JEE Main January 2025

Question Paper With Text Solution

22 January | Shift-1

CHEMISTRY

MATRIX

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

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JEE MAIN JANUARY 2025 | 22TH JANUARY SHIFT-1

SECTION – A

Question ID : 656445140

656445129

51. The incorrect statements regarding geometrical isomerism are :

(A) Propene shows geometrical isomerism.

(B) Trans isomer has identical atoms/groups on the opposite sides of the double bond.

(C) Cis-but-2-ene has higher dipole moment than trans-but-2-ene.

(D) 2-methylbut-2-ene shows two geometrical isomers.

(E) Trans-isomer has lower melting point than cis isomer.

Choose the correct answer from the options given below :

(1) (A), (D) and (E) Only

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

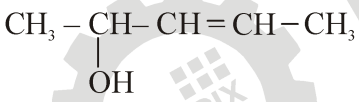
(3) (A) and (E) Only

(4) (B) and (C) Only

Ans. Official answer NTA (1)

Question ID : 656445139

52. How many different stereoisomers are possible for the given molecule :



(1) 3 (2) 1 (3) 4 (4) 2

Ans. Official answer NTA (3)

Question ID : 656445141

53. Given below are two statements :

Statement I : One mole of propyne reacts with excess of sodium to liberate half a mole of H_2 gas.

Statement II : Four g of propyne reacts with $NaNH_2$ to liberate NH_3 gas which occupies 224 mL at STP.

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

(1) Statement I is correct but Statement II is incorrect.

(2) Both Statement I and Statement II are correct

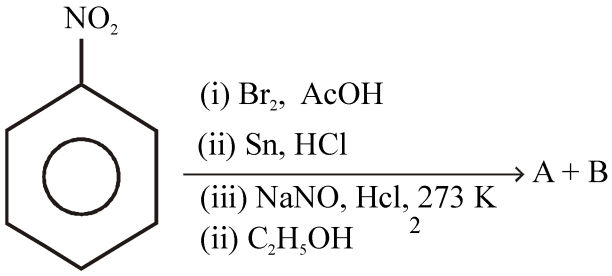
(3) Statement I is incorrect but Statement II is correct

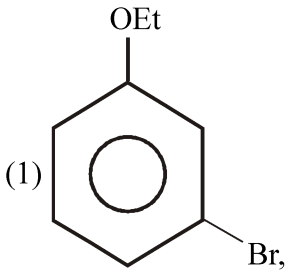
(4) Both Statement I and Statement II are incorrect

Ans. Official answer NTA (1)

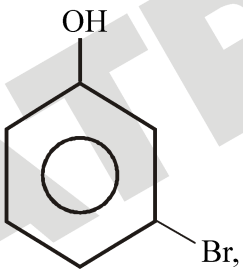
Question ID : 656445143

54. The products formed in the following reaction sequence are :

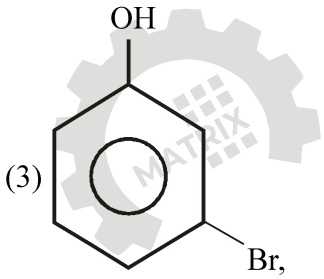


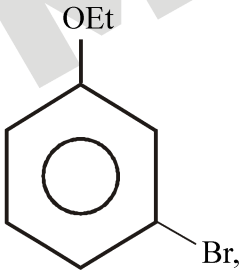
(1) 

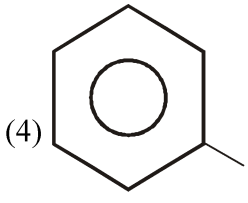
CH_2-COOH

(2) 

CH_3-CHO

(3) 



(4) 

CH_3-CHO

Ans. Official answer NTA (4)

Question ID : 656445128

55. Arrange the following solutions in order of their increasing boiling points :

(i) 10^{-4} M NaCl (ii) 10^{-4} M Urea (iii) 10^{-3} M NaCl (iv) 10^{-2} M NaCl

(1) (iv) < (iii) < (i) < (ii)

(2) (ii) < (i) ≡ (iii) < (iv)

(3) (i) < (ii) < (iii) < (iv)

(4) (ii) < (i) < (iii) < (iv)

Ans. Official answer NTA (4)

Question ID : 656445127

56. A liquid when kept inside a thermally insulated closed vessel at 25° C was mechanically stirred from outside. What will be the correct option for the following thermodynamic parameters :

(1) $\Delta U > 0, q = 0, w > 0$

(2) $\Delta U < 0, q = 0, w > 0$

(3) $\Delta U = 0, q < 0, w > 0$

(4) $\Delta U = 0, q = 0, w = 0$

Ans. Official answer NTA (1)

Question ID : 656445134

57. Match List-I with List-II.

List-I	List-II
(A) $Al^{3} < Mg^{2+} < Na^{+} < F^{-}$	(I) Ionisation Enthalpy
(B) B < C < O < N	(II) Metallic character
(C) B < Al < Mg < K	(III) Electronegativity
(D) Si < P < S < Cl	(IV) Ionic radii

Choose the correct answer from the options given below :

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

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

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

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

Ans. Official answer NTA (2)

Question ID : 656445133

58. Which of the following electronegativity order is incorrect :

(1) S < Cl < O < F

(2) Al < Mg < B < N

(3) Al < Si < C < N

(4) Mg < Be < B < N

Ans. Official answer NTA (2)

Question ID : 656445132

59. Which of the following statement is not true for radioactive decay :

(1) Decay constant does not depend upon temperature.

(2) Amount of radioactive substance remained after three half lives is $\frac{1}{8}$ original amount.

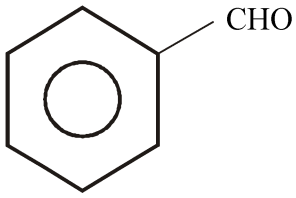
(3) Half life is 2 times of $\frac{1}{\text{rate constant}}$

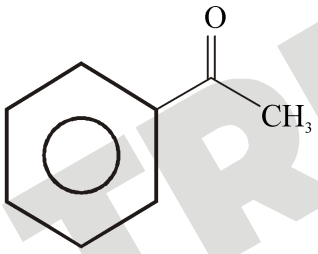
(4) Decay constant increases with increase in temperature.

Ans. Official answer NTA (4)

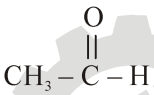
Question ID : 656445145

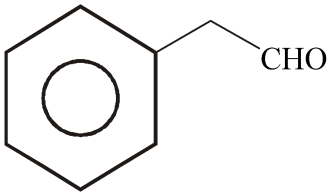
60. The compounds which give positive Fehling's test are :

(A) 

(B) 

(C) $HOCH_2 - CO - (CHOH)_3 - CH_2 - OH$

(D) 

(E) 

Choose the correct answer from the options given below :

(1) (A), (D) and (E) Only

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

(3) (A), (C) and (D) Only

(4) (A), (B) and (C) Only

Ans. Official answer NTA (2)

Sol.

Question ID : 656445129

61. A vessel at 1000 K contains CO_2 with a pressure of 0.5 atm. Some of CO_2 is converted into CO on addition of graphite. If total pressure at equilibrium is 0.8 atm, then Kp is :

(1) 0.3 atm (2) 0.18 atm (3) 3 atm (4) 1.8 atm

Ans. Official answer NTA (4)

Sol.

Question ID : 656445144

62. Which of the following acids is a vitamin :

(1) Saccharic acid (2) Adipic acid

(3) Ascorbic acid (4) Aspartic acid

Ans. Official answer NTA (3)

Sol.

Question ID : 656445136

63. From the magnetic behaviour of $[NiCl_4]^{2-}$ (paramagnetic) and $[Ni(CO_4]$ (diamagnetic), choose the correct geometry and oxidation state. :

(1) $\begin{matrix}[NiCl_4]^{2-} : Ni^{II}, \text{square planar} \\ [Ni(CO)_4] : Ni(0), \text{square planar}\end{matrix}$

(2) $\begin{matrix}[NiCl_4]^{2-} : Ni(0), \text{tetrahedral} \\ [Ni(CO)_4] : Ni(0), \text{square planar}\end{matrix}$

(3) $\begin{matrix}[NiCl_4]^{2-} : Ni^{II}, \text{tetrahedral} \\ [Ni(CO)_4] : Ni^{II}, \text{square planar}\end{matrix}$

(4) $\begin{matrix}[NiCl_4]^{2-} : Ni^{II}, \text{tetrahedral} \\ [Ni(CO)_4] : Ni(0), \text{tetrahedral}\end{matrix}$

Ans. Official answer NTA (4)

Sol.

Question ID : 656445131

64. Which of the following electrolyte can be used to obtain $H_2S_2O_8$ by the process of electrolysis :

(1) Dilute solution of sulphuric acid (2) Concentrated solution of sulphuric acid

(3) Acidified dilute solution of sodium sulphate (4) Dilute solution of sodium sulphate

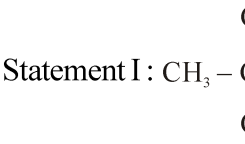
Ans. Official answer NTA (2)

Sol.

Question ID : 656445142

65. Given below are two statements :

Statement I : $CH_3 - O - CH_2 - Cl$ will undergo S_N1 reaction though it is a primary halide.

Statement I :  will not undergo S_N2 reaction very easily though it is a primary halide.

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

(1) Both Statement I and Statement II are incorrect

(2) Both Statement I and Statement II are correct

(3) Statement I is incorrect but Statement II is correct

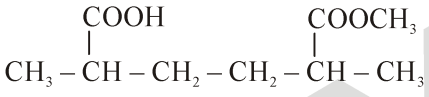
(4) Statement I is correct but Statement II is incorrect

Ans. Official answer NTA (2)

Sol.

Question ID : 656445138

66. The IUPAC name of the following compound is :



(1) Methyl-6-carboxy-2,5-dimethylhexanoate

(2) 2-Carboxy-5-methoxycarbonylhexane

(3) Methyl-5-carboxy-2-methylhexanoate

(4) 6-Methoxycarbonyl-2,5-dimethylhexanoic acid

Ans. Official answer NTA (4)

Sol.

Question ID : 656445130

67. A solution of aluminium chloride is electrolysed for 30 minutes using a current of 2 A. The amount of the aluminium deposited at the cathode is _____ :

[Given : molar mass of aluminium and chlorine are 27 g mol^{-1} and 35.5 g mol^{-1} respectively.

Faraday constant = 96500 C mol^{-1}]

(1) 1.007 g (2) 0.336 g (3) 0.441 g (4) 1.660 g

Ans. Official answer NTA (2)

Sol.

Question ID : 656445135

68. Lanthanoid ions with $4f^7$ configuration are :

(A) Eu^{2+} (B) Gd^{3+} (C) Eu^{2+}

(D) Tb^{3+} (E) Sm^{2+}

Choose the correct answer from the options given below :

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

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

Ans. Official answer NTA (2)

Sol.

Question ID : 656445126

69. Radius of the first excited state of Helium ion is given as :

$a_0 \rightarrow$ radius of first stationary state of hydrogen atom :

(1) $r = 2a_0$ (2) $r = \frac{a_0}{2}$ (3) $r = 4a_0$ (4) $r = \frac{a_0}{4}$

Ans. Official answer NTA (1)

Sol.

Question ID : 656445137

70. In which of the following complexes the CFSE, Δ_o will be equal to zero :

(1) $[Fe(NH_3)_6]Br_2$ (2) $[Fe(en)_3]Cl_3$

(3) $K_3[Fe(SCN)_6]$ (4) $K_4[Fe(CN)_6]$

Ans. Official answer NTA (3)

Sol.

SECTION – B

Question ID : 656445146

71. Some CO_2 gas was kept in a sealed container at a pressure of 1 atm and at 273 K . This entire amount of CO_2 gas was later passed through an aqueous solution of $Ca(OH)_2$. The excess unreacted $Ca(OH)_2$ was later neutralized with 0.1 M of 40 mL HCl. If the volume of the sealed container of CO_2 was x, then x is _____ cm^3 (nearest integer).
[Given : The entire amount of CO_2 (g) reacted with exactly half the initial amount of $Ca(OH)_2$ present in thequeous solution.]

Ans. Official answer NTA (45)

Sol.

Question ID : 656445148

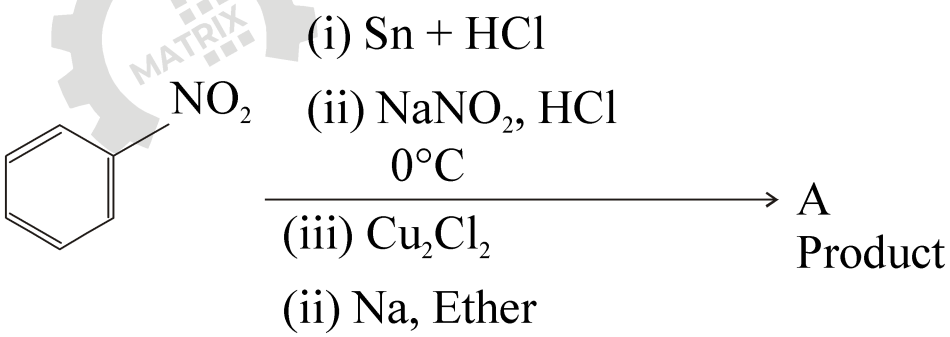
72. $A \rightarrow B$ The molecule A changes into its isomeric form B by following a first order kinetics at a temperature of 1000 K . If the energy barrier with respect to reactant energy for such isomeric transformation is 191.48 kJ mol^{-1} and the frequency factor is 10^{20}, the time required for 50% molecules of A to become B is _____ picoseconds (nearest integer). [R = 8.314 J K^{-1} mol^{-1}]

Ans. Official answer NTA (69)

Sol.

Question ID : 656445150

73. Consider the following sequence of reactions :



Molar mass of the product formed (A) is _____ g mol^{-1}.

Ans. Official answer NTA (154)

Sol.

Question ID : 656445149

74. In Carius method for estimation of halogens, 180 mg of an organic compound produced 143.5 mg of AgCl . The percentage composition of chlorine in the compound is _____ %.

(Given : molar mass in g mol^{-1} of Ag : 108, Cl : 35.5)

Ans. Official answer NTA (20)

Sol.

Question ID : 656445147

75. The number of molecules / ions that show linear geometry among the following is____

$SO_2, BeCl_2, CO_2, N_3^-, NO_2, F_2O, XeF_2, NO_2^+, I_3^-, O_3$

Ans. Official answer NTA (6)

Sol.