JEE Main 2023 April 6 Shift 1 Chemistry 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

Question 1: Match List I with List II

List I (Natural Amino acid)	List II (One Letter Code)
(A) Arginine	(I) D
(B) Aspartic acid	(II) N
(C) Asparagine	(III) A
(D) Alanine	(IV) R

Choose the correct answer from the options given below:

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

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

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

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

Question 2: Formation of which complex, among the following, is not a confirmatory test of Pb^{2+} ions

(1) lead sulphate

(2) lead nitrate

(3) lead chromate

(4) lead iodide

Question 3: The volume of 0.02 M aqueous HBr required to neutralize 10.0 mL of 0.01 M aqueous $Ba(OH)_2$ is (Assume complete neutralization)

(1) 5.0 mL

(2) 10.0 mL

(3) 2.5 mL

(4) 7.5 mL

Question 4: Group-13 elements react with O_2 in amorphous form to form oxides of type M_2O_3 (M = element). Which among the following is the most basic oxide?

(1) Al_2O_3

(2) Tl_2O_3

(3) Ga_2O_3

(4) B_2O_3

Question 5: The IUPAC name of $K_3[Co(C_2O_4)_3]$ is -

(1) Potassium tris(oxalate)cobaltate(III)

(2) Potassium trioxalatocobalt(III)

(3) Potassium tris(oxalato)cobaltate(III)

(4) Potassium tris(oxalate)cobalt(III)

Question 6: If the radius of the first orbit of hydrogen atom is a_0, then de Broglie's wavelength of electron in 3^{rd} orbit is

(1) $\frac{\pi a_0}{6}$

(2) $\frac{\pi a_0}{3}$

(3) $6\pi a_0$

(4) $3\pi a_0$

Question 7: The group of chemicals used as pesticide is

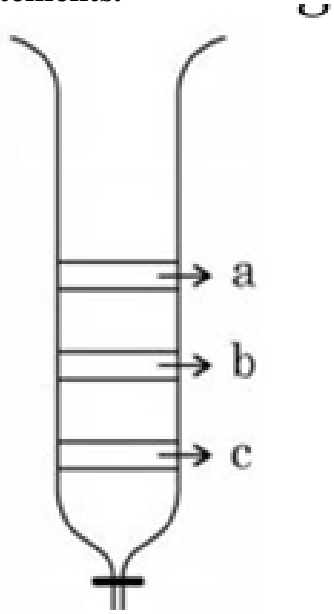
(1) Sodium chlorate, DDT, PAN

(2) DDT, Aldrin

(3) Aldrin, Sodium chlorate, Sodium arsinite

(4) Dieldrin, Sodium arsinite, Tetrachloroethene

Question 8: From the figure of column chromatography given below, identify incorrect statements.



A. Compound 'c' is more polar than 'a' and 'b'.

B. Compound 'a' is least polar.

C. Compound 'b' comes out of the column before 'c' and after 'a'.

D. Compound 'a' spends more time in the column.

Choose the correct answer from the options given below:

(1) A, B and D only

(2) A, B and C only

(3) B and D only

(4) B, C and D only

Question 9: Ion having highest hydration enthalpy among the given alkaline earth metal ions is:

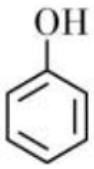
(1) $\mathbf{Be^{2+}}$

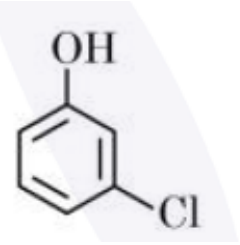
(2) $\mathbf{Ba^{2+}}$

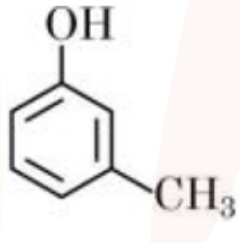
(3) $\mathbf{Ca^{2+}}$

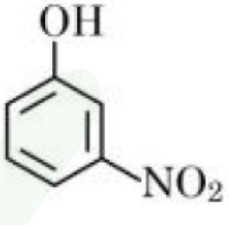
(4) $\mathbf{Sr^{2+}}$

Question 10: The strongest acid from the following is

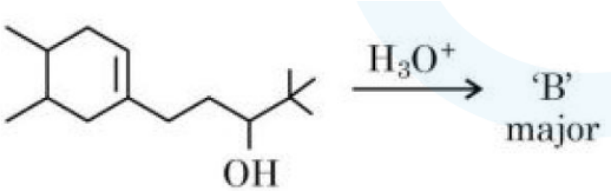
(1) 

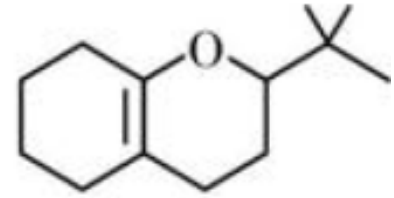
(2) 

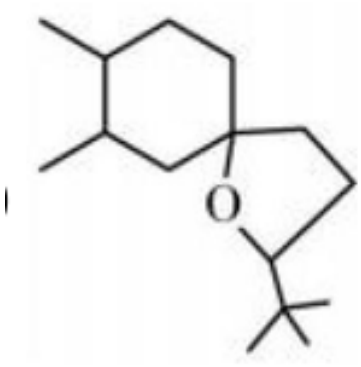
(3) 

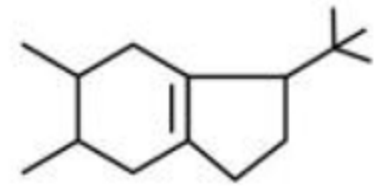
(4) 

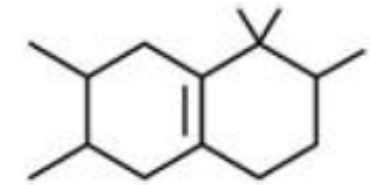
Question 11: In the following reaction, 'B' is



(1) 

(2) 

(3) 

(4) 

Question 12: Structures of $BeCl_2$ in solid state, vapour phase and at very high temperature respectively are:

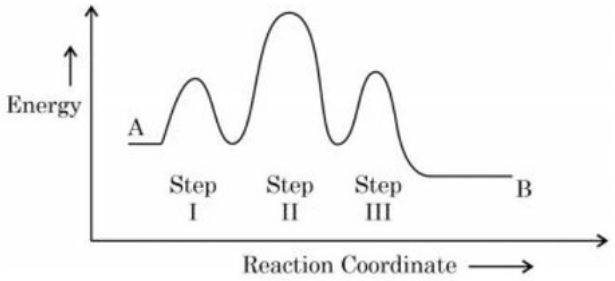
(1) Polymeric, Dimeric, Monomeric

(2) Dimeric, Polymeric, Monomeric

(3) Monomeric, Dimeric, Polymeric

(4) Polymeric, Monomeric, Dimeric

Question 13: Consider the following reaction that goes from A to B in three steps as shown below:



Choose the correct option

Number of Intermediates	Number of Activated complex	Rate determining step
(1) 2	3	II
(2) 3	2	II
(3) 2	3	III
(4) 2	3	I

Question 14: The product, which is not obtained during the electrolysis of brine solution is

(1) HCl

(2) NaOH

(3) Cl_2

(4) H_2

Question 15: Which one of the following elements will remain as liquid inside pure boiling water?

(1) Li

(2) Ga

(3) Cs

(4) Br

Question 16: Given below are two statements: one is labelled as "Assertion A" and the other is labelled as "Reason R"

Assertion A: In the complex $Ni(CO)_4$ and $Fe(CO)_5$, the metals have zero oxidation state.

Reason R: Low oxidation states are found when a complex has ligands capable of π-donor

character in addition to the σ-bonding.

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

(1) A is not correct but R is correct.

(2) A is correct but R is not correct

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

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

Question 17: Given below are two statements:

Statement I: Morphine is a narcotic analgesic. It helps in relieving pain without producing sleep.

Statement II: Morphine and its derivatives are obtained from opium poppy.

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

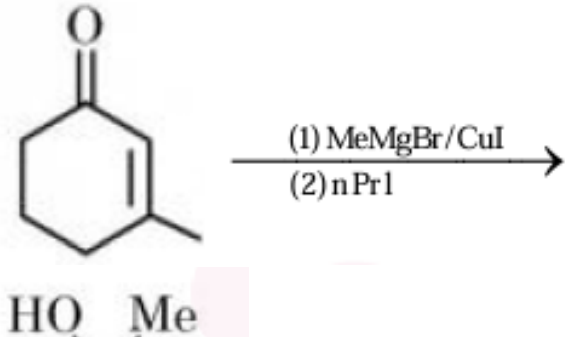
(1) Statement I is true but statement II is false

(2) Both statement I and statement II are true

(3) Statement I is false but statement II is true

(4) Both Statement I and Statement II are false

Question 18: Find out the major product from the following reaction.



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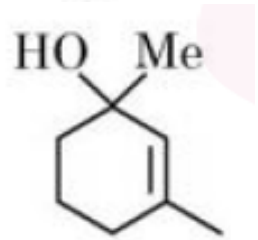

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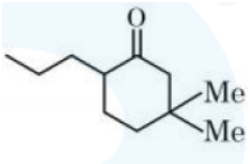
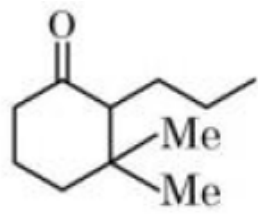
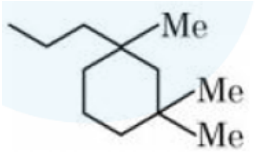


(3) 

(4) 

Question 19: During the reaction of permanganate with thiosulphate, the change in oxidation of manganese occurs by value of 3. Identify which of the below medium will favour the reaction

(1) aqueous neutral

(2) aqueous acidic

(3) both aqueous acidic and neutral

(4) both aqueous acidic and faintly alkaline

Question 20: Element not present in Nessler's reagent is

(1) K

(2) N

(3) I

(4) Hg

Section B

Question 21: The standard reduction potentials at 298 K for the following half cells are given below:

$NO_3^- + 4H^+ + 3e^- \rightarrow NO(g) + 2H_2O \quad E^0 = 0.97V$

$V^{2+}(aq) + 2e^- \rightarrow V \quad E^0 = -1.19V$

$Fe^{3+}(aq) + 3e^- \rightarrow Fe \quad E^0 = -0.04V$

$Ag^+(aq) + e^- \rightarrow Ag(s) \quad E^0 = 0.80V$

$Au^{3+}(aq) + 3e^- \rightarrow Au(s) \quad E^0 = 1.40V$

The number of metal(s) which will be oxidized by NO_3^- in aqueous solution is _____

Question 22: Number of crystal system from the following where body centred unit cell can be found, is _____

Cubic, tetragonal, orthorhombic, hexagonal, rhombohedral, monoclinic, triclinic

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Question 23: Among the following the number of compounds which will give positive iodoform reaction is _____

(a) 1-Phenylbutan-2-one

(b) 2-Methylbutan-2-ol

(c) 3-Methylbutan-2-ol

(d) 1-Phenylethanol

(e) 3,3-dimethylbutan-2-one

(f) 1-Phenylpropan-2-ol

Question 24: Number of isomeric aromatic amines with molecular formula C_8H_11N, which can be synthesized by Gabriel Phthalimide synthesis is _____

Question 25: Consider the following pairs of solution which will be isotonic at the same temperature. The number of pairs of solutions is/are _____

A. 1 M aq. NaCl and 2 M aq. Urea

B. 1 M aq. $CaCl_2$ and 1.5 M aq. KCl

C. 1.5 M aq. $AlCl_3$ and 2 M aq. Na_2SO_4

D. 2.5 M aq. KCl and 1 M aq. $Al_2(SO_4)_3$

Question 26: The number of colloidal systems from the following, which will have 'liquid' as the dispersion medium, is _____

Gem stones, paints, smoke, cheese, milk, hair cream, insecticide sprays, froth, soap lather

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Question 27: In an ice crystal, each water molecule is hydrogen bonded to neighbouring molecules.

Question 28: Consider the following data

Heat of combustion of $H_2(g)$ = -241.8 kJ mol^{-1}

Heat of combustion of C(s) = -393.5 kJ mol^{-1}

Heat of combustion of $C_2H_5OH(l)$ = -1234.7 kJ mol^{-1}

The heat of formation of $C_2H_5OH(l)$ is (-) _____ kJ mol^{-1} (Nearest integer).

Question 29: The equilibrium composition for the reaction PCl_3 + $Cl_2 \rightleftharpoons PCl_5$ at 298 K is given below:

$PCl_3]_{eq}$ = 0.2 mol L^{-1}, $[Cl_2]_{eq}$ = 0.1 mol L^{-1}, $[PCl_5]_{eq}$ = 0.40 mol L^{-1}

If 0.2 mol of Cl_2 is added at the same temperature, the equilibrium concentrations of PCl_5 is _____ $\times$ **10^{-2} mol L^{-1}**

Given: K_c for the reaction at 298 K is 20

Question 30: The number of species having a square planar shape from the following is

_____

XeF_4, SF_4, SiF_4, BrF_4^-, $[Cu(NH_3)_4]^{2+}$, $[FeCl_4]^{2-}$, $[PtCl_4]^{2-}$
