FINAL JEE–MAIN EXAMINATION – JANUARY, 2024

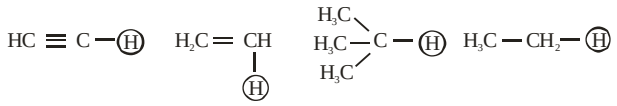
(Held On Monday 29th January, 2024) **TIME : 3 : 00 PM to 06 : 00 PM**

CHEMISTRY

TEST PAPER WITH ANSWER

SECTION-A

61. The ascending acidity order of the following H atoms is



A B C D

(1) C < D < B < A

(2) A < B < C < D

(3) A < B < D < C

(4) D < C < B < A

Ans. (1)

62. Match List I with List II

List I (Bio Polymer)		List II (Monomer)	
A.	Starch	I.	nucleotide
B.	Cellulose	II.	α-glucose
C.	Nucleic acid	III.	β-glucose
D.	Protein	IV.	α-amino acid

Choose the correct answer from the options given below :-

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

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

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

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

Ans. (4)

63. Match List I with List II

List I (Compound)		List II (pK_a value)	
A.	Ethanol	I.	10.0
B.	Phenol	II.	15.9
C.	m-Nitrophenol	III.	7.1
D.	p-Nitrophenol	IV.	8.3

Choose the correct answer from the options given below :-

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

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

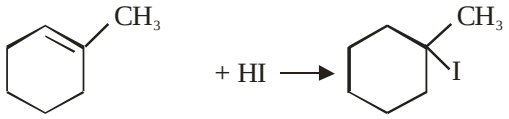
(3) A-III, B-IV, C-I, D-II

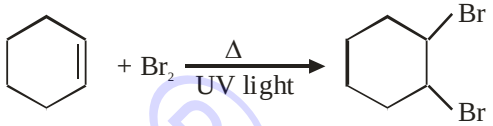
(4) A-II, B-I, C-IV, D-III

Ans. (4)

64. Which of the following reaction is correct ?

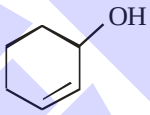
(1) $CH_3CH_2CH_2NH_2 \xrightarrow[H_2O]{HNO_2,0^\circ C} CH_3CH_2OH + N_2 + HCl$

(2) 

(3) 

(4) $C_2H_5CONH_2 + Br_2 + NaOH \rightarrow C_2H_5CH_2NH_2 + Na_2CO_3 + NaBr + H_2O$

Ans. (2)

65. According to IUPAC system, the compound  is named as

(1) Cyclohex-1-en-2-ol

(2) 1-Hydroxyhex-2-ene

(3) Cyclohex-1-en-3-ol

(4) Cyclohex-2-en-1-ol

Ans. (4)

66. The correct IUPAC name of K_2MnO_4 is

(1) Potassium tetraoxopermanganate (VI)

(2) Potassium tetraoxidomanganate (VI)

(3) Dipotassium tetraoxidomanganate (VII)

(4) Potassium tetraoxidomanganese (VI)

Ans. (2)

67. A reagent which gives brilliant red precipitate with Nickel ions in basic medium is

(1) sodium nitroprusside

(2) neutral $FeCl_3$

(3) meta-dinitrobenzene

(4) dimethyl glyoxime

Ans. (4)

68. Phenol treated with chloroform in presence of sodium hydroxide, which further hydrolysed in presence of an acid results

(1) Salicyclic acid

(2) Benzene-1,2-diol

(3) Benzene-1, 3-diol

(4) 2-Hydroxybenzaldehyde

Ans. (4)

69. Match List I with List II

List I (Spectral Series for Hydrogen)		List II (Spectral Region/Higher Energy State)	
A.	Lyman	I.	Infrared region
B.	Balmer	II.	UV region
C.	Paschen	III.	Infrared region
D.	Pfund	IV.	Visible region

Choose the correct answer from the options given below :-

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

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

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

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

Ans. (3)

70. On passing a gas, 'X', through Nessler's reagent, a brown precipitate is obtained. The gas 'X' is

(1) H_2S

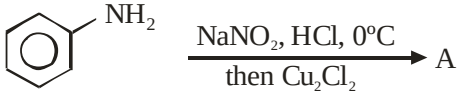
(2) CO_2

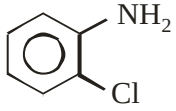
(3) NH_3

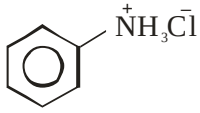
(4) Cl_2

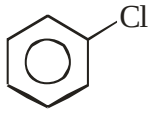
Ans. (3)

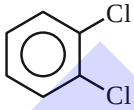
71. The product A formed in the following reaction is:



(1) 

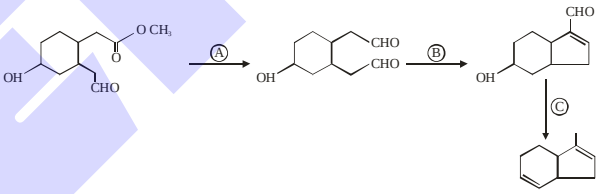
(2) 

(3) 

(4) 

Ans. (3)

72. Identify the reagents used for the following conversion



(1) A = $LiAlH_4$, B = $NaOH_{(aq)}$, C = NH_2–NH_2/KOH, ethylene glycol

(2) A = $LiAlH_4$, B = $NaOH_{(alc)}$, C =Zn/HCl

(3) A = DIBAL-H, B= $NaOH_{(aq)}$, C= NH_2–NH_2/KOH, ethylene glycol

(4) A = DIBAL-H, B = $NaOH_{(alc)}$, C = Zn/HCl

Ans. (4)

73. Which of the following acts as a strong reducing agent? (Atomic number : Ce = 58, Eu = 63, Gd = 64, Lu = 71)

(1) Lu^{3+}

(2) Gd^{3+}

(3) Eu^{2+}

(4) Ce^{4+}

Ans. (3)

74. Chromatographic technique/s based on the principle of differential adsorption is/are

A. Column chromatography
B. Thin layer chromatography
C. Paper chromatography

Choose the most appropriate answer from the options given below:

(1) B only
(2) A only
(3) A & B only
(4) C only

Ans. (3)

75. Which of the following statements are correct about Zn, Cd and Hg?

A. They exhibit high enthalpy of atomization as the d-subshell is full.
B. Zn and Cd do not show variable oxidation state while Hg shows +I and +II.
C. Compounds of Zn, Cd and Hg are paramagnetic in nature.
D. Zn, Cd and Hg are called soft metals.

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

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

Ans. (1)

76. The element having the highest first ionization enthalpy is

(1) Si
(2) Al
(3) N
(4) C

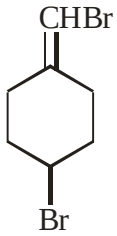
Ans. (3)

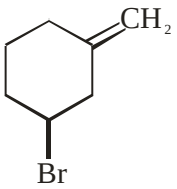
77. Alkyl halide is converted into alkyl isocyanide by reaction with

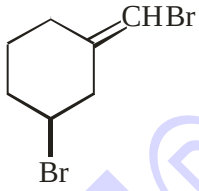
(1) NaCN
(2) NH_4CN
(3) KCN
(4) AgCN

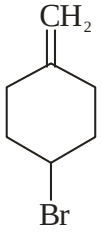
Ans. (4)

78. Which one of the following will show geometrical isomerism?

(1) 

(2) 

(3) 

(4) 

Ans. (3)

79. Given below are two statements:

Statement I: Fluorine has most negative electron gain enthalpy in its group.

Statement II: Oxygen has least negative electron gain enthalpy in its group.

In the light of the above statements, choose the most appropriate from the options given below.

(1) Both Statement I and Statement II are true
(2) Statement I is true but Statement II is false
(3) Both Statement I and Statement II are false
(4) Statement I is false but Statement II is true

Ans. (4)

80. Anomalous behaviour of oxygen is due to its

(1) Large size and high electronegativity
(2) Small size and low electronegativity
(3) Small size and high electronegativity
(4) Large size and low electronegativity

Ans. (3)

SECTION-B

81. The total number of anti bonding molecular orbitals, formed from 2s and 2p atomic orbitals in a diatomic molecule is _____.

Ans. (4)

82. The oxidation number of iron in the compound formed during brown ring test for NO_3^- ion is _____.

Ans. (1)

83. The following concentrations were observed at 500 K for the formation of NH_3 from N_2 and H_2. At equilibrium : $[N_2] = 2 \times 10^{-2}$ M, $[H_2] = 3 \times 10^{-2}$ M and $[NH_3] = 1.5 \times 10^{-2}$M. Equilibrium constant for the reaction is _____.

Ans. (417)

84. Molality of 0.8 M H_2SO_4 solution (density 1.06 g cm^{-3}) is _____$\times 10^{-3}$ m.

Ans. (815)

85. If 50 mL of 0.5 M oxalic acid is required to neutralise 25 mL of NaOH solution, the amount of NaOH in 50 mL of given NaOH solution is _____g.

Ans. (4)

86. The total number of 'Sigma' and Pi bonds in 2-formylhex-4-enoic acid is ____.

Ans. (22)

87. The half-life of radioisotopic bromine - 82 is 36 hours. The fraction which remains after one day is _____ $\times 10^{-2}$.

(Given antilog 0.2006 = 1.587)

Ans. (63)

88. Standard enthalpy of vapourisation for CCl_4 is 30.5 kJ mol^{-1}. Heat required for vapourisation of 284g of CCl_4 at constant temperature is _____ kJ.
(Given molar mass in g mol^{-1} ; C = 12, Cl = 35.5)

Ans. (56)

89. A constant current was passed through a solution of $AuCl_4^-$ ion between gold electrodes. After a period of 10.0 minutes, the increase in mass of cathode was 1.314 g. The total charge passed through the solution is _____ $\times 10^{-2}$ F.

(Given atomic mass of Au = 197)

Ans. (2)

90. The total number of molecules with zero dipole moment among CH_4, BF_3, H_2O, HF, NH_3, CO_2 and SO_2 is _____.

Ans. (3)

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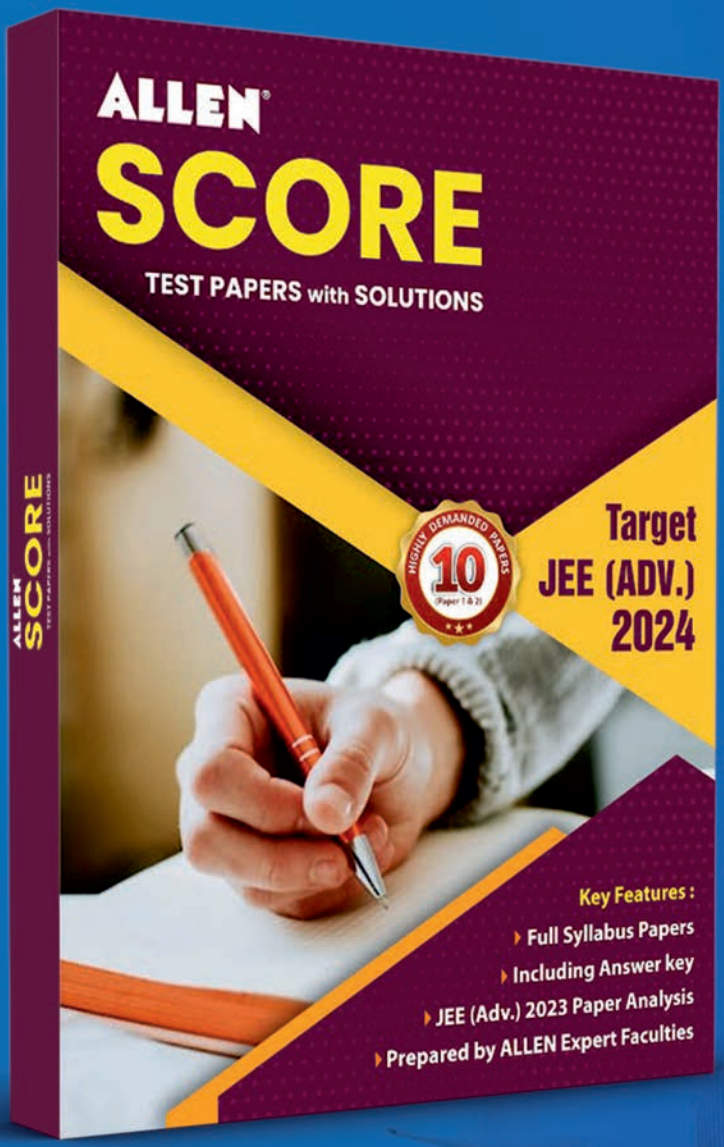

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