JEE Main April 2024

Question Paper With Text Solution

06 April | Shift-2

CHEMISTRY

MATRIX

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

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61. Match List-I with List-II

List-I	List-II
Tetrahedral Complex	Electronic configuration
(A) $TiCl_4$	(I) e^2, t_2^0
(B) $[FeO_4]^{2-}$	(II) e^4, t_2^3
(C) $[FeCl_4]^-$	(III) e^0, t_2^0
(D) $[CoCl_4]^{2-}$	(IV) e^2, t_2^3

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

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

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

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

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

Question ID: 87827055948

Ans. Official Answer by NTA (3)

Sol.

62. Match List-I with List-II

List-I	List-II
Alkali Metal	Emission Wavelength in nm
(A) Li	(I) 589.2
(B) Na	(II) 455.5
(C) Rb	(III) 670.8
(D) Cs	(IV) 780.0

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

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

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

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

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

Question ID: 87827055943

Ans. Official Answer by NTA (1)

Sol.

63. Given below are two statements :

Statement 1 : PF_5 and BrF_5 both exhibit sp^3d hybridisation.

Statement II : Both SF_6 and $[Co(NH_3)_6]^{3+}$ exhibit sp^3d^2 hybridisation.

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) Statement I is true but Statement II is false

(3) Both Statement I and Statement II are false

(4) Both Statement I and Statement II are true

Question ID: 87827055939

Ans. Official Answer by NTA (3)

Sol.

64. How can an electrochemical cell be converted into an electrolytic cell?

(1) Applying an external opposite potential lower than E^0_{cell}.

(2) Exchanging the electrodes at anode and cathode.

(3) Reversing the flow of ions in salt bridge.

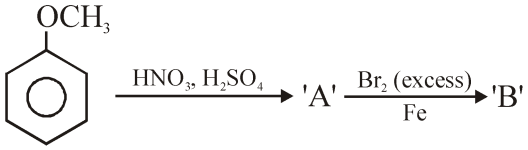
(4) Applying an external opposite potential greater than E^0_{cell}.

Question ID: 87827055942

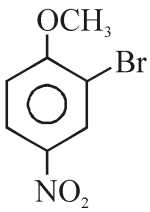
Ans. Official Answer by NTA (4)

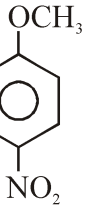
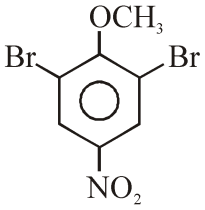
Sol.

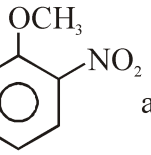
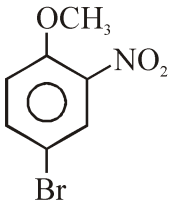
65. The major products formed :

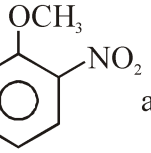
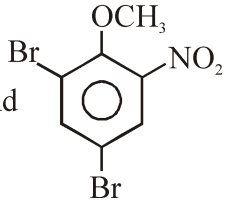


A and B respectively are :

(1)  and 

(2)  and 

(3)  and 

(4)  and 

Question ID: 87827055956

Ans. Official Answer by NTA (2)

Sol.

66. During the detection of acidic radical present in a salt, a student gets a pale yellow precipitate soluble with difficulty in NH_4OH solution when sodium carbonate extract was first acidified with dil HNO_3 and then $AgNO_3$ solution was added. This indicates presence of :

(1) I^- (2) Br^- (3) CO_3^{2-} (4) Cl^-

Question ID: 87827055949

Ans. Official Answer by NTA (2)

Sol.

67. The number of ions from the following that are expected to behave as oxidising agent is :

Sn^{4+}, Sn^{2+}, Pb^{2+}, Tl^{3+}, Pb^{4+}, Tl^+

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

Question ID: 87827055944

Ans. Official Answer by NTA (1)

Sol.

68. The correct IUPAC name of $[PtBr_2(PMe_3)_2]$ is :

(1) bis(trimethylphosphine) dibromoplatinum (II)

(2) dibromobis(trimethylphosphine)platinum (II)

(3) dibromodi(trimethylphosphine)platinum (II)

(4) bis[bromo(trimethylphosphine)]platinum (II)

Question ID: 87827055947

Ans. Official Answer by NTA (2)

Sol.

69. Consider the given reaction, identify the major product P.

$$CH_3–COOH \xrightarrow[(iv)H_2O/\bar{O}H,\Delta]{(i)LiAlH_4\ (ii)PCC\ (iii)HCN/\bar{O}H} \text{"P"}$$

(1) $CH_3–\underset{\displaystyle OH}{\underset{|}{CH}}–COOH$

(2) $CH_3–\overset{\displaystyle O}{\overset{\|}{C}}–CH_2CH_3$

(3) $CH_3–CH_2–\overset{\displaystyle O}{\overset{\|}{C}}–NH_2$

(4) $CH_3–CH_2–CH_2–OH$

Question ID: 87827055955

Ans. Official Answer by NTA (1)

Sol.

70. Evaluate the following statements related to group 14 elements for their correctness.

(A) Covalent radius decreases down the group from C to Pb in a regular manner.

(B) Electronegativity decreases from C to Pb down the group gradually.

(C) Maximum covalance of C is 4 whereas other elements can expand their covalance due to presence of d orbitals.

(D) Heavier elements do not form pπ-pπ bonds.

(E) Carbon can exhibit negative oxidation states.

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

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

Question ID: 87827055945

Ans. Official Answer by NTA (1)

Sol.

71. The ratio $\frac{K_p}{K_C}$ for the reaction :

$CO(g) + \frac{1}{2}O_2(g) \rightleftharpoons CO_2(g)$ is :

(1) 1 (2) $\frac{1}{\sqrt{RT}}$ (3) $(RT)^{1/2}$ (4) RT

Question ID: 87827055940

Ans. Official Answer by NTA (2)

Sol.

72. The incorrect statements regarding enzymes are :

(A) Enzymes are biocatalysts.

(B) Enzymes are non-specific and can catalyse different kinds of reactions.

(C) Most Enzmes are globular proteins.

(D) Enzyme - oxidase catalyses the hydrolysis of maltose into glucose.

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

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

Question ID: 87827055957

Ans. Official Answer by NTA (2)

Sol.

73. The correct statement among the following, for a "chromatography" purification method is :

(1) Non-polar compounds are retained at top and polar compounds come down in column chromatography.

(2) R_f is an integral value

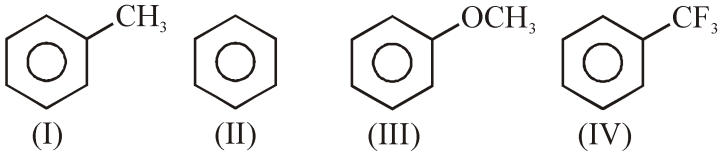
(3) R_f of a polar compound is smaller than that of a non-polar compund.

(4) Organic compounds run faster than solvent in the thin layer chromatographic plate.

Question ID: 87827055950

Ans. Official Answer by NTA (3)

Sol.

74. 

(I) (II) (III) (IV)

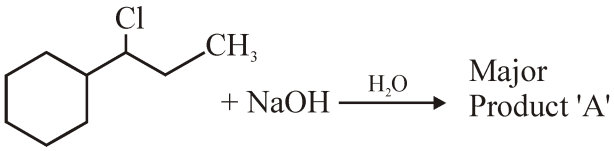
The correct arragenment for decreasing order of electrophilic substitution for above compounds is :

(1) III > IV > II > I (2) IV > I > II > III (3) II > IV > III > I (4) III > I > II > IV

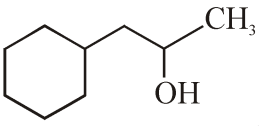
Question ID: 87827055951

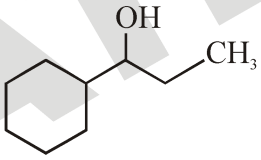
Ans. Official Answer by NTA (4)

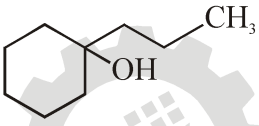
Sol.

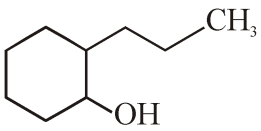
75. 

Consider the above chemical reaction. Product "A" is :

(1) 

(2) 

(3) 

(4) 

Question ID: 87827055953

Ans. Official Answer by NTA (3)

Sol.

76. Molality (m) of 3 M aqueous solution of NaCl is :

(Given : Density of solution = 1.25 g mL^{-1}, Molar mass in g mol^{-1} : Na-23, Cl-35.5)

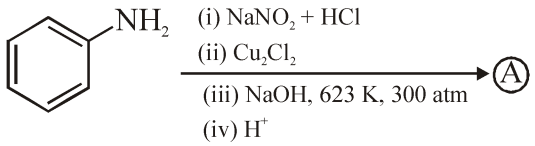
(1) 1.90 m (2) 3.85 m (3) 2.90 m (4) 2.79 m

Question ID: 87827055938

Ans. Official Answer by NTA (4)

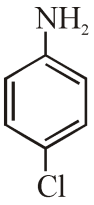
Sol.

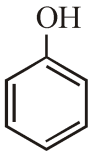
77. Identify the product Ⓐ in the following reaction.



(1) 

(2) 

(3) 

(4) 

Question ID: 87827055954

Ans. Official Answer by NTA (4)

Sol.

78. Arrange the following elements in the increasing order of number of unpaired electrons in it.

(A) Sc

(B) Cr

(C) V

(D) Ti

(E) Mn

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

(1) (A) < (D) < (C) < (E) < (B)

(2) (B) < (C) < (D) < (E) < (A)

(3) (A) < (D) < (C) < (B) < (E)

(4) (C) < (E) < (B) < (A) < (D)

Question ID: 87827055946

Ans. Official Answer by NTA (1)

Sol.

79. Match List-I with List-II

List-I Reaction	List-II Type of redox reaction
(A) $N_{2(g)}+O_{2(g)} \rightarrow 2NO_{(g)}$	(I) Decomposition
(B) $2Pb(NO_3)_{2(s)} \rightarrow 2PbO_{(s)} + 4NO_{2(g)} + O_{2(g)}$	(II) Displacement
(C) $2Na_{(s)} + 2H_2O_{(l)} \rightarrow 2NaOH_{(aq.)} + H_{2(g)}$	(III) Disproportionation

(D) $2NO_{2(s)} + 2^{-}OH_{(aq.)} \rightarrow NO_{2(aq)}^{-} + NO_{3(aq.)}^{-} + H_2O_{(l)}$ (IV) Combination

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

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

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

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

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

Question ID: 87827055941

Ans. Official Answer by NTA (1)

Sol.

80. The incorrect statement regarding the geometrical isomers of 2-butene is ;

(1) cis-2-butene has less dipole moment than trans-2-butene.

(2) cis-2-butene and trans-2-butene are not interconvertible at room temperature.

(3) trans-2-butene is more stable than cis-2-butene.

(4) cis-2-butene and trans-2-butene are stereoisomers.

Question ID: 87827055952

Ans. Official Answer by NTA (1)

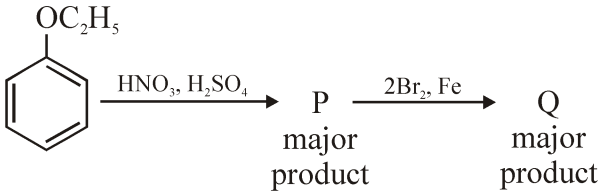
Sol.

81. For the reaction at 298 K, $2A + B \rightarrow C$. $\Delta H = 400$ kJ mol^{-1} and $\Delta S = 0.2$ kJ mol^{-1} K^{-1}. The reaction will become spontaneous above _____ K.

Question ID: 87827055960

Ans. Official Answer by NTA (2000)

Sol.

82. 

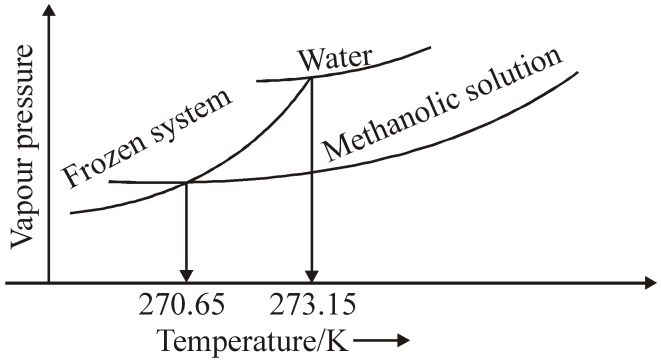
The ratio of number of oxygen atoms to bromine atoms in the product Q is _____ $\times 10^{-1}$.

Question ID: 87827055966

Ans. Official Answer by NTA (15)

Sol.

83. When 'x' × 10^{-2} mL methanol (molar mass = 32 g; density = 0.792 g/cm^3) is added to 100 mL water (density = 1 g/cm^3), the following diagram is obtained.



x = _____ (nearest integer).

[Given : Molal freezing point depression constant of water at 273.15 K is 1.86 K kg mol^{-1}]

Question ID: 87827055961

Ans. Official Answer by NTA (543)

Sol.

84. An amine (X) is prepared by amnmonolvsis of benzyl chloride. On adding p-toluenesulphonyl chloride to it the solution remains clear. Molar mass of the amine (X) formed is _____ g mol^{-1}.

(Given molar mass in gmol^{-1} C : 12, H :1, O :16, N : 14)

Question ID: 87827055967

Ans. Official Answer by NTA (287)

Sol.

85. Total number of species from the following with central atom utilising sp^2 hybrid orbitals for bonding is _____.

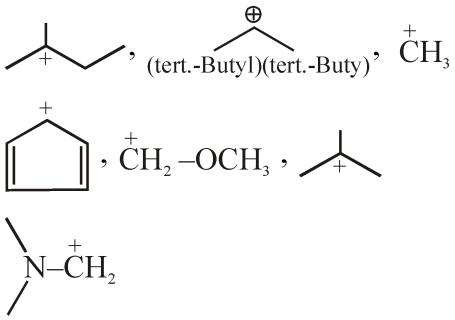
NH_3, SO_2, SiO_2, $BeCl_2$, C_2H_2, C_2H_4, BCl_3, HCHO, C_6H_6, BF_3, $C_2H_4Cl_2$

Question ID: 87827055959

Ans. Official Answer by NTA (6)

Sol.

86. Number of carbocations from the following that are not stabilized by hyperconjugation is _____.



Question ID: 87827055965

Ans. Official Answer by NTA (5)

Sol.

87. Consider the following reactions

$$NiS + HNO_3 + HCl \rightarrow A + NO + S + H_2O$$

$$A + NH_4OH + \underset{\underset{H_3C - \overset{|}{C} = N - OH}{|}}{H_3C - C = N - OH} \rightarrow B + NH_4Cl + H_2O$$

The number of protons that do not involve in hydrogen bonding in the product B is _____.

Question ID: 87827055964

Ans. Official Answer by NTA (12)

Sol.

88. Among VO_2^+, MnO_4^- and $Cr_2O_7^{2-}$, the spin-only magnetic moment value of the species with least oxidising ability is _____ BM (Nearest integer)

(Given atomic member V = 23, Mn = 25, Cr = 24)

Question ID: 87827055963

Ans. Official Answer by NTA (0)

Sol.

89. For hydrogen atom, energy of an electron in first excited state is –3.4eV, K.E. of the same electron of hydrogen atom is x eV. Value of x is _____ $\times 10^{-1}$ eV. (Nearest integer)

Question ID: 87827055958

Ans. Official Answer by NTA (34)

Sol.

90. Consider the two different first order reactions given below

$A + B \rightarrow C$ (Reaction 1)

$P \rightarrow Q$ (Reaction 2)

The ratio of the half life of Reaction 1 : Reaction 2 is 5 : 2. If t_1 and t_2 represent the time taken to complete 2/3rd and 4/5th of Reaction 1 and Reaction 2, respectively, then the value of the ratio

$t_1 : t_2$ is _____ $\times 10^{-1}$ (nearest integer).

[Given : $\log_{10}(3) = 0.477$ and $\log_{10}(5) = 0.699$]

Question ID: 87827055962

Ans. Official Answer by NTA (17)

Sol.