JEE Main 2023 April 12 Shift 1 Question Paper

Time Allowed :3 Hours	**Maximum Marks :**300	**Total Questions :**90

General Instructions

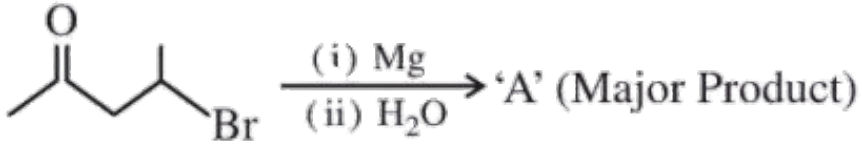
Read the following instructions very carefully and strictly follow them:

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

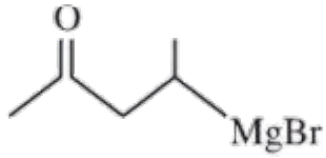
CHEMISTRY

Section-A

61. The compound shown below undergoes the following reactions:



A is

(1) 

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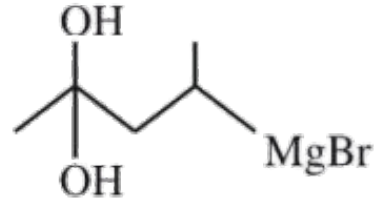
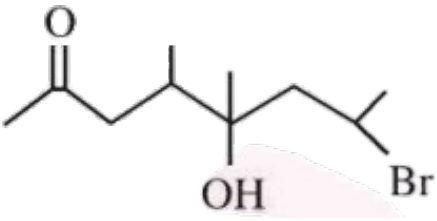
(3) 

(4) 

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62. Four gases A, B, C, and D have critical temperatures 5.3, 33.2, 126.0, and 154.3 K respectively.

For their adsorption on a fixed amount of charcoal, the correct order is:

(1) C > B > D > A.

(2) C > D > B > A.

(3) D > C > A > B.

(4) D > C > B > A.

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63. Given below are two statements:

Assertion A: 5f electrons can participate in bonding to a far greater extent than 4f electrons.

Reason R: 5f orbitals are not as buried as 4f orbitals.

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

(1) Both A and R are true but R is NOT the correct explanation of A.

(2) Both A and R are true and R is the correct explanation of A.

(3) A is false but R is true.

(4) A is true but R is false.

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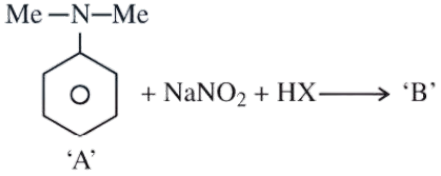
64. The incorrect statement regarding the reaction given below is:



(1) The electrophile involved in the reaction is NO^+

(2) 'B' is N-nitroso ammonium compound

(3) The reaction occurs at low temperature

(4) The product 'B' formed in the above reaction is p-nitroso compound at low temperature

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65. Match List I with List II

LIST I Complex		**LIST II CFSE(Δ_0)**	
A.	$[Cu(NH_3)_6]^{2+}$	I.	−0.6
B.	$[Ti(N_2O)_6]^{3+}$	II.	−2.0
C.	$[Fe(CN)_6]^{3-}$	III.	−1.2
D.	$[NiF_6]^{4-}$	IV.	−0.4

Choose the correct answer from the options given below:

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

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

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

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

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66. Match List I with List II

LIST I (Examples)		LIST I (Examples)	
A.	2-Chloro-1, 3 - butadiene	I.	Biodegradable polymer
B.	Nylon 2-nylon 6	II.	Synthetic Rubber
C.	Polyacrylonitrile	III.	Polyester
D.	Dacron	IV.	Addition Polymer

Choose the correct answer from the options given below:

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

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

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

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

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67. The density of alkali metals is in the order:

(1) Na < K < Cs < Rb.

(2) K < Na < Rb < Cs.

(3) K < Cs < Na < Rb.

(4) Na < Rb < K < Cs.

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68. Given below are two statements:

Statements: $SbCl_5$ is more covalent than $SbCl_3$

Statements:

The higher oxides of halogens also tend to be more stable than the lower ones.

In 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) Both statement I and Statement II are incorrect

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

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

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69. A metal chloride contains 55.0% of chlorine by weight. 100 mL vapours of the metal chloride at STP weigh 0.57 g. The molecular formula of the metal chloride is:

(Given: Atomic mass of chlorine is 35.5 u)

(1) MCl_2

(2) MCl_4

(3) MCl_3

(4) MCl

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70. Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R.

Assertion A: In the Ellingham diagram, a sharp change in the slope of the line is observed for Mg $\rightarrow$ MgO at $\sim 1120^{\circ}C$.

Reason R: There is a large change of entropy associated with the change of state.

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

(1) Both A and R are true but R is NOT the correct explanation of A.

(2) Both A and R are true and R is the correct explanation of A.

(3) A is false but R is true.

(4) A is true but R is false.

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71. Match List I with List II

LIST I		LIST II	
A.	Nitrogen oxides in air	I.	Eutrophication
B.	Methane in air	II.	pH of rain water becomes 5.6.
C.	Carbon dioxide	III.	Global warming
D.	Phosphate fertilisers in water	IV.	Acid rain

Choose the correct answer from the options given below:

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

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

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

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

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72. For lead storage battery pick the correct statements:

A. During charging of battery, $PbSO_4$ on anode is converted into PbO_2

B. During charging of battery, $PbSO_4$ on cathode is converted into PbO_2

C. Lead storage battery, consists of grid of lead packed with PbO_2 as anode

D. Lead storage battery has $\sim 38\%$ solution of sulphuric acid as an electrolyte

Choose the correct answer from the options given below:

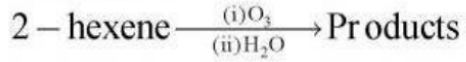
(1) B, D only

(2) B, C, D only

(3) A, B, D only

(4) B, C only

73.



(1) Butanoic acid and acetic acid

(2) Butanal and acetic acid

(3) Butanal and acetaldehyde

(4) Butanoic acid and acetaldehyde

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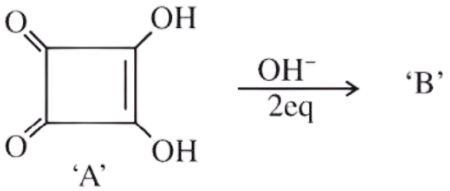
74. Correct statements for the given reaction are:



A. Compound 'B' is aromatic

B. The completion of the above reaction is very slow

C. 'A' shows tautomerism

D. The bond lengths C-C in compound 'B' are found to be same

Choose the correct answer from the options given below:

(1) A, B and D only

(2) A, B and C only

(3) B, C and D only

(4) A, C and D only

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75. The bond order and magnetic property of acetylide ion are same as that of:

(1) NO^+.

(2) O_2^+.

(3) O_2^-.

(4) N_2^+.

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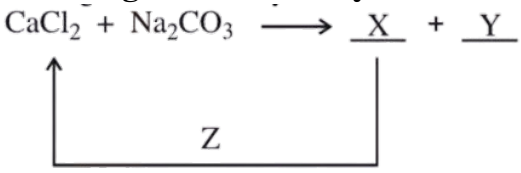
76. In the given reaction cycle



X, Y and Z respectively are

(1)

X	Y	Z
CaO	$NaCl + CO_2$	KCl

(2)

X	Y	Z
$CaCO_3$	NaCl	KCl

(3)

X	Y	Z
$CaCO_3$	NaCl	HCl

(4)

X	Y	Z
CaO	$NaCl + CO_2$	NaCl

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77. Given below are two statements:

Statement I: Boron is extremely hard indicating its high lattice energy.

Statement II: Boron has the highest melting and boiling point compared to its other group members.

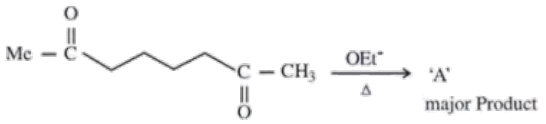
(1) Statement I is incorrect but Statement II is correct

(2) Both Statement I and Statement II are correct

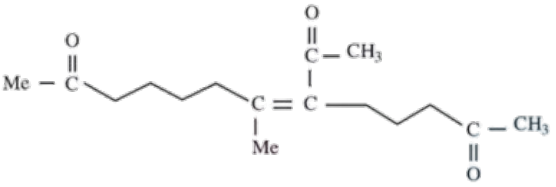
(3) Statement I is correct but Statement II is incorrect

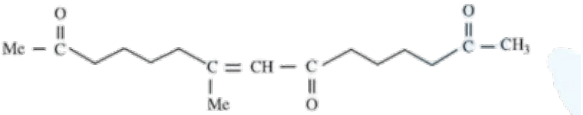
(4) Both Statement I and Statement II are incorrect

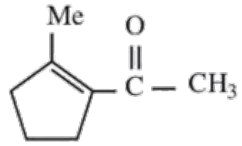
78.

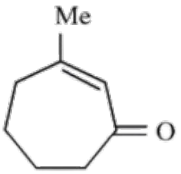
78. 

A in the above reaction is :

(1) 

(2) 

(3) 

(4) 

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79. Match List I with List II

LIST I Type of Hydride		LIST II Example	
A.	Electron deficient hydride	I.	MgH_2
B.	Electron rich hydride	II.	HF
C.	Electron precise hydride	III.	B_2H_6
D.	Saline hydride	IV.	CH_4

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

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

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

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

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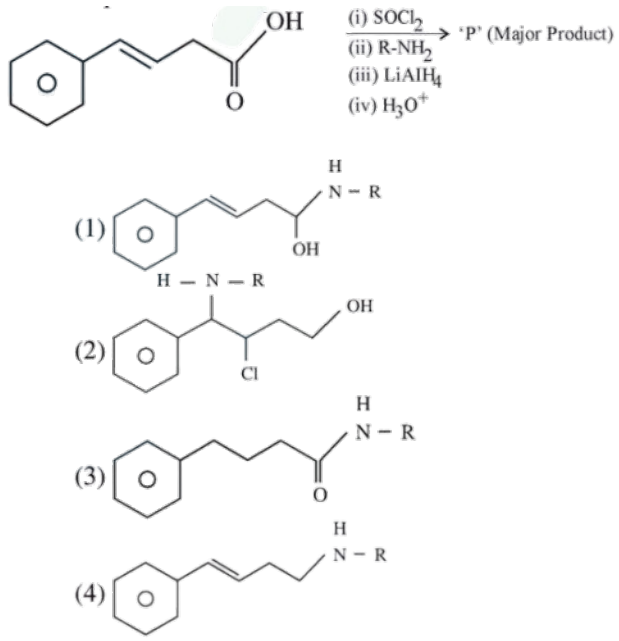
80. The major product P formed in the following sequence of reactions is:



SECTION-B

81. One mole of an ideal gas at 350K is in a 2.0 L vessel of thermally conducting walls, which are in contact with the surroundings. It undergoes isothermal reversible expansion from 2.0L to 3.0L against a constant pressure of 4 atm. The change in entropy of the surroundings ΔS is _____ J K^{-1} (Nearest integer).
Given $R = 8.314$ J K^{-1} Mol^{-1}.

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82. The mass of NH_3 produced when 131.8 kg of cyclohexanecarbaldehyde undergoes Tollens test is _____ kg. (Nearest Integer) Given: Molar Mass of C = 12 g/mol, N = 14 g/mol, O = 16 g/mol.

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83. In an oligopeptide named Alanylglycylphenylalanylisoleucine, the number of sp^2 hybridised carbons is _____.

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84. An analyst wants to convert 1L HCl of pH = 1 to a solution of HCl of pH 2. The volume of water needed to do this dilution is _____ mL. (Nearest Integer)

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85. Three organic compounds A, B, and C were allowed to run in thin layer chromatography using hexane and gave the following result. The Rf value of the most

polar compound is _____ x 10^{-2}

(1) 25

(2) 0.25

(3) 0.75

(4) 1

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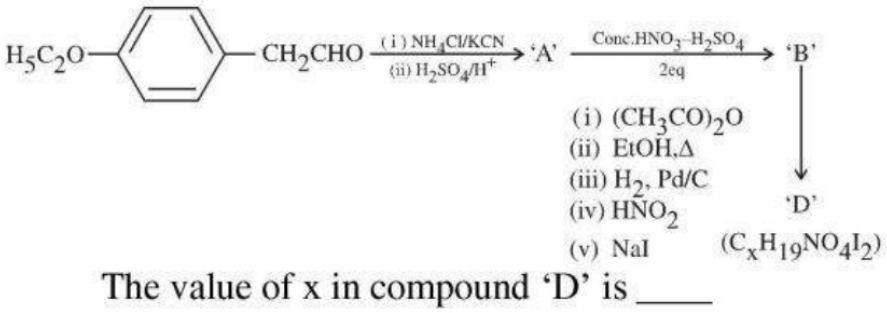
86. 80 mole percent of $MgCl_2$ is dissociated in aqueous solution. The vapour pressure of 1.0 molal aqueous solution of $MgCl_2$ at 38°C is _____ mm Hg. (Nearest integer)

87.



The value of x in compound D is

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89. The reaction $2NO + Br_2 \rightarrow 2NOBr$ takes place through the mechanism given below:

$$NO + Br_2 \leftrightarrow NOB_2 \quad \text{(fast)}$$

$$NOB_2 + NO \rightarrow 2NOBr \quad \text{(slow)}$$

The overall order of the reaction is _____.

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90. Values of work function (W_0) for a few metals are given below. The number of metals which will show the photoelectric effect when light of wavelength 400 nm falls on it is

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