FINAL JEE–MAIN EXAMINATION – APRIL, 2024

(Held On Thursday 04th April, 2024) **TIME : 3 : 00 PM to 6 : 00 PM**

CHEMISTRY

TEST PAPER WITH ANSWER

SECTION-A

61. The equilibrium constant for the reaction

$$SO_3(g) \rightleftharpoons SO_2(g) + \frac{1}{2}O_2(g)$$

is $K_C = 4.9 \times 10^{-2}$. The value of K_C for the reaction given below is

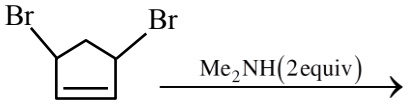
$$2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g)$$ is

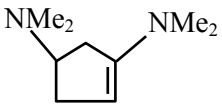
(1) 4.9 (2) 41.6

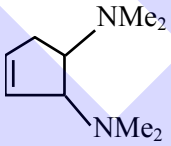
(3) 49 (4) 416

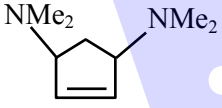
Ans. (4)

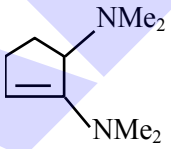
62. Find out the major product formed from the following reaction. [Me: $-CH_3$]



(1) 

(2) 

(3) 

(4) 

Ans. (2)

63. When MnO_2 and H_2SO_4 is added to a salt (A), the greenish yellow gas liberated as salt (A) is :

(1) NaBr (2) CaI_2

(3) KNO_3 (4) NH_4Cl

Ans. (4)

64. The correct statement/s about Hydrogen bonding is/are :

A. Hydrogen bonding exists when H is covalently bonded to the highly electro negative atom.

B. Intermolecular H bonding is present in o-nitro phenol

C. Intramolecular H bonding is present in HF.

D. The magnitude of H bonding depends on the physical state of the compound.

E. H-bonding has powerful effect on the structure and properties of compounds.

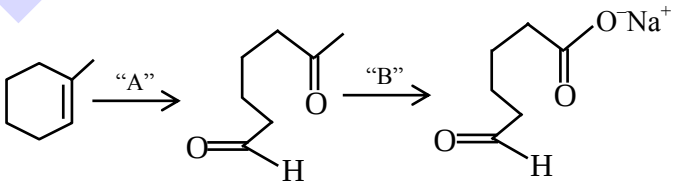
Choose the **correct** answer from the options given below :

(1) A only (2) A, D, E only

(3) A, B, D only (4) A, B, C only

Ans. (2)

65.



In the above chemical reaction sequence "A'' and "B" respectively are :

(1) O_3, Zn/H_2O and $NaOH_{(alc.)}$ / I_2

(2) H_2O, H^+ and $NaOH_{(alc.)}$ / I_2

(3) H_2O, H^+ and $KMnO_4$

(4) O_3, Zn/H_2O and $KMnO_4$

Ans. (1)

66. Common name of Benzene-1, 2-diol is

(1) quinol (2) resorcinol

(3) catechol (4) o-cresol

Ans. (3)

67. $CH_3-CH_2-CH_2-Br + NaOH \xrightarrow{C_2H_5OH}$ Product 'A'

Product A $\xrightarrow[H^+]{H_2O}$ Product "B"

Product A $\xrightarrow[H_2O/H_2O_2/^-OH]{\text{Diborane}}$ Product "C"

Consider the above reactions, identify product B and product C.

(1) B = C = 2-Propanol

(2) B = 2-Propanol C = 1-Propanol

(3) B = 1-Propanol C = 2-Propanol

(4) B = C = 1-Propanol

Ans. (2)

68. The adsorbent used in adsorption chromatography is/are

A. silica gel B. alumina

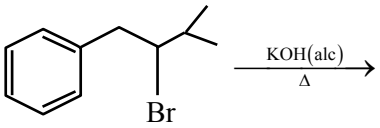
C. quick lime D. magnesia

Choose the **most appropriate** answer from the options given below :

(1) B only (2) C and D only

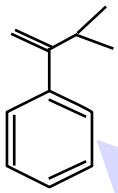
(3) A and B only (4) A only

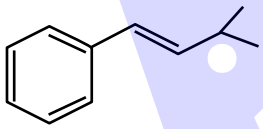
Ans. (3)

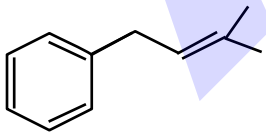
69. 

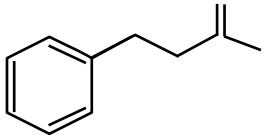
major product "P"

Product P is

(1) 

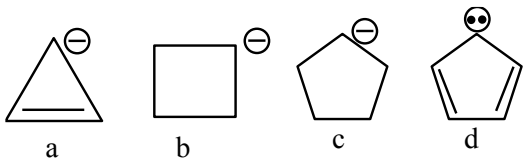
(2) 

(3) 

(4) 

Ans. (2)

70. Correct order of stability of carbanion is



(1) c > b > d > a (2) a > b > c > d

(3) d > a > c > b (4) d > c > b > a

Ans. (4)

71. The correct order of the first ionization enthalpy is

(1) Al > Ga > Tl (2) Ga > Al > B

(3) B > Al > Ga (4) Tl > Ga > Al

Ans. (4)

72. If an iron (III) complex with the formula $\left[Fe(NH_3)_x(CN)_y\right]^-$ has no electron in its e_g orbital, then the value of x + y is

(1) 5 (2) 6

(3) 3 (4) 4

Ans. (2)

73. Fuel cell, using hydrogen and oxygen as fuels,

A. has been used in spaceship

B. has as efficiency of 40% to produce electricity

C. uses aluminium as catalysts

D. is eco-friendly

E. is actually a type of Galvanic cell only

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

(3) A,B,D,E only (4) A,D,E only

Ans. (4)

74. Choose the **Incorrect** Statement about Dalton's Atomic Theory

(1) Compounds are formed when atoms of different elements combine in any ratio

(2) All the atoms of a given element have identical properties including identical mass

(3) Matter consists of indivisible atoms

(4) Chemical reactions involve recorganization of atoms

Ans. (1)

75. Match List I with List II

	LIST I		LIST II
A.	α- Glucose and α-Galactose	I.	Functional isomers
B.	α- Glucose and β-Glucose	II.	Homologous
C.	α- Glucose and α-Fructose	III.	Anomers
D.	α- Glucose and α-Ribose	IV.	Epimers

Choose the **correct** answer from the options given below:

(1) A-III, B-IV, C-II, D-I

(2) A-III, B-IV, C-I, D-II

(3) A-IV, B-III, C-I, D-II

(4) A-IV, B-III, C-II, D-I

Ans. (3)

76. Given below are two statements:

Statement I : The correct order of first ionization enthalpy values of Li, Na, F and Cl is Na < Li < Cl < F.

Statement II : The correct order of negative electron gain enthalpy values of Li, Na, F and Cl is Na < Li < F < Cl

In the light of the above statements, choose the **correct** answer from the options given below :

(1) Both Statement I and Statement II are true

(2) Both Statement I and Statement II are false

(3) Statement I is false but Statement II is true

(4) Statement I is true but Statement II is false

Ans. (1)

77. For a strong electrolyte, a plot of molar conductivity against $(\text{concentration})^{1/2}$ is a straight line, with a negative slope, the correct unit for the slope is

(1) $S\ cm^2\ mol^{-3/2}\ L^{1/2}$ (2) $S\ cm^2\ mol^{-1}\ L^{1/2}$

(3) $S\ cm^2\ mol^{-3/2}\ L$ (4) $S\ cm^2\ mol^{-3/2}\ L^{-1/2}$

Ans. (1)

78. A first row transition metal in its +2 oxidation state has a spin-only magnetic moment value of 3.86 BM. The atomic number of the metal is

(1) 25 (2) 26

(3) 22 (4) 23

Ans. (4)

79. The number of unpaired d-electrons in $[Co(H_2O)_6]^{3+}$ is_____

(1) 4 (2) 2

(3) 0 (4) 1

Ans. (3)

80. The number of species from the following that have pyramidal geometry around the central atom is_____

$S_2O_3^{2-}, SO_4^{2-}, SO_3^{2-}, S_2O_7^{2-}$

(1) 4 (2) 3

(3) 1 (4) 2

Ans. (3)

SECTION-B

81. The maximum number of orbitals which can be identified with n = 4 and $m_l = 0$ is_____

Ans. (4)

82. Number of compounds/species from the following with non-zero dipole moment is_____

$BeCl_2$, BCl_3, NF_3, XeF_4, CCl_4, H_2O H_2S, HBr, CO_2, H_2, HCl

Ans. (5)

83. Three moles of an ideal gas are compressed isothermally from 60 L to 20 L using constant pressure of 5 atm. Heat exchange Q for the compression is – ____ Lit. atm.

Ans. (200)

84. From 6.55 g of aniline, the maximum amount of acetanilide that can be prepared will be___$\times 10^{-1}$ g.

Ans. (95)

85. Consider the following reaction, the rate expression of which is given below

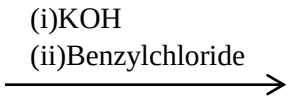
$A + B \rightarrow C$

$\text{rate} = k\,[A]^{1/2}\,[B]^{1/2}$

The reaction is initiated by taking 1M concentration A and B each. If the rate constant (k) is $4.6 \times 10^{-2}\ s^{-1}$, then the time taken for A to become 0.1 M is_____sec. (nearest integer)

Ans. (50)

86. Phthalimide is made to undergo following sequence of reactions.



Total number of π bonds present in product 'P' is/are

Ans. (8)

87. The total number of 'sigma' and 'Pi' bonds in 2-oxohex-4-ynoic acid is____.

Ans. (18)

88. A first row transition metal with highest enthalpy of atomisation, upon reaction with oxygen at high temperature forms oxides of formula M_2O_n (where n = 3,4,5). The 'spin-only' magnetic moment value of the amphoteric oxide from the above oxides is___ BM (near integer)

(Given atomic number : Sc : 21, Ti : 22, V : 23, Cr : 24, Mn : 25, Fe : 26, Co : 27, Ni : 28 ,Cu : 29, Zn : 30)

Ans. (0)

89. 2.7 Kg of each of water and acetic acid are mixed, The freezing point of the solution will be –x °C. Consider the acetic acid does not dimerise in water, nor dissociates in water x = _____(nearest integer)

[Given : Molar mass of water = 18 g mol^{-1}, acetic acid = 60 g mol^{-1}]

K_f H_2O : 1.86 K kg mol^{-1}

K_f acetic acid : 3.90 K kg mol^{-1}

freezing point : H_2O = 273 K, acetic acid = 290 K]

Ans. (31)

90. Vanillin compound obtained from vanilla beans, has total sum of oxygen atoms and π electrons is__

Ans. (11)