JEE Main April 2024

Question Paper With Text Solution

09 April | Shift-1

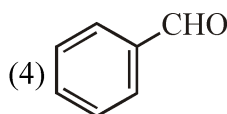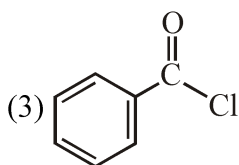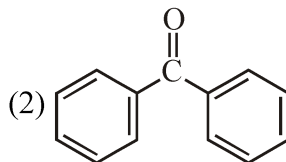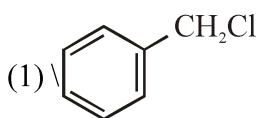# CHEMISTRY

61. Identify major product "X" formed in the following reaction :

$$\xrightarrow[\text{Anhydrous AlCl}_3/\text{CuCl}]{\text{CO, HCl}} \text{X (Major Product)}$$

(1) CH₂Cl (benzene ring with CH_2Cl substituent)

(2) O=C (benzophenone structure — two benzene rings with C=O)

(3) O=C–Cl (benzene ring with $COCl$ substituent)

(4) CHO (benzene ring with CHO substituent)
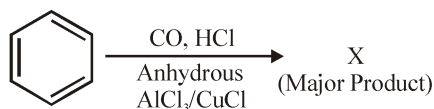
Question ID: 87827056222

Ans. Official Answer by NTA (4)

Sol.

62. On reaction of Lead Sulphide with dilute nitric acid which of the following is not formed ?

(1) Nitrous oxide   (2) Nitric oxide   (3) Lead nitrate   (4) Sulphur

Question ID: 87827056226

Ans. Official Answer by NTA (1)

Sol.

63. Relative stability of the contributiong structures is :

$$CH_2=CH-\overset{\overset{\displaystyle :O:}{\|}}{C}-H \longleftrightarrow \overset{+}{C}H_2-CH=\overset{\overset{\displaystyle :\overset{..}{O}:^-}{\|}}{C}-H \longleftrightarrow :\overset{-}{C}H_2-CH=\overset{\overset{\displaystyle :\overset{..}{O}+}{\|}}{C}-H$$

        (I)   (II)   (III)

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

Question ID: 87827056218

Ans. Official Answer by NTA (4)

Sol.

64. In which one of the following pairs the central atoms exhibit sp^2 hybridization ?

(1) NH_2^- and BF_3 (2) H_2O and NO_2 (3) NH_2^- and H_2O (4) BF_3 and NO_2^-

Question ID: 87827056209

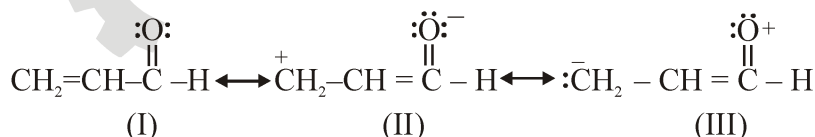**MATRIX JEE ACADEMY**
Office : Piprali Road, Sikar (Raj.) | Ph. 01572-241911
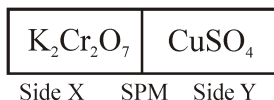**Website :** www.matrixedu.in ; Email : smd@matrixacademy.co.in

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Ans.   Official Answer by NTA (4)

Sol.

65.   0.05M $CuSO_4$ when treated with 0.01M $K_2Cr_2O_7$ gives green colour solution of $Cu_2Cr_2O_7$. The two solutions are separated as shown below :

[SPM : Semi Permeable Membrane]

$K_2Cr_2O_7$	$CuSO_4$
Side X SPM	Side Y

Due to osmosis :

(1) Molarity of $CuSO_4$ slution is lowered.   (2) Molarity of $K_2Cr_2O_7$ solution is lowered.

(3) Green colour formation observed on side Y. (4) Gree colour formation observed on side X.

Question ID: 87827056210

Ans.   Official Answer by NTA (1)

Sol.

66.   Compare the energies of following sets of quantum numbers for multielectron system.

(A) n = 4, l = 1

(B) n = 4, l = 2

(C) n = 3, l = 1

(D) n = 3, l = 2

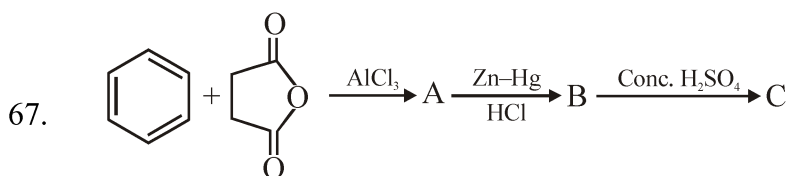(E) n = 4, l = 0

Choose the correct answer from the options given below :

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

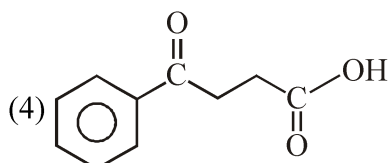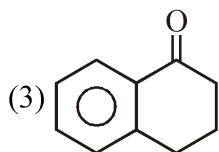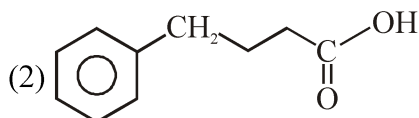(3) (B) > (A) > (C) > (E) > (D)   (4) (E) < (C) < (D) < (A) < (B)
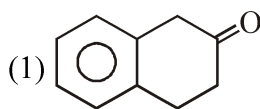
Question ID: 87827056208

Ans.   Official Answer by NTA (2)

Sol.

67.

What is the structure of C ?

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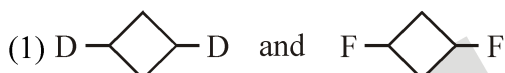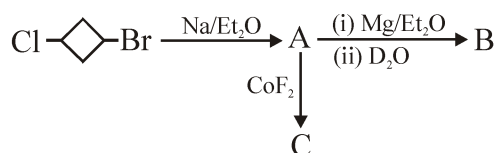**Page No. 3**

(1)

(2)

(3)

(4)

Question ID: 87827056219

Ans.   Official Answer by NTA (3)

Sol.

68.   In the following sequence of reaction, the major products B and C respectively are :

(1)

(2)

(3)

(4)

Question ID: 87827056221

Ans.   Official Answer by NTA (2)

Sol.

69.   Given below are two statments : one is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A) : S_N2 reaction of $C_6H_5CH_2Br$ occurs more readily than the S_N2 reaction of CH_3CH_2Br.

Reason (R) : The partially bonded unhybridized p-orbital that develops in the trigonal bipyramidal transition state is stabilized by conjugation with the phenyl ring.

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

(1) Both A and R are correct ans R is the correct explanation of A.

(2) A is correct but R is not correct

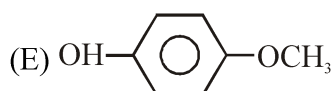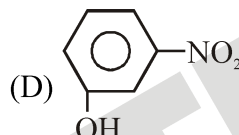(3) Both A and R are correct but R is not the correct explanation of A
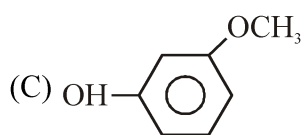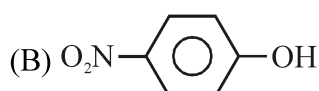
(4) A is not correct but R is correct

Question ID: 87827056220

Ans.   Official Answer by NTA (1)

Sol.

70.   For the given compounds, the correct order of increasing pK_a value :

(A) C_6H_5-OH

(B) $O_2N-C_6H_4-OH$

(C) $OH-C_6H_4-OCH_3$ (with OCH₃ at top)

(D) $C_6H_4(OH)-NO_2$

(E) $OH-C_6H_4-OCH_3$
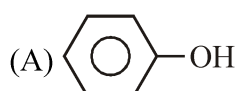
Choose the correct answr from the options given below :

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

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

Question ID: 87827056224

Ans.   Official Answer by NTA (1)

        Answer by Matrix is (bonus)

Sol.

71.   Identify the product A and product B in the following set of reactions.

$CH_3-CH=CH_2$

$\xrightarrow{H_2O,\ H^+}$ major product A

$\xrightarrow[H_2O,\ H_2O_2,\ \bar{O}H]{(BH_3)_2}$ major product B

(1) $CH_3-CH(OH)-CH_3$ (2) $CH_3CH_2CH_2-OH$ (3) $CH_3CH_2CH_3$ (4) $CH_3CH_2CH_3$
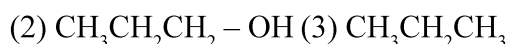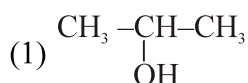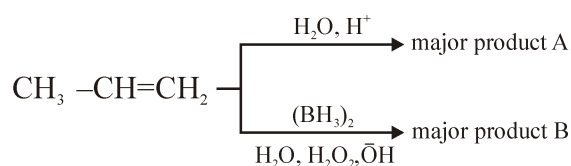
Question ID: 87827056223

Ans.   Official Answer by NTA (1)

Sol.

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72. Correct order of basic strength of Pyrrole $\left(\begin{array}{c}\overset{..}{N}\\H\end{array}\right)$, Pyridine $\left(\overset{..}{N}\right)$ and Piperidine $\left(\begin{array}{c}\overset{..}{N}\\H\end{array}\right)$ is:

   (1) Pyrrole > Piperidine > Pyridine   (2) Pyrrole > Pyridine > Piperidien

   (3) Pyridine > Piperidine > Pyrrole   (4) Piperidine > Pyridine > Pyrrole

   Question ID: 87827056225

Ans.   Official Answer by NTA (4)

Sol.

73. Given below are two statments : one is labelled as Assertion (A) and the other is labelled as Reason (R).

   Assertion (A) : The total number of geometrical isomers shown by $[Co(en)_2Cl_2]^+$ complex ion is three.

   Reason (r) : $[Co(en)_2Cl_2]^+$ complex ion has an octahedral geometry.

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

   (1) A is not correct but R is correct

   (2) Both A and R correct but R is not the correct explanation of A

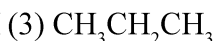   (3) Both A and r are correct and R is the correct explanation of A
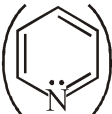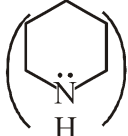
   (4) A is correct but R is not correct

   Question ID: 87827056216

Ans.   Official Answer by NTA (1)

Sol.

74. Identify the incorrect statments regarding primary standard of titrimetric analysis.

   (A) It should be purely available in dry form.

   (B) It should not undergo chemical change in air.

   (C) It should be hygroscopic and should react with another chemical instantaneously and stoichiometrically.

   (D) It should be readily soluble in water.

   (E) $KMnO_4$ & NaOH can be used as primary standard.

   Choose the correct answer from the options given below :

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

   Question ID: 87827056227

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Ans.   Official Answer by NTA (3)

Sol.

75.   The molar conductivity for electrolytes A and B are plotted against $C^{1/2}$ as shown below. Electrolytes A and B respectively are :
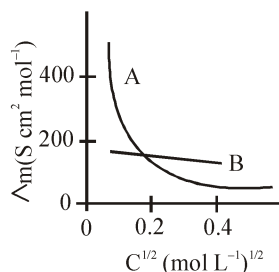
	A	B
(1)	strong electrolyte	weak electrolyte
(2)	weak electrolyte	weak electrolyte
(3)	strong electrolyte	strong electrolyte
(4)	weak electrolyte	strong electrolyte

Question ID: 87827056211

Ans.   Official Answer by NTA (4)

Sol.

76.   The electronic configuration of Cu(II) $3d^9$ whereas that of Cu(I) $3d^{10}$. Which of the following is correct ?

(1) Cu(II) is less stable

(2) Stability of Cu(I) and Cu(II) depends on nature of copper salts

(3) Cu(II) is more stable

(4) Cu(I) and Cu(II) are equally stable

Question ID: 87827056215

Ans.   Official Answer by NTA (3)

Sol.

77.   Given below are two statements :

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Statement (I) : The oxidation state of an element in a particular compound is the charge acquired by its atom on the basis of electron gain enthalpy consideration from other atoms in the molecule.

Statement (II) : $p\pi - p\pi$ bond formation is more prevalent in second period elements over other periods.

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 correct

(2) Statement I is incorrect but Statement Ii is correct

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

(4) Both Statement I and Statement II are incorrect

Question ID: 87827056212

Ans.   Official Answer by NTA (2)

Sol.

78.   The F^- ions make the enamel on teeth much harder by converthing hydroxyapatite (the enamel on the surface of teeth) into much harder fluoroapatite having the formula.

(1) $[3(Ca_3(PO_4)_3) \cdot CaF_2]$ (2) $[3(Ca_2(PO_4)_2) \cdot Ca(OH)_2]$

(3) $[3(Ca_3(PO_4)_2) \cdot Ca(OH)_2]$ (4) $[3(Ca_3(PO_4)_2) \cdot CaF_2]$

Question ID: 87827056214

Ans.   Official Answer by NTA (4)

Sol.

79.   Methods used for purification of organic compounds are based on :

(1) nature of compound and presence of impurity.

(2) neither on nature of compound nor on the impurity present.

(3) presence of impurity only.

(4) nature of compound only.

Question ID: 87827056217

Ans.   Official Answer by NTA (1)

Sol.

80.   Given below are two statments : one is labelled as Assertion (A) and the other is labelled as Reason(R).

Assertion (A) : Both rhombic and monoclinic culphur exist as S_8 while oxygen exists as O_2.

Reason (R) : Oxygen forms $p\pi - p\pi$ multiple bonds with itself and other elements having small size and high

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electronegativity like C, N, wich is not possible for sulphur.

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

(1) A is correct but R is nor correct

(2) Both A and R are correct but R is not the correct explanation of A

(3) A is not correct but R is correct

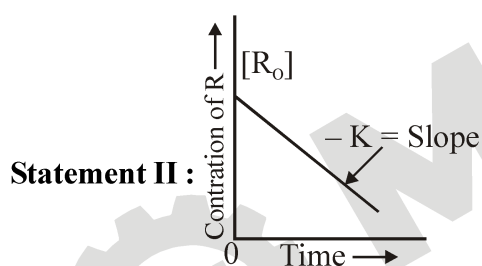(4) Both A and R are correct and R is the correct explanation of A

Question ID: 87827056213

Ans.   Official Answer by NTA (1)

Sol.

81.   Given below are two statements :

Statement I : The rate law for the reaction $A + B \rightarrow C$ is rate $(r) = k[A]^2[B]$. When the concentration of both A and B is doubled, the reaction rate is increased "x" times.

Statement II :

The figure is showing "the variation in concentration against time plot" for a "y" order reaction.
The Value of x + y is _____ .

Question ID: 87827056233

Ans.   Official Answer by NTA (8)

Sol.

82.   The heat of solution of anhydrous $CuSO_4$ and $CuSO_4 \cdot 5H_2O$ are $-70\,kJ\,mol^{-1}$ and $+12\,kJ\,mol^{-1}$ respectively. The heat of hydration of $CuSO_4$ to $CuSO_4 \cdot 5H_2O$ is $-x\,kJ$. The value of x is _____ . (nearest integer).

Question ID: 87827056230
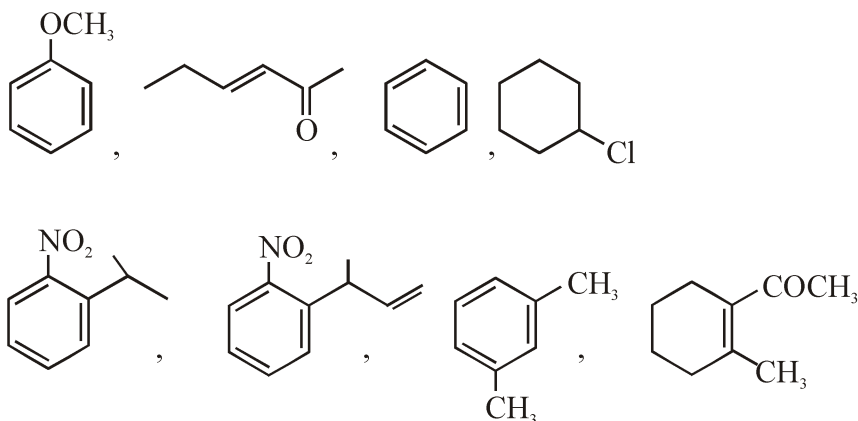
Ans.   Official Answer by NTA (82)

Sol.

83.   How many compound among the following compounds show inductive, mesomeric as well as hyperconjugation effects ?

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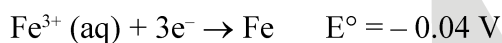
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Question ID: 87827056236

Ans. Official Answer by NTA (4)

Sol.

84. The standard reduction potentials at 298 K for the following half cells are given below :

$Cr_2O_7^{2-} + 14H^+ + 6e^- \rightarrow 2Cr^{3+} + 7H_2O, \ E° = 1.33 \text{ V}$

$Fe^{3+}(aq) + 3e^- \rightarrow Fe \qquad E° = -0.04 \text{ V}$

$Ni^{2+}(aq) + 2e^- \rightarrow Ni \qquad E° = -0.25 \text{ V}$

$Ag^+(aq) + e^- \rightarrow Ag \qquad E° = 0.80 \text{ V}$

$Au^{3+}(aq) + 3e^- \rightarrow Au \qquad E° = 1.40 \text{ V}$

Consider the given electrochemical reactions,

The number of metal(s) which will be oxidized be $Cr_2O_7^{2-}$, in aqueous solution is _____ .

Question ID: 87827056232

Ans. Official Answer by NTA (3)

Sol.

85. Total number of essential amino acid among the given list of amino acid is _____ .

Arginine, Phenylalanine, Aspartic acid, Cysteine, Histidine, Valine, Proline

Question ID: 87827056237

Ans. Official Answer by NTA (4)

Sol.

86. When equal volume of 1M HCl and 1M H_2SO_4 are separately neutralised by excess volume of 1M NaOH

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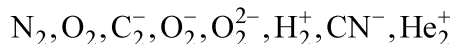
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solution. x and y kJ of heat is liberated respectively. The value of y/x is _____.

Question ID: 87827056231

Ans.   Official Answer by NTA (2)

Sol.

87.   the total number of species from the following in which one unpaired electron is present, is _____.

$$N_2, O_2, C_2^-, O_2^-, O_2^{2-}, H_2^+, CN^-, He_2^+$$

Question ID: 87827056229

Ans.   Official Answer by NTA (4)

Sol.

88.   Number of ambidentate ligands among the following is _____.

$$NO_2^-, SCN^-, C_2O_4^{2-}, NH_3, CN^-, SO_4^{2-}, H_2O.$$

Question ID: 87827056235

Ans.   Official Answer by NTA (3)

Sol.

89.   Molarity (M) of an aqueous solution containing x g of anhyd. $CuSO_4$ in 500 mL solution at 32°C is 2×10^{-1} M. Its molality will be _____ $\times 10^{-3}$ m. (nearest integer).

[Given density of the solution = 1.25 g/mL]

Question ID: 87827056228

Ans.   Official Answer by NTA (81)

Sol.

90.   Number of colourless lanthanoid ions among the following is _____ .

$Eu^{3+}, Lu^{3+}, Nd^{3+}, La^{3+}, Sm^{3+}$

Question ID: 87827056234

Ans.   Official Answer by NTA (2)

Sol.

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