

FINAL JEE-MAIN EXAMINATION – APRIL, 2024

(Held On Monday 08th April, 2024)

TIME : 3 : 00 PM to 6 : 00 PM

CHEMISTRY

SECTION-A

61. In qualitative test for identification of presence of phosphorous, the compound is heated with an oxidising agent. Which is further treated with nitric acid and ammonium molybdate respectively. The yellow coloured precipitate obtained is :

- (1) $\text{Na}_3\text{PO}_4 \cdot 12\text{MoO}_3$
- (2) $(\text{NH}_4)_3\text{PO}_4 \cdot 12(\text{NH}_4)_2\text{MoO}_4$
- (3) $(\text{NH}_4)_3\text{PO}_4 \cdot 12\text{MoO}_3$
- (4) $\text{MoPO}_4 \cdot 21\text{NH}_4\text{NO}_3$

Ans. (3)

62. For a reaction $\text{A} \xrightarrow{K_1} \text{B} \xrightarrow{K_2} \text{C}$

If the rate of formation of B is set to be zero then the concentration of B is given by :

- (1) $K_1K_2[\text{A}]$
- (2) $(K_1 - K_2)[\text{A}]$
- (3) $(K_1 + K_2)[\text{A}]$
- (4) $(K_1/K_2)[\text{A}]$

Ans. (4)

63. When ψ_A and ψ_B are the wave functions of atomic orbitals, then σ^* is represented by :

- (1) $\psi_A - 2\psi_B$
- (2) $\psi_A - \psi_B$
- (3) $\psi_A + 2\psi_B$
- (4) $\psi_A + \psi_B$

Ans. (2)

64. Which one the following compounds will readily react with dilute NaOH?

- (1) $\text{C}_6\text{H}_5\text{CH}_2\text{OH}$
- (2) $\text{C}_2\text{H}_5\text{OH}$
- (3) $(\text{CH}_3)_3\text{COH}$
- (4) $\text{C}_6\text{H}_5\text{OH}$

Ans. (4)

65. The shape of carbocation is :

- (1) trigonal planar
- (2) diagonal pyramidal
- (3) tetrahedral
- (4) diagonal

Ans. (1)

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66. Given below are two statements :


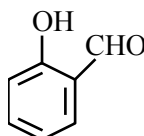
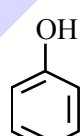
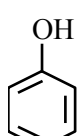
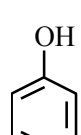
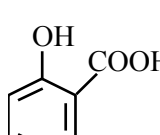
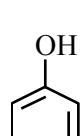
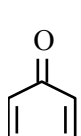
Statement (I) : $\text{S}_{\text{N}}2$ reactions are 'stereospecific', indicating that they result in the formation only one stereo-isomers as the product.

Statement (II) : $\text{S}_{\text{N}}1$ reactions generally result in formation of product as racemic mixtures. In the light of the above statements, choose the **correct** answer from the options given below :

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

Ans. (3)

67. Match List-I with List-II.

List-I (Reactions)	List-II (Products)
(A)  $\xrightarrow[\text{(ii) H}_2\text{O, warm}]{\text{(i) NaNO}_2 + \text{HCl}}$	(I) 
(B)  $\xrightarrow[\text{H}_2\text{SO}_4]{\text{Na}_2\text{Cr}_2\text{O}_7}$	(II) 
(C)  $\xrightarrow[\text{(ii) H}^+]{\text{(i) CHCl}_3 + \text{aq NaOH}}$	(III) 
(D)  $\xrightarrow[\text{(iii) H}^+]{\text{(i) NaOH, (ii) CO}_2}$	(IV) 

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

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

Ans. (4)



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68. Match List-I with List-II.

List-I (Test)	List-II (Identification)
(A) Bayer's test	(I) Phenol
(B) Ceric ammonium nitrate test	(II) Aldehyde
(C) Phthalein dye test	(III) Alcoholic-OH group
(D) Schiff's test	(IV) Unsaturation

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

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

Ans. (4)

 69. Identify the **incorrect** statements about group 15 elements :

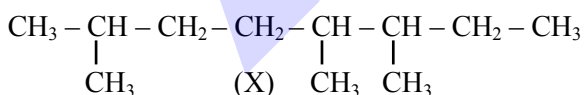
- (A) Dinitrogen is a diatomic gas which acts like an inert gas at room temperature.
 (B) The common oxidation states of these elements are -3 , $+3$ and $+5$.
 (C) Nitrogen has unique ability to form $p\pi-p\pi$ multiple bonds.
 (D) The stability of $+5$ oxidation states increases down the group.
 (E) Nitrogen shows a maximum covalency of 6.

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

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

Ans. (4)

70. IUPAC name of following hydrocarbon (X) is :



- (1) 2-Ethyl-3,6-dimethylheptane
 (2) 2-Ethyl-2,6-diethylheptane
 (3) 2,5,6-Trimethyloctane
 (4) 3,4,7-Trimethyloctane

Ans. (3)

 71. The equilibrium $\text{Cr}_2\text{O}_7^{2-} \rightleftharpoons 2\text{CrO}_4^{2-}$ is shifted to the right in :

- (1) an acidic medium
 (2) a basic medium
 (3) a weakly acidic medium
 (4) a neutral medium

Ans. (2)

72. Given below are two statements :

Statement (I) : A Buffer solution is the mixture of a salt and an acid or a base mixed in any particular quantities.

Statement (II) : Blood is naturally occurring buffer solution whose pH is maintained by $\text{H}_2\text{CO}_3 / \text{HCO}_3^-$ concentrations.

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

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

Ans. (1)

73. The correct sequence of acidic strength of the following aliphatic acids in their decreasing order is :

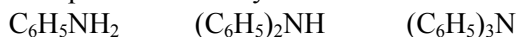


- (1) $\text{HCOOH} > \text{CH}_3\text{COOH} > \text{CH}_3\text{CH}_2\text{COOH} > \text{CH}_3\text{CH}_2\text{CH}_2\text{COOH}$
 (2) $\text{HCOOH} > \text{CH}_3\text{CH}_2\text{CH}_2\text{COOH} > \text{CH}_3\text{CH}_2\text{COOH} > \text{CH}_3\text{COOH}$
 (3) $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH} > \text{CH}_3\text{CH}_2\text{COOH} > \text{CH}_3\text{COOH} > \text{HCOOH}$
 (4) $\text{CH}_3\text{COOH} > \text{CH}_3\text{CH}_2\text{COOH} > \text{CH}_3\text{CH}_2\text{CH}_2\text{COOH} > \text{HCOOH}$

Ans. (1)

74. Given below are two statements :

Statement (I) : All the following compounds react with p-toluenesulfonyl chloride.



Statement (II) : Their products in the above reaction are soluble in aqueous NaOH.

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

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

Ans. (1)


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75. The emf of cell $\text{Tl} \left| \text{Tl}^+_{(0.001\text{M})} \right| \left| \text{Cu}^{2+}_{(0.01\text{M})} \right| \text{Cu}$ is 0.83 V at 298 K. It could be increased by :
- (1) increasing concentration of Tl^+ ions
 - (2) increasing concentration of both Tl^+ and Cu^{2+} ions
 - (3) decreasing concentration of both Tl^+ and Cu^{2+} ions
 - (4) increasing concentration of Cu^{2+} ions

Ans. (4)

76. Identify the correct statements about p-block elements and their compounds.

- (A) Non metals have higher electronegativity than metals.
 - (B) Non metals have lower ionisation enthalpy than metals.
 - (C) Compounds formed between highly reactive nonmetals and highly reactive metals are generally ionic.
 - (D) The non-metal oxides are generally basic in nature.
 - (E) The metal oxides are generally acidic or neutral in nature.
- (1) (D) and (E) only (2) (A) and (C) only
 (3) (B) and (E) only (4) (B) and (D) only

Ans. (2)

77. Given below are two statements :

Statement (I) : Kjeldahl method is applicable to estimate nitrogen in pyridine.

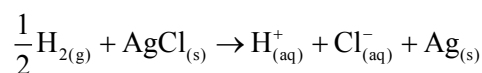
Statement (II) : The nitrogen present in pyridine can easily be converted into ammonium sulphate in Kjeldahl method.

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

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

Ans. (1)

78. The reaction ;



occurs in which of the following galvanic cell :

- (1) $\text{Pt} \left| \text{H}_{2(\text{g})} \right| \text{HCl}_{(\text{soln.})} \left| \text{AgCl}_{(\text{s})} \right| \text{Ag}$
- (2) $\text{Pt} \left| \text{H}_{2(\text{g})} \right| \text{HCl}_{(\text{soln.})} \left| \text{AgNO}_{3(\text{aq})} \right| \text{Ag}$
- (3) $\text{Pt} \left| \text{H}_{2(\text{g})} \right| \text{KCl}_{(\text{soln.})} \left| \text{AgCl}_{(\text{s})} \right| \text{Ag}$
- (4) $\text{Ag} \left| \text{AgCl}_{(\text{s})} \right| \text{KCl}_{(\text{soln.})} \left| \text{AgNO}_{3(\text{aq.})} \right| \text{Ag}$

Ans. (3)

79. Given below are two statements :

Statement (I) : Fusion of MnO_2 with KOH and an oxidising agent gives dark green K_2MnO_4 .

Statement (II) : Manganate ion on electrolytic oxidation in alkaline medium gives permanganate ion.

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

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

Ans. (1)

80. Match **List-I** with **List-II**.

List-I (Complex ion)	List-II (Spin only magnetic moment in B.M.)
(A) $[\text{Cr}(\text{NH}_3)_6]^{3+}$	(I) 4.90
(B) $[\text{NiCl}_4]^{2-}$	(II) 3.87
(C) $[\text{CoF}_6]^{3-}$	(III) 0.0
(D) $[\text{Ni}(\text{CN})_4]^{2-}$	(IV) 2.83

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

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

Ans. (3)



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SECTION-B

81. $\Delta_{\text{vap}} H^\ominus$ for water is $+40.49 \text{ kJ mol}^{-1}$ at 1 bar and 100°C . Change in internal energy for this vapourisation under same condition is _____ kJ mol^{-1} . (Integer answer)

(Given $R = 8.3 \text{ JK}^{-1} \text{ mol}^{-1}$)

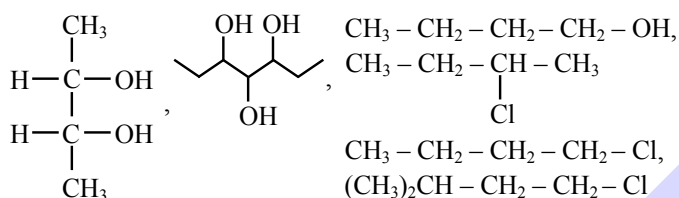
Ans. (38)

82. Number of molecules having bond order 2 from the following molecule is _____.

$\text{C}_2, \text{O}_2, \text{Be}_2, \text{Li}_2, \text{Ne}_2, \text{N}_2, \text{He}_2$

Ans. (2)

83. Total number of optically active compounds from the following is _____.



Ans. (1)

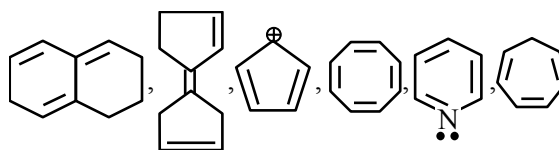
84. The total number of carbon atoms present in tyrosine, an amino acid, is _____.

Ans. (9)

85. Two moles of benzaldehyde and one mole of acetone under alkaline conditions using aqueous NaOH after heating gives x as the major product. The number of π bonds in the product x is

Ans. (9)

86. Total number of aromatic compounds among the following compounds is _____.



Ans. (1)

87. Molality of an aqueous solution of urea is 4.44 m. Mole fraction of urea in solution is $x \times 10^{-3}$.

Value of x is _____ (integer answer)

Ans. (74)

88. Total number of unpaired electrons in the complex ion $[\text{Co}(\text{NH}_3)_6]^{3+}$ and $[\text{NiCl}_4]^{2-}$ is

Ans. (2)

89. Wavenumber for a radiation having 5800 \AA wavelength is $x \times 10 \text{ cm}^{-1}$. The value of x is _____.

Ans. (1724)

90. A solution is prepared by adding 1 mole ethyl alcohol in 9 mole water. The mass percent of solute in the solution is _____ (Integer Answer)
 (Given : Molar mass in g mol^{-1} Ethyl alcohol : 46, water : 18)

Ans. (22)



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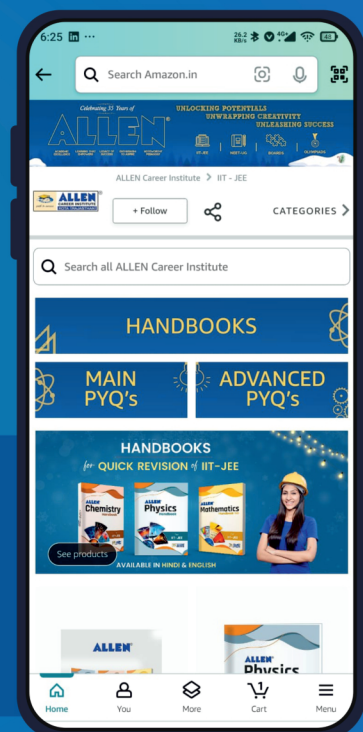
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