JEE Main January 2025

Question Paper With Text Solution

29 January | Shift-2

CHEMISTRY

MATRIX

JEE Main & Advanced | XI-XII Foundation| VI-X Pre-Foundation

Office : Piprali Road, Sikar (Raj.) | Ph. 01572-241911

Website : www.matrixedu.in ; Email : smd@matrixacademy.co.in

JEE MAIN JANUARY 2025 | 29TH JANUARY SHIFT-2

SECTION – A

Question ID :

51. Identify the homoleptic complexes with odd number of d electrons in the central metal :

(A) $[FeO_4]^{2-}$

(B) $[Fe(CN)_6]^{3-}$

(C) $[Fe(CN)_5NO]^{2-}$

(D) $[CoCl_4]^{2-}$

(E) $\left[Co(H_2O)_3\ F_3\right]$

Choose the correct answer from the options given below :

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

Ans. Official answer NTA (4)

Sol.

Question ID : 6564451180

52. Given below are two statements :

Statement (I): NaCl is added to the ice at $0^{\circ}C$, present in the ice cream box to prevent the melting of ice cream.

Statement (II) : On addition of NaCl to ice at $0^{\circ}C$, there is a depression in freezing point.

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

Ans. Official answer NTA (4)

Sol.

Question ID : 6564451182

53. O_2 gas will be evolved as a product of electrolysis of :

(A) an aqueous solution of $AgNO_3$ using silver electrodes.

(B) an aqueous solution of $AgNO_3$ using platinum electrodes.

(C) a dilute solution of H_2SO_4 using platinum electrodes.

(D) a high concentration solution of H_2SO_4 using platinum electrodes.

Choose the correct answer from the options given below :

(1) (B) and (C) only

(2) (A) and (C) only

(3) (B) and (D) only

(4) (A) and (D) only

Ans. Official answer NTA (1)

Sol.

Question ID : 6564451176

54. M solution of KI reacts with excess of H_2SO_4 and KIO_3 solutions. According to equation

$$5I^- + IO_3^- + 6H^+ \longrightarrow 3I_2 + 3H_2O$$

Identify the correct statements :

(A) 200 mL of KI solution reacts with 0.004 mol of KlO_3

(B) 200 mL of KI solution reacts with 0.006 mol of H_2SO_4

(C) 0.5 L of KI solution produced 0.005 mol of I_2

(D) Equivalent weight of KIO_3 is equal to $\left(\frac{\text{Molecular weight}}{5}\right)$

Choose the correct answer from the options given below :

(1) (A) and (B) only

(2) (C) and (D) only

(3) (B) and (C) only

(4) (A) and (D) only

Ans. Official answer NTA (4)

Sol.

Question ID : 6564451181

55. Consider the equilibrium

$CO(g) + 3H_2(g) = CH_4(g) + H_2O(g)$

If the pressure applied over the system increases by two fold at constant temperature then

(A) Concentration of reactants and products increases.
(B) Equilibrium will shift in forward direction.
(C) Equilibrium constant increases since concentration of products increases.
(D) Equilibrium constant remains unchanged as concentration of reactants and products remain same.
Choose the correct answer from the options given below :
(1) (B) and (C) only
(2) (A), (B) and (D) only
(3) (A), (B) and (C) only
(3) (A) and (B) only

Ans. Official answer NTA (4)

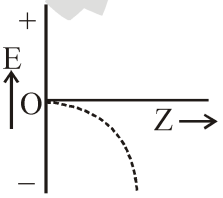
Sol.

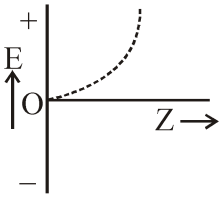
Question ID : 6564451178

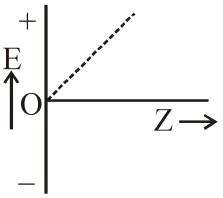
56. For hydrogen like species, which of the following graphs provides the most appropriate representation of E vs Z plot for a constant n ?

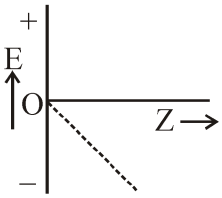
[E : Energy of the stationary state,

Z : atomic number, n = principal quantum number]

(1) 

(2) 

(3) 

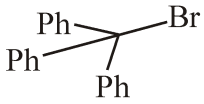
(4) 

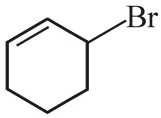
Ans. Official answer NTA (1)

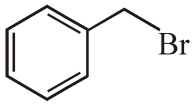
Sol.

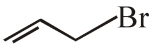
Question ID : 6564451192

57. Which among the following halides will generate the most stable carbocation in the nucleophilic substitution reaction?

(1) 

(2) 

(3) 

(4) 

Ans. Official answer NTA (1)

Sol.

Question ID : 6564451185

58. The type of oxide formed by the element among Li, Na, Be, Mg, B and Al that has the least atomic radius is :

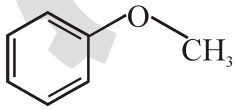
(1) A_2O (2) A_2O_3 (3) AO_2 (4) AO

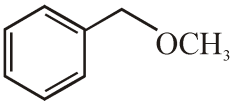
Ans. Official answer NTA (2)

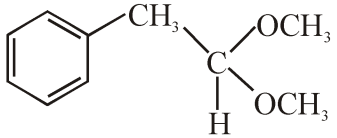
Sol.

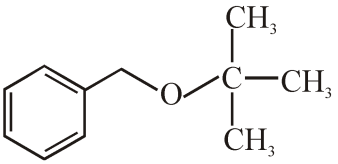
Question ID : 6564451193

59. Which one of the following with HBr will given a phenol ?

(1) 

(2) 

(3) 

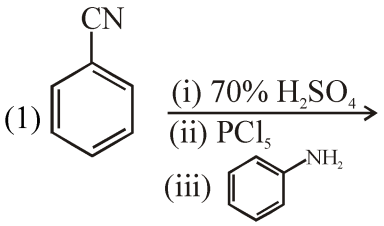
(4) 

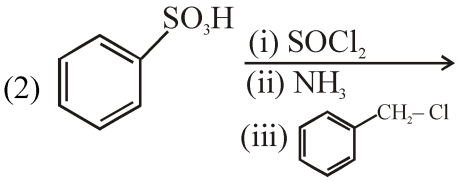
Ans. Official answer NTA (1)

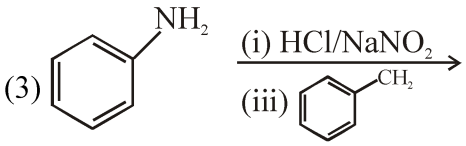
Sol.

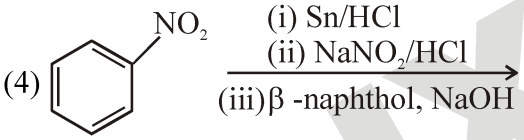
Question ID : 6564451194

60. Which one of the following reaction sequences will given an azo dye ?

(1) 

(2) 

(3) 

(4) 

Ans.

Ans. Official answer NTA (4)

Question ID : 6564451177

61. Given below are two statements :

Statement (I) : It is impossible to specify simultaneously with arbitrary precision, both the linear momentum and the position of a particle.

Statement (II) : If the uncertainty in the measurement of position and uncertainty in measurement of momentum are equal for an electron, then the uncertainty in the measurement of velocity is $\geq \sqrt{\frac{h}{\pi} \times \frac{1}{2m}}$

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 are false

(4) Both Statement I and Statement II are true

Ans. Official answer NTA (4)

Sol.

Question ID : 6564451190

62. Total number of sigma (σ) ..... and pi(π) ..... bond respectively present in hex-1-en-4-yne are :

(1) 3 and 13 (2) 13 and 3 (3) 14 and 3 (4) 11 and 3

Ans. Official answer NTA (2)

Sol.

Question ID : 6564451189

63. Given below are two statements :

Statement (I): In partition chromatography, stationary phase is thin film of liquid present in the inert support.

Statement (II) : In paper chromatography, the material of paper acts as a stationary phase.

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 are false

(4) Both Statement I and Statement II are true

Ans. Official answer NTA (1)

Sol.

Question ID : 6564451184

64. Drug X becomes ineffective after 50 % decomposition. The original concentration of drug in a bottle was 16 mg/ML which becomes 4 mg/mL. in 12 months. The expiry time of the drug in months is ..... .

Assume that the decomposition of the drug follows first order kinetics.

(1) 6 (2) 12 (3) 2 (4) 3

Ans. Official answer NTA (1)

Sol.

Question ID : 6564451187

65. The calculated spin-only magnetic moments of $K_3[Fe(OH)_6]$ and $K_4[Fe(OH)_6]$ respectively are :

(1) 4.90 and 5.92 B.M.

(2) 5.92 and 4.90 B.M.

(3) 4.90 and 4.90 B.M.

(4) 3.87 and 4.90 B.M.

Ans. Official answer NTA (2)

Sol.

Question ID : 6564451179

66. $C(diamond) \rightarrow C(graphite) + XkJ\,mol^{-1}$

$C(diamond) + O_2(g) \rightarrow CO_2(g) + YkJ\,mol^{-1}$

$C(graphite) + O_2(g) \rightarrow CO_2(g) + Z\,kJmol^{-1}$

at constant temperature. Then

(1) $X = -Y + Z$ (2) $X = Y - Z$ (3) $-X = Y + Z$ (4) $X = Y + Z$

Ans. Official answer NTA (2)

Sol.

Question ID : 6564451195

67. Identify the essential amino acids from below :

(A) Valine

(B) Proline

(C) Lysine

(D) Threonine

(E) Tyrosine

Choose the correct answer from the options given below :

(1) (A), (C) and (D) only

(2) (C), (D) and (E) only

(3) (A), (C) and (E) only

(4) (B), (C) and (E) only

Ans. Official answer NTA (1)

Sol.

Question ID : 6564451183

68. Match List - I with List - II :

List - I	List-II
Applications	Batteries/Cell
(A) Transistors	(I)Anode – Zn / Hg; Cathode - HgO + C
(B) Hearing aids	(II) Hydrpgen fuel cell
(C) Invertors	(III) Anode - Zn ; Cathode - Carbon
(D) Apollo space ship	(IV) Anode - Pb; Cathode - Pb | PbO_2

Choose the correct answer from the options given below :

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

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

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

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

Ans. Official answer NTA (3)

Sol.

Question ID : 6564451191

69. Given below are two statements :

Statement (I): On nitration of m-xylene with HNO_3, $H2SO_4$ followed by oxidation, 4-nitrobenzene-1,3-dicarboxylic acid is obtained as the major product.

Statement (II) : $-CH_3$ group is o/p-directing while $-NO_2$ group is m-directing group.

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) Both Statement I and Statement II are false

(3) Both Statement I and Statement II are true

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

Ans. Official answer NTA (3)

Sol.

Question ID : 6564451186

70. First ionisation enthalpy values of first four group 15 elements are given below. Choose the correct value for the element that is a main component of apatite family :

(1) $834\,kJ\,mol^{-1}$

(2) $947\,kJ\,mol^{-1}$

(3) $1402\,kJ\,mol^{-1}$

(4) $1012\,kJ\,mol^{-1}$

Ans. Official answer NTA (4)

Sol.

Question ID : 6564451200

71. In the Claisen-Schmidt reaction to prepare, dibenzalacetone from 5.3 g of benzaldehyde, a total of 3.51 g of product was obtained. The percentage yield in this reaction was _____ %.

Ans. Official answer NTA (60)

Sol.

Question ID : 6564451199

72. Isomeric hydrocarbons $\rightarrow$ negative Baeyer's test

(Molecular formula C_9H_{12})

The total number of isomers from above with four different non-aliphatic substitution sites is -

Ans. Official answer NTA (2)

Sol.

Question ID : 6564451197

73. Consider the following low-spin complexes

$K_3\left[Co(NO_2)_6\right], K_4\left[Fe(CN)_6\right], K_3\left[Fe(CN)_6\right], Cu_2\left[Fe(CN)_6\right]$ *and* $Zn_2\left[Fe(CN)_6\right]$

The sum of the spin-only magnetic moment values of complexes having yellow colour is _____ B.M.

(answer in nearest integer)

Ans. Official answer NTA (0)

Sol.

Question ID : 6564451198

74. In the sulphur estimation, 0.20 g of a pure organic compound gave 0.40 g of barium sulphate. The percentage of sulphur in the compound is _____ $\times 10^{-1}\%$.

(Molar mass : O =16, S =32,Ba =137 in g mol^{-1})

Ans. Official answer NTA (275)

Sol.

Question ID : 6564451196

75. Total number of non bonded electrons present in NO_2^- ion based on Lewis theory is _____.

Ans. Official answer NTA (12)

Sol.