having comparable energies
 (4) 4f and 5d levels being close in energies

Ans: [3]

69. A 20 litre container at 400 K contains $\text{CO}_2(\text{g})$ at pressure 0.4 atm and an excess of SrO (neglect the volume of solid SrO). The volume of the container is now decreased by moving the movable piston fitted in the container. The maximum volume of the container, when pressure of CO_2 attains its maximum value, will

be (Given that: $\text{SrCO}_3(\text{s}) \rightleftharpoons \text{SrO}(\text{s}) + \text{CO}_2(\text{g})$, $K_p = 1.6\text{atm}$)

- (1) 5 litre (2) 10 litre
 (3) 4 litre (4) 2 litre

Ans: [1]

70. The **correct** statement regarding electrophile is

- (1) Electrophile is a negatively charged species and can form a bond by accepting a pair of electrons from a nucleophile
- (2) Electrophile is a negatively charged species and can form a bond by accepting a pair of electrons from another electrophile
- (3) Electrophiles are generally neutral species and can form a bond by accepting a pair of electrons from a nucleophile
- (4) Electrophile can be either neutral or positively charged species and can form a bond by accepting a pair of electrons from a nucleophile

Ans: [4]

71. Which of the following is a sink for CO?

- (1) Haemoglobin
- (2) Micro organisms present in the soil
- (3) Oceans
- (4) Plants

Ans: [1]

72. The element $Z = 114$ has been discovered recently. It will belong to which of the following family / group and electronic configuration?

- (1) Halogen family, $[\text{Rn}]5f^{14} 6d^{10} 7s^2 7p^5$
- (2) Carbon family, $[\text{Rn}]5f^{14} 6d^{10} 7s^2 7p^2$
- (3) Oxygen family, $[\text{Rn}]5f^{14} 6d^{10} 7s^2 7p^4$
- (4) Nitrogen family, $[\text{Rn}]5f^{14} 6d^{10} 7s^2 7p^6$

Ans: [2]

73. Correct increasing order for the wavelengths of absorption in the visible region for the complexes of Co^{3+} is

- (1) $[\text{Co}(\text{en})_3]^{3+}$, $[\text{Co}(\text{NH}_3)_6]^{3+}$, $[\text{Co}(\text{H}_2\text{O})_6]^{3+}$
- (2) $[\text{Co}(\text{H}_2\text{O})_6]^{3+}$, $[\text{Co}(\text{en})_3]^{3+}$, $[\text{Co}(\text{NH}_3)_6]^{3+}$
- (3) $[\text{Co}(\text{H}_2\text{O})_6]^{3+}$, $[\text{Co}(\text{NH}_3)_6]^{3+}$, $[\text{Co}(\text{en})_3]^{3+}$
- (4) $[\text{Co}(\text{NH}_3)_6]^{3+}$, $[\text{Co}(\text{en})_3]^{3+}$, $[\text{Co}(\text{H}_2\text{O})_6]^{3+}$

Ans: [1]

74. Which of the following statements is **not** correct?

- (1) Insulin maintains sugar level in the blood of a human body
- (2) Ovalbumin is a simple food reserve in egg-white
- (3) Blood proteins thrombin and fibrinogen are involved in blood clotting
- (4) Denaturation makes the proteins more active

Ans: [4]

75. An example of a sigma bonded organometallic compound is

- (1) Ruthenocene
- (2) Grignard's reagent
- (3) Ferrocene
- (4) Cobaltocene

Ans: [2]

76. Which of the following is dependent on temperature?

- (1) Molality
- (2) Molarity
- (3) Mole fraction
- (4) Weight percentage

Ans: [2]

77. For a given reaction, $\Delta H = 35.5 \text{ kJ mol}^{-1}$ and $\Delta S = 83.6 \text{ kJ mol}^{-1}$. The reaction is spontaneous at (Assume that ΔH and ΔS do not vary with temperature)

- (1) $T < 425 \text{ K}$
- (2) $T > 425 \text{ K}$
- (3) all temperature
- (4) $T > 298 \text{ K}$

Ans: [2]

78. The most suitable method of separation of 1 : 1 mixture of ortho and para - nitrophenols is

- (1) Sublimation
- (2) Chromatography
- (3) Crystallisation
- (4) Steam distillation

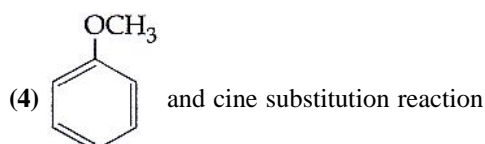
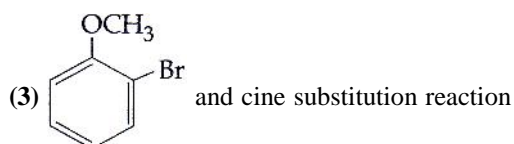
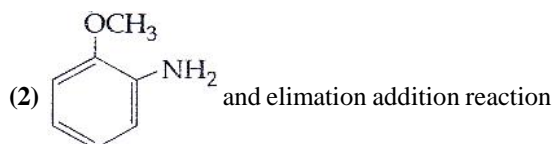
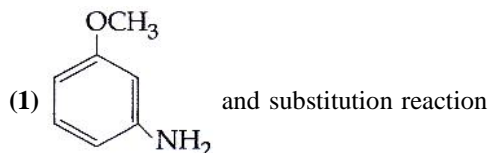
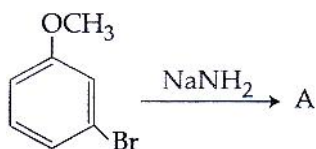
Ans: [4]

79. Which one of the following pairs of species have the same bond order?

- (1) CO, NO
- (2) O_2 , NO^+
- (3) CN^- , CO
- (4) N_2 , O_2^-

Ans: [3]

80. Identify A and predict the type of reaction



Ans: [2]

81. A first order reaction has a specific reaction rate of 10^{-2} sec^{-1} . How much time will it take for 20 g of the reactant to reduce to 5g?

- (1) 238.6 sec (2) 138.6 sec
 (3) 346.5 sec (4) 693.0 sec

Ans: [2]

82. Name the gas that can readily decolourise acidified KMnO_4 solution

- (1) CO_2 (2) SO_2
 (3) NO_2 (4) P_2O_5

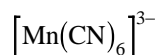
Ans: [2]

83. The heating of phenyl methyl ethers with HI produces

- (1) ethyl chlorides (2) iodobenzene
 (3) phenol (4) benzene

Ans: [3]

84. Pick out the correct statement with respect to



- (1) It is sp^3d^2 hybridized and octahedral
 (2) It is sp^3d^2 hybridized and tetrahedral
 (3) It is d^2sp^3 hybridized and octahedral
 (4) It is dsp^2 hybridized and square planar

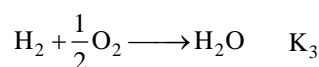
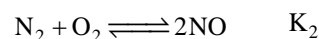
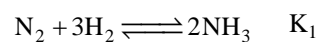
Ans: [3]

85. Ionic mobility of which of the following alkali metal ions is lowest when aqueous solution of their salts are put under an electric field?

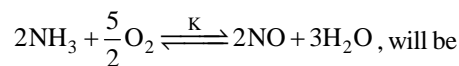
- (1) Na (2) K
 (3) Rb (4) Li

Ans: [4]

86. The equilibrium constants of the following are:



The equilibrium constant (K) of the reaction



- (1) $\frac{K_1 K_3^3}{K_2}$ (2) $\frac{K_2 K_3^3}{K_1}$
 (3) $\frac{K_2 K_3}{K_1}$ (4) $\frac{K_2^3 K_3}{K_1}$

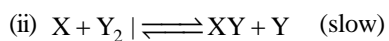
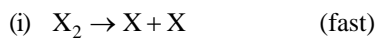
Ans: [2]

87. Which of the following reactions is appropriate for converting acetamide to methanamine?

- (1) Carbylamine reaction
 (2) Hoffmann hypobromamide reaction
 (3) Stephens reaction
 (4) Gabriels phthalimide synthesis

Ans: [2]

88. Mechanism of a hypothetical reaction $X_2 + Y_2 \rightarrow 2XY$ is given below



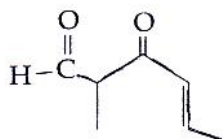
The overall order of the reaction will be

(1) 1 (2) 2

(3) 0 (4) 0

Ans: [4]

89. The IUPAC name of the compound



is

(1) 3-keto-2-methylhex-4-enal

(2) 5-formylhex-2-en-3-one

(3) 5-methyl-4-oxohex-2-en-5-al

(4) 3-keto-2-methylhex-5-enal

Ans: [1]

90. Extraction of gold and silver involved leaching with CN^- ion. Silver is later recovered by

(1) liquation (2) distillation

(3) zone refining (4) displacement with Zn

Ans: [4]