JEE Main 2023 April 11 Shift 2 Chemistry Question Paper

Time Allowed :1 Hour	Maximum Marks :100	Total Questions :30

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. 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.

1. Which one of the following pairs is an example of polar molecular solids?
(A) $SO_2(s), NH_3(s)$
(B) $SO_2(s), CO_2(s)$
(C) $HCl(s), AlN(s)$
(D) $MgO(s), SO_2(s)$

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2. What weight of glucose must be dissolved in 100 g of water to lower the vapour pressure by 0.20 mm Hg? (Assume dilute solution is being formed). Given: Vapour pressure of pure water is 54.2 mm Hg at room temperature. Molar mass of glucose is 180 g mol^{-1}.
(A) 3.69 g
(B) 4.69 g
(C) 2.59 g
(D) 3.59 g

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3. For a chemical reaction A + B → Product, the order is 1 with respect to A and B.

Rate mol L^{-1} S^{-1}	[A] mol L^{-1}	[B] mol L^{-1}
0.10	20	0.5
0.40	x	0.5
0.80	40	y

What is the value of x and y?
(A) 80 and 2
(B) 40 and 4
(C) 160 and 4
(D) 80 and 4

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4. A solution is prepared by adding 2 g of "X" to 1 mole of water. Mass percent of "X" in the solution is
(A) 2%
(B) 5%
(C) 10%
(D) 20%

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5. Given below are two statements:
Statement I: In the metallurgy process, sulphide ore is converted to oxide before reduction.
Statement II: Oxide ores in general are easier to reduce.
In the light of the above statements, choose the most appropriate answer from the options given below:
(A) Both Statement I and Statement II are correct
(B) Both Statement I and Statement II are incorrect
(C) Statement I is correct but Statement II is incorrect
(D) Statement I is incorrect but Statement II is correct

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6. Which hydride among the following is less stable?
(A) LiH
(B) BeH_2
(C) NH_3
(D) HF

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7. One mole of P_4 reacts with 8 moles of $SOCl_2$ to give 4 moles of A, x mole of SO_2 and 2 moles of B. A, B and x respectively are
(A) PCl_3, S_2Cl_2 and 4
(B) $POCl_3, S_2Cl_2$ and 2
(C) PCl_3, S_2Cl_2 and 2
(D) $POCl_3, S_2Cl_2$ and 4

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8. Alkali metal from the following with least melting point is:
(A) Na
(B) K

(C) Rb
(D) Cs

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9. The magnetic moment is measured in Bohr Magneton (BM).
Spin only magnetic moment of Fe in $[Fe(H_2O)_6]^{3+}$ and $[Fe(CN)_6]^{3-}$ complexes respectively is:
(A) 6.92 B.M. in both
(B) 4.89 B.M. and 6.92 B.M.
(C) 5.92 B.M. and 1.732 B.M.
(D) 3.87 B.M. and 1.732 B.M.

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10. Given below are two statements, one is labelled as Assertion A and the other is labelled as Reason R.
Assertion A : $[CoCl(NH_3)_5]^{2+}$ absorbs at lower wavelength of light with respect to $[Co(NH_3)_5(H_2O)]^{3+}$
Reason R : It is because the wavelength of the light absorbed depends on the oxidation state of the metal ion.
In the light of the above statements, choose the correct answer from the options given below:
(A) Both A and R are true and R is the correct explanation of A
(B) Both A and R are true but R is NOT the correct explanation of A
(C) A is true but R is false
(D) A is false but R is true

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11. Which of the following compounds is an example of Freon?
(A) $C_2Cl_2F_4$
(B) $C_2H_2F_2$
(C) C_2HF_3
(D) C_2F_4

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12. If Ni^{2+} is replaced by Pt^{2+} in the complex $[NiCl_2Br_2]^{2-}$, which of the following properties are expected to get changed?
A. Geometry
B. Geometrical isomerism
C. Optical isomerism
D. Magnetic properties
(A) A and D
(B) B and C
(C) A, B and C
(D) A, B and D

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13. Match List I with List II

	LIST I Complex		LIST II Colour
A.	$Mg(NH_4)PO_4$	I.	brown
B.	$K_3[Co(NO_2)_6]$	II.	white
C.	$MnO(OH)_2$	III.	yellow
D.	$Fe_4[Fe(CN)_6]_3$	IV.	blue

Choose the correct answer from the options given below:

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

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

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

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

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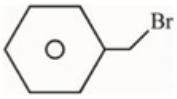
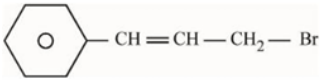
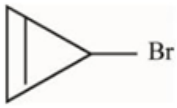
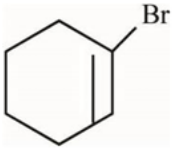
14. Compound from the following that will not produce precipitate on reaction with $AgNO_3$ is:

(A) 

(B) 

(C) 

(D) 

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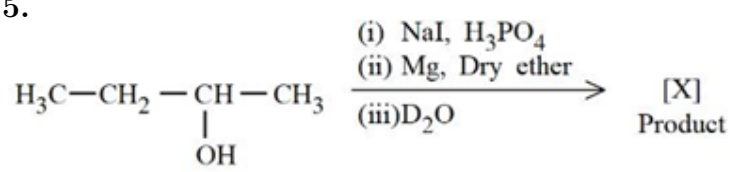
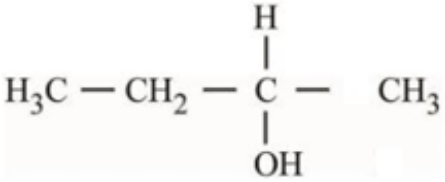
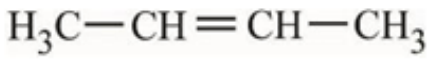
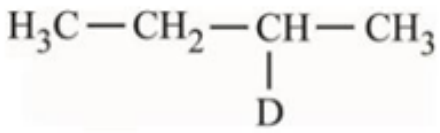
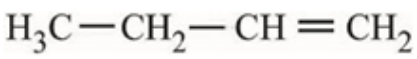


Product [X] formed in the above reaction is:

(A) 

(B) 

(C) 

(D) 

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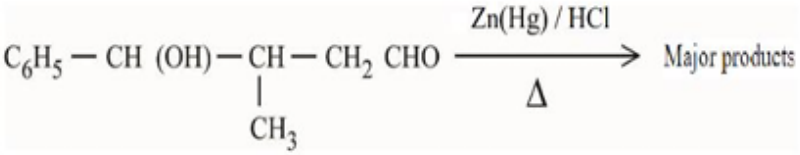
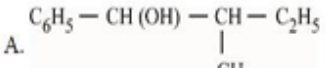
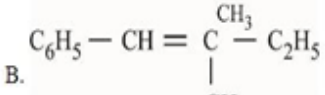
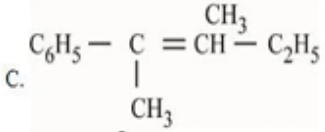
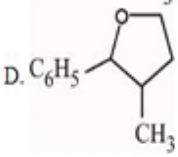
16. The major product formed in the following reaction is:



A. 

B. 

C. 

D. 

(A) A only (saturated alcohol)
(B) B only (conjugated alkene)
(C) C only (rearranged alkene)
(D) D only (cyclic ether)

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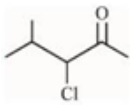
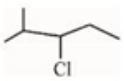
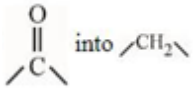
17. Given below are two statements, one is labelled as Assertion A and the other is labelled as Reason R.

Assertion A :  **can be subjected to Wolff-Kishner reduction to give** 

Reason R : Wolff-Kishner reduction is used to convert 

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

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

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

(C) A is true but R is false

(D) A is false but R is true

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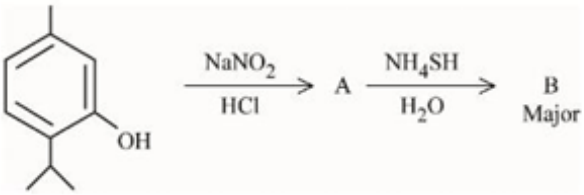
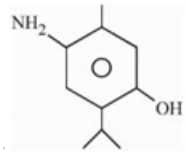
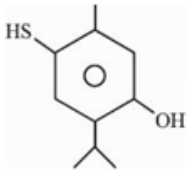
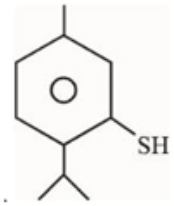
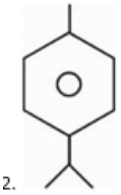
18. Compound 'B' is:



(A) 

(B) 

(C) 

(D) 

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

Assertion A : A solution of the product obtained by heating a mole of glycine with a mole of chlorine in presence of red phosphorous generates chiral carbon atom.

Reason R : A molecule with 2 chiral carbons is always optically active.

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

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

(B) Both A and R are true but R is NOT the correct explanation of A
(C) A is true but R is false
(D) A is false but R is true

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20. Given below are two statements:
Statement I : Ethene at 333 to 343 K and 6-7 atm pressure in the presence of $AlEt_3$ and $TiCl_4$ undergoes addition polymerization to give LDP.
Statement II : Caprolactam at 533-543 K in H_2O through step growth polymerizes to give Nylon 6.
In the light of the above statements, choose the correct answer from the options given below:
(A) Both Statement I and Statement II are true
(B) Both Statement I and Statement II are false
(C) Statement I is true but Statement II is false
(D) Statement I is false but Statement II is true

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21. The volume of hydrogen liberated at STP by treating 2.4 g of magnesium with excess of hydrochloric acid is _____ $\times 10^{-2}$ L.
Given: Molar volume of gas is 22.4 L at STP.
Molar mass of magnesium is 24 g mol^{-1}

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22. The maximum number of lone pairs of electrons on the central atom from the following species is _____
ClO_3^-, XeF_4, SF_4 **and** I_3^-

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23. The number of correct statements from the following is _____
A. For 1s orbital, the probability density is maximum at the nucleus
B. For 2s orbital, the probability density first increases to maximum and then decreases sharply to zero.
C. Boundary surface diagrams of the orbitals encloses a region of 100% probability of finding the electron.
D. p and d-orbitals have 1 and 2 angular nodes respectively
E. probability density of p-orbital is zero at the nucleus

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24. The total number of intensive properties from the following is _____
Volume, Molar heat capacity, Molarity, E^θ cell, Gibbs free energy change, Molar mass, Mole

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25. 4.5 moles each of hydrogen and iodine is heated in a sealed ten litre vessel. At equilibrium, 3 moles of HI were found. The equilibrium constant for $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$ is _____

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26. The number of correct statements from the following is _____
A. E_{cell} is an intensive parameter
B. A negative E^{θ} means that the redox couple is a stronger reducing agent than the H^+/H_2 couple.
C. The amount of electricity required for oxidation or reduction depends on the stoichiometry of the electrode reaction.
D. The amount of chemical reaction which occurs at any electrode during electrolysis by a current is proportional to the quantity of electricity passed through the electrolyte.

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27. The number of correct statements about modern adsorption theory of heterogeneous catalysis from the following is _____
A. The catalyst is diffused over the surface of reactants.
B. Reactants are adsorbed on the surface of the catalyst.
C. Occurrence of chemical reaction on the catalyst's surface through formation of an intermediate.
D. It is a combination of intermediate compound formation theory and the old adsorption theory.
E. It explains the action of the catalyst as well as those of catalytic promoters and poisons.

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28. $Mg(NO_3)_2 \cdot XH_2O$ and $Ba(NO_3)_2 \cdot YH_2O$, represent formula of the crystalline forms of nitrate salts. Sum of X and Y is _____

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29. Number of compounds from the following which will not produce orange red precipitate with Benedict solution is _____
Glucose, maltose, sucrose, ribose, 2-deoxyribose, amylose, lactose

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30. The number of possible isomeric products formed when 3-chloro-1-butene reacts with HCl through carbocation formation is _____
