

JEE Main 2023 April 13 Shift 1 Question Paper with Solutions

Time Allowed :3 Hours

Maximum Marks :300

Total Questions :90

General Instructions

Read the following instructions very carefully and strictly follow them:

1. The test is of 3 hours duration.
2. The question paper consists of 90 questions, out of which 75 are to attempted.
The maximum marks are 300.
3. There are three parts in the question paper consisting of Physics, Chemistry and Mathematics having 30 questions in each part of equal weightage.
4. Each part (subject) has two sections.
 - (i) Section-A: This section contains 20 multiple choice questions which have only one correct answer. Each question carries 4 marks for correct answer and –1 mark for wrong answer.
 - (ii) Section-B: This section contains 10 questions. In Section-B, attempt any five questions out of 10. The answer to each of the questions is a numerical value. Each question carries 4 marks for correct answer and –1 mark for wrong answer. For Section-B, the answer should be rounded off to the nearest integer

Chemistry

Section-A

61. Given below are two statements:

Statement I: Permutit process is more efficient compared to the synthetic resin method for the softening of water.

Statement II: Synthetic resin method results in the formation of soluble sodium salts.

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

- (1) Both the Statements I and 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 the Statements I and II are incorrect
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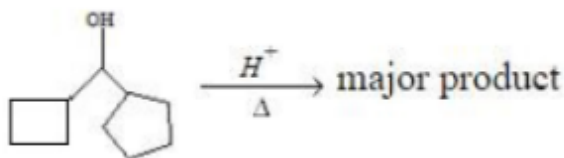
62. Which one of the following is most likely a mismatch?

- (1) Zinc - Liquation
 - (2) Copper - Electrolysis
 - (3) Titanium - van Arkel Method
 - (4) Nickel - Mond process
-

63. The energy of an electron in the first Bohr orbit of hydrogen atom is -2.18×10^{-18} J. Its energy in the third Bohr orbit is —.

- (1) $\frac{1}{27}$ of this value
 - (2) $\frac{1}{9}$ of this value
 - (3) One third of this value
 - (4) Three times this value
-

64.



In the above reaction, left hand side and right hand side rings are named as 'A' and 'B' respectively. They undergo ring expansion. The correct statement for this process is:

- (1) Finally both rings will become six membered each.
 - (2) Ring expansion can go upto seven membered rings
 - (3) Finally both rings will become five membered each.
 - (4) Only A will become 6 membered.
-

65. Match The following

Column-A	Column-B
a) Nylon 6	I. Natural Rubber
b) Vulcanized Rubber	II. Cross Linked
c) cis-1, 4-polyisoprene	III. Caprolactam
d) Polychloroprene	IV. Neoprene

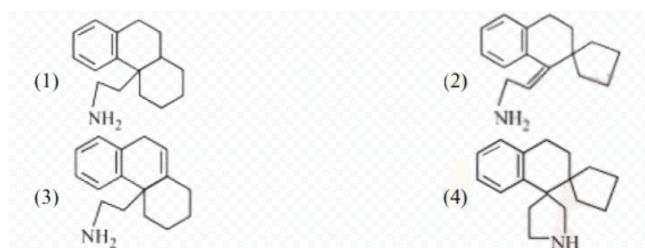
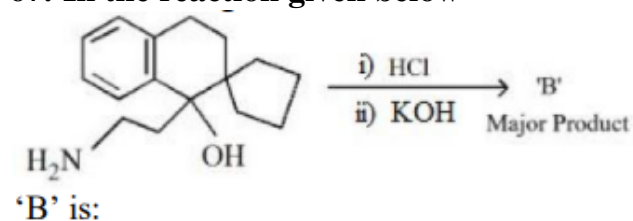
Choose the correct answer from options given below:

- (1) a → II, a → III, c → IV, d → I
- (2) a → IV, b → III, c → II, d → I
- (3) a → III, b → II, c → I, d → IV
- (4) a → III, b → IV, c → I, d → II

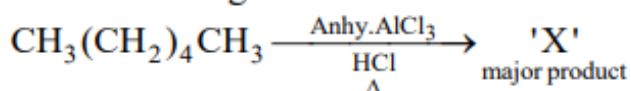
66. What happens when a lyophilic sol is added to a lyophobic sol?

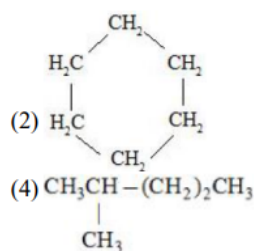
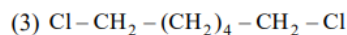
- (1) Film of lyophobic sol is formed over lyophilic sol.
- (2) Lyophilic sol is dispersed in lyophobic sol.
- (3) Lyophobic sol is coagulated.
- (4) Film of lyophilic sol is formed over lyophobic sol.

67. In the reaction given below



68. In the following reaction 'X' is

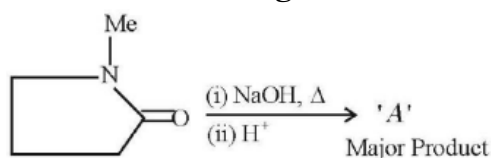




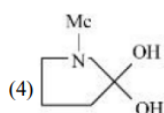
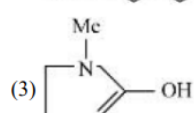
69. 2-Methyl propyl bromide reacts with $\text{C}_2\text{H}_5\text{O}^-$ and gives 'A' when reacted with $\text{C}_2\text{H}_5\text{OH}$ it gives 'B'. The mechanism followed in these reactions and the products 'A' and 'B' respectively are:

- (1) SN_1 , A = tert-butyl ethyl ether; SN_1 , B = 2-butyl ethyl ether
(2) SN_2 , A = 2-butyl ethyl ether; SN_2 , B = iso-butyl ethyl ether
(3) SN_2 , A = iso-butyl ethyl ether; SN_1 , B = tert-butyl ethyl ether
(4) SN_1 , A = tert-butyl ethyl ether; SN_2 , B = iso-butyl ethyl ether

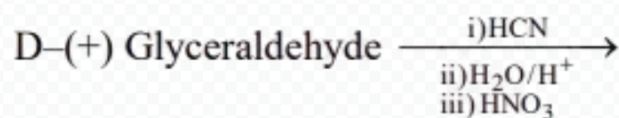
70. In the reaction given below



'A' is



71.



The products formed in the above reaction are:

- (1) Two optically active products
(2) One optically inactive and one meso product.
(3) One optically active and one meso product.
(4) Two optically inactive products.

72. ClF_5 at room temperature is:

- (1) Colourless liquid with square pyramidal geometry
 - (2) Colourless gas with trigonal bipyramidal geometry
 - (3) Colourless gas with square pyramidal geometry
 - (4) Colourless liquid with trigonal bipyramidal geometry
-

73. The pair of lanthanides in which both elements have high third-ionization energy is:

- (1) Dy, Gd
 - (2) Eu, Gd
 - (3) Lu, Yb
 - (4) Eu, Yb
-

74. The mismatched combinations are

- A. Chlorophyll - Co
- B. Water hardness - EDTA
- C. Photography - $[\text{Ag}(\text{CN})_2]^-$
- D. Wilkinson catalyst - $[(\text{PPh}_3)_3\text{RhCl}]$
- E. Chelating ligand - D-Penicillamine

Choose the correct answer from the options given below: (1) A and C Only

- (2) D and E Only
 - (3) A and Only
 - (4) A, C, and E Only
-

75. Which of the following statements are not correct?

- A. The electron gain enthalpy of F is more negative than that of Cl.
- B. Ionization enthalpy decreases in a group of the periodic table.
- C. The electronegativity of an atom depends upon the atoms bonded to it.
- D. Al_2O_3 and NO are examples of amphoteric oxides.

Choose the most appropriate answer from the options given below:

- (1) A, C, and D Only

- (2) B and D Only
 - (3) A, B and D Only
 - (4) A, B, C and D
-

76. The radical which mainly causes ozone depletion in the presence of UV radiation is:

- (1) $\text{NO}^\cdot$
 - (2) $\text{OH}^\cdot$
 - (3) CH_3
 - (4) $\text{Cl}^\cdot$
-

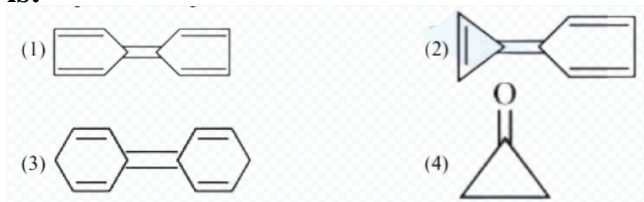
77. In which of the following processes, the bond order increases and paramagnetic character changes to diamagnetic one?

- (1) $\text{O}_2 \rightarrow \text{O}_2^+$
 - (2) $\text{O}_2 \rightarrow \text{O}_2^{2-}$
 - (3) $\text{NO} \rightarrow \text{NO}^+$
 - (4) $\text{N}_2 \rightarrow \text{N}_2^+$
-

78. The incorrect statement from the following for borazine is:

- (1) It is a cyclic compound.
 - (2) It has electronic delocalization.
 - (3) It can react with water.
 - (4) It contains banana bonds.
-

79. Among the following compounds, the one which shows the highest dipole moment is:



80. $\text{Be}(\text{OH})_2$ reacts with $\text{Sr}(\text{OH})_2$ to yield an ionic salt. Choose the incorrect option related to this reaction from the following:

- (1) Be is tetrahedrally coordinated in the ionic salt.
- (2) The reaction is an example of acid-base neutralization reaction.
- (3) The element Be is present in the cationic part of the ionic salt.
- (4) Both Sr and Be elements are present in the ionic salt.
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Section-B

81. Solution of 12 g of non-electrolyte (A) prepared by dissolving it in 1000 mL of water exerts the same osmotic pressure as that of 0.05M glucose solution at the same temperature. The empirical formula of A is CH_2O . The molecular mass of A is _____ g. (Nearest integer)

82. KMnO_4 is titrated with ferrous ammonium sulphate hexahydrate in the presence of dilute H_2SO_4 . The number of water molecules produced for 2 molecules of KMnO_4 is ____.

83. 20 mL of calcium hydroxide was consumed when it was reacted with 10 mL of unknown solution of H_2SO_4 . Also, 20 mL standard solution of 0.5 M HCl containing 2 drops of phenolphthalein was titrated with calcium hydroxide. The mixture showed pink colour when the burette displayed the value of 35.5 mL, whereas the burette of H_2SO_4 showed 25.5 mL initially. The concentration of H_2SO_4 is _____ M. (Nearest integer)

84. $t_{87.5}$ is the time required for the reaction to undergo 87.5% completion and t_{50} is the time required for the reaction to undergo 50% completion. The relation between $t_{87.5}$ and t_{50} for a first order reaction is _____ $t_{87.5}$. (Nearest integer)

85. A certain quantity of real gas occupies a volume of 0.15 dm^3 at 100 atm and 500 K when its compressibility factor is 1.07. Its volume at 300 atm and 300 K (When its compressibility factor is 1.4) is $\times 10^{-4} \text{ dm}^3$. (Nearest integer)

86. A metal surface of 100 cm^2 area has to be coated with nickel layer of thickness 0.001

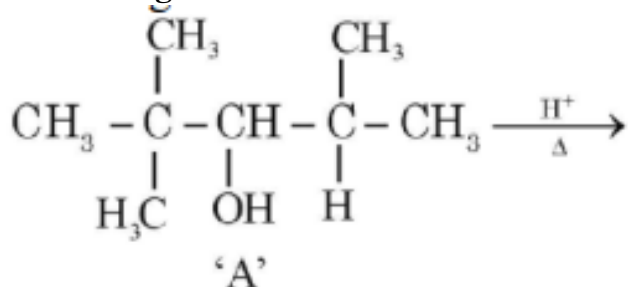
mm. A current of 2 A was passed through a solution of $\text{Ni}(\text{NO}_3)_2$ for x seconds to coat the desired layer. The value of x is _____. (Nearest integer)

87. 25.0 mL of 0.050 M $\text{Ba}(\text{NO}_3)_2$ is mixed with 25.0 mL of 0.020 M NaF. K_{sp} of BaF_2 is 0.5×10^{-6} at 298 K. The ratio of $[\text{Ba}^{2+}]$ $[\text{F}^-]$ and K_{sp} is _____. (Nearest integer)

88. $\text{A}_2 + \text{B}_2 \rightarrow 2\text{AB}$. $\Delta H_f^0 = -200 \text{ kJ mol}^{-1}$ A_2 and B_2 are diatomic molecules. If the bond enthalpies of A_2 , B_2 and AB are in the ratio 1 : 0.5 : 1, then the bond enthalpy of A_2 is _____ kJ mol^{-1} . (Nearest integer)

89. An organic compound gives 0.220 g of CO_2 and 0.126 g of H_2O on complete combustion. If the % of carbon is 24, then the % of hydrogen is $\text{---} \times 10^{-1}$. (Nearest integer)

90. For the given reaction:



The total number of possible products formed by tertiary carbocation of A is _____.
