

FINAL JEE(Advanced) EXAMINATION - 2019

 (Held On Monday 27th MAY, 2019)

PAPER-1
TEST PAPER WITH ANSWER
PART-2 : CHEMISTRY
SECTION-1 : (Maximum Marks : 12)

- This section contains **FOUR (04)** questions.
- Each question has **FOUR** options. **ONLY ONE** of these four options is the correct answer.
- For each question, choose the option corresponding to the correct answer.
- Answer to each question will be evaluated according to the following marking scheme :

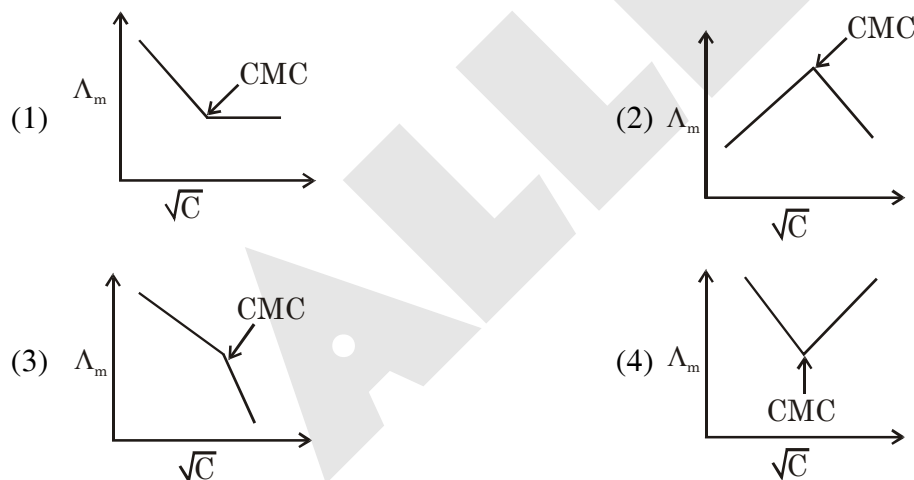
Full Marks : +3 If **ONLY** the correct option is chosen.

Zero Marks : 0 If none of the options is chosen (i.e. the question is unanswered)

Negative Marks : -1 In all other cases

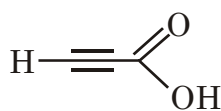
1. Molar conductivity (Λ_m) of aqueous solution of sodium stearate, which behaves as a strong electrolyte, is recorded at varying concentration(c) of sodium stearate. Which one of the following plots provides the correct representation of micelle formation in the solution ?

(Critical micelle concentration (CMC) is marked with an arrow in the figures.)

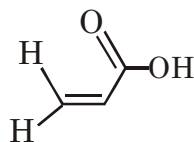


Ans. (3)

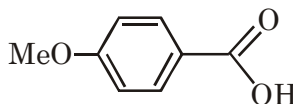
2. The correct order of acid strength of the following carboxylic acids is -



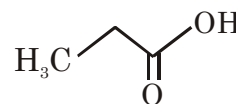
I



II



III



IV

(1) I > III > II > IV

(2) III > II > I > IV

(3) II > I > IV > III

(4) I > II > III > IV

Ans. (4)

3. Calamine, malachite, magnetite and cryolite, respectively are
- (1) ZnSO_4 , CuCO_3 , Fe_2O_3 , AlF_3 (2) ZnCO_3 , $\text{CuCO}_3 \cdot \text{Cu}(\text{OH})_2$, Fe_3O_4 , Na_3AlF_6
 (3) ZnSO_4 , $\text{Cu}(\text{OH})_2$, Fe_3O_4 , Na_3AlF_6 (4) ZnCO_3 , CuCO_3 , Fe_2O_3 , Na_3AlF_6

Ans. (2)

4. The green colour produced in the borax bead test of a chromium(III) salt is due to -
- (1) $\text{Cr}(\text{BO}_2)_3$ (2) CrB (3) $\text{Cr}_2(\text{B}_4\text{O}_7)_3$ (4) Cr_2O_3

Ans. (1)

SECTION-2 : (Maximum Marks: 32)

- This section contains **EIGHT (08)** questions.
- Each question has **FOUR** options. **ONE OR MORE THAN ONE** of these four option(s) is (are) correct answer(s).
- For each question, choose the option(s) corresponding to (all) the correct answer(s)
- Answer to each question will be evaluated according to the following marking scheme:

Full Marks : +4 If only (all) the correct option(s) is (are) chosen.
Partial Marks : +3 If all the four options are correct but **ONLY** three options are chosen.
Partial Marks : +2 If three or more options are correct but **ONLY** two options are chosen and both of which are correct.
Partial Marks : +1 If two or more options are correct but **ONLY** one option is chosen and it is a correct option.
Zero Marks : 0 If none of the options is chosen (i.e. the question is unanswered).
Negative Marks : -1 In all other cases.
- For example, in a question, if (A), (B) and (D) are the **ONLY** three options corresponding to correct answers, then

choosing **ONLY** (A), (B) and (D) will get +4 marks;
 choosing **ONLY** (A) and (B) will get +2 marks;
 choosing **ONLY** (A) and (D) will get +2 marks;
 choosing **ONLY** (B) and (D) will get +2 marks;
 choosing **ONLY** (A) will get +1 marks;
 choosing **ONLY** (B) will get +1 marks;
 choosing **ONLY** (D) will get +1 marks;
 choosing no option (i.e. the question is unanswered) will get 0 marks, and
 choosing any other combination of options will get -1 mark.

1. Fusion of MnO_2 with KOH in presence of O_2 produces a salt **W**. Alkaline solution of **W** upon eletrolytic oxidation yields another salt **X**. The manganese containing ions present in **W** and **X**, respectively, are **Y** and **Z**. Correct statement(s) is (are)
- (1) **Y** is diamagnetic in nature while **Z** is paramagnetic
 (2) Both **Y** and **Z** are coloured and have tetrahedral shape
 (3) In both **Y** and **Z**, π -bonding occurs between p-orbitals of oxygen and d-orbitals of manganese.
 (4) In aqueous acidic solution, **Y** undergoes disproportionation reaction to give **Z** and MnO_2 .

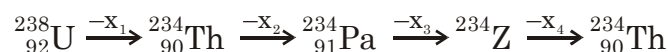
Ans. (2,3,4)

2. Which of the following statement(s) is (are) correct regarding the root mean square speed (U_{rms}) and average translational kinetic energy (ϵ_{av}) of a molecule in a gas at equilibrium ?

- (1) U_{rms} is doubled when its temperature is increased four times
- (2) ϵ_{av} at a given temperature does not depend on its molecular mass
- (3) U_{rms} is inversely proportional to the square root of its molecular mass
- (4) ϵ_{av} is doubled when its temperature is increased four times

Ans. (1,2,3)

3. In the decay sequence :



x_1 , x_2 , x_3 and x_4 are particles/ radiation emitted by the respective isotopes. The correct option(s) is/are-

- (1) Z is an isotope of uranium
- (2) x_2 is β^-
- (3) x_1 will deflect towards negatively charged plate
- (4) x_3 is γ -ray

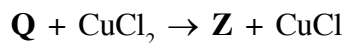
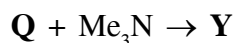
Ans. (1,2,3)

4. Which of the following statement(s) is(are) true ?

- (1) Oxidation of glucose with bromine water gives glutamic acid
- (2) The two six-membered cyclic hemiacetal forms of D-(+)-glucose are called anomers
- (3) Hydrolysis of sucrose gives dextrorotatory glucose and laevorotatory fructose
- (4) Monosaccharides **cannot** be hydrolysed to give polyhydroxy aldehydes and ketones

Ans. (2,3,4)

5. A tin chloride **Q** undergoes the following reactions (not balanced)

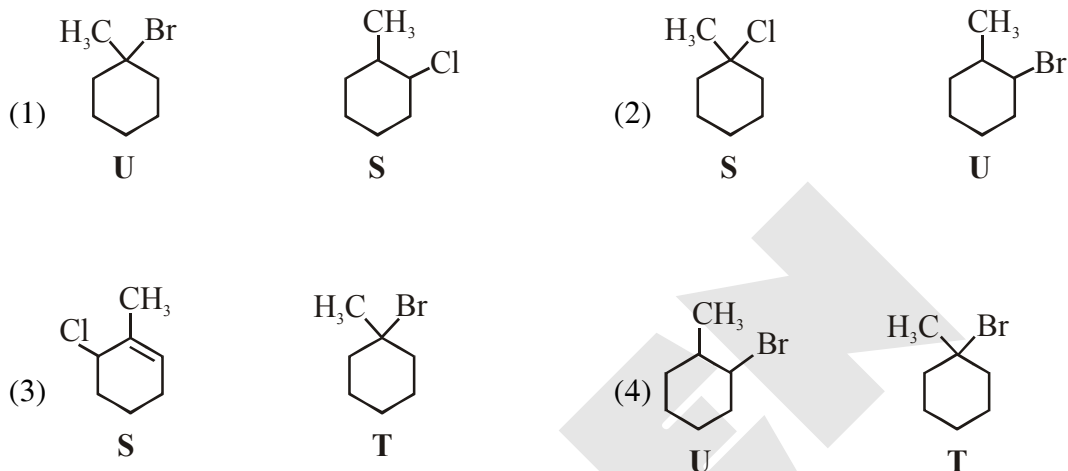
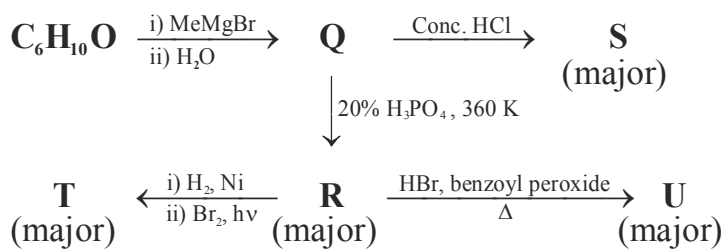


X is a monoanion having pyramidal geometry. Both Y and Z are neutral compounds. Choose the correct option(s).

- (1) The central atoms in X is sp^3 hybridized
- (2) The oxidation state of the central atom in Z is +2
- (3) The central atom in Z has one lone pair of electrons
- (4) There is a coordinate bond in Y

Ans. (1,4)

6. Choose the correct option(s) for the following set of reactions



Ans. (2,4)

7. Each of the following options contains a set of four molecules. Identify the option(s) where all four molecules possess permanent dipole moment at room temperature.

- (1) BeCl_2 , CO_2 , BCl_3 , CHCl_3 (2) SO_2 , $\text{C}_6\text{H}_5\text{Cl}$, H_2Se , BrF_5
 (3) BF_3 , O_3 , SF_6 , XeF_6 (4) NO_2 , NH_3 , POCl_3 , CH_3Cl

Ans. (2,4)

8. Choose the reaction(s) from the following options, for which the standard enthalpy of reaction is equal to the standard enthalpy of formation.

- (1) $\frac{3}{2}\text{O}_2(\text{g}) \rightarrow \text{O}_3(\text{g})$ (2) $\frac{1}{8}\text{S}_8(\text{s}) + \text{O}_2(\text{g}) \rightarrow \text{SO}_2(\text{g})$
 (3) $2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{H}_2\text{O}(\text{l})$ (4) $2\text{C}(\text{g}) + 3\text{H}_2(\text{g}) \rightarrow \text{C}_2\text{H}_6(\text{g})$

Ans. (1,2)

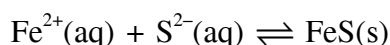
SECTION-3 : (Maximum Marks: 18)

- This section contains **SIX (06)** questions. The answer to each question is a **NUMERICAL VALUE**.
- For each question, enter the correct numerical value of the answer using the mouse and the on-screen virtual numeric keypad in the place designated to enter the answer. If the numerical value has more than two decimal places, **truncate/round-off** the value to **Two** decimal places.
- Answer to each question will be evaluated according to the following marking scheme:

Full Marks : +3 If **ONLY** the correct numerical value is entered.

Zero Marks : 0 In all other cases.

1. For the following reaction, the equilibrium constant K_c at 298 K is 1.6×10^{17} .



When equal volumes of 0.06 M $\text{Fe}^{2+}(\text{aq})$ and 0.2 M $\text{S}^{2-}(\text{aq})$ solutions are mixed, the equilibrium concentration of $\text{Fe}^{2+}(\text{aq})$ is found to be $Y \times 10^{-17}$ M. The value of Y is _____

Ans. (8.92 or 8.93)

2. Among B_2H_6 , $\text{B}_3\text{N}_3\text{H}_6$, N_2O , N_2O_4 , $\text{H}_2\text{S}_2\text{O}_3$ and $\text{H}_2\text{S}_2\text{O}_8$, the total number of molecules containing covalent bond between two atoms of the same kind is _____

Ans. (4.00)

3. Consider the kinetic data given in the following table for the reaction $\text{A} + \text{B} + \text{C} \rightarrow \text{Product}$.

Experiment No.	[A] (mol dm ⁻³)	[B] (mol dm ⁻³)	[C] (mol dm ⁻³)	Rate of reaction (mol dm ⁻³ s ⁻¹)
1	0.2	0.1	0.1	6.0×10^{-5}
2	0.2	0.2	0.1	6.0×10^{-5}
3	0.2	0.1	0.2	1.2×10^{-4}
4	0.3	0.1	0.1	9.0×10^{-5}

The rate of the reaction for $[\text{A}] = 0.15 \text{ mol dm}^{-3}$, $[\text{B}] = 0.25 \text{ mol dm}^{-3}$ and $[\text{C}] = 0.15 \text{ mol dm}^{-3}$ is found to be $Y \times 10^{-5} \text{ mol dm}^{-3} \text{ s}^{-1}$. The value of Y is _____

Ans. (6.75)

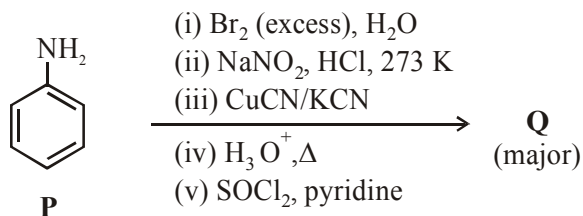
4. On dissolving 0.5 g of a non-volatile non-ionic solute to 39 g of benzene, its vapor pressure decreases from 650 mm Hg to 640 mm Hg. The depression of freezing point of benzene (in K) upon addition of the solute is _____

(Given data : Molar mass and the molal freezing point depression constant of benzene are 78 g mol^{-1} and $5.12 \text{ K kg mol}^{-1}$, respectively)

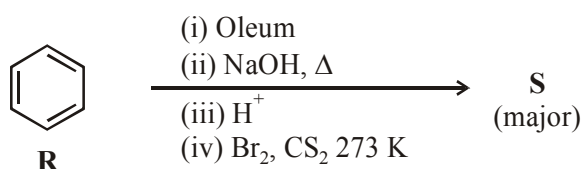
Ans. (1.02 or 1.03)

5. Scheme 1 and 2 describe the conversion of **P** to **Q** and **R** to **S**, respectively. Scheme 3 describes the synthesis of **T** from **Q** and **S**. The total number of Br atoms in a molecule of **T** is _____

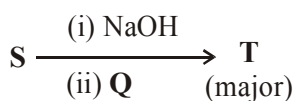
Scheme 1 :



Scheme 2 :



Scheme 3 :



Ans. (4.00)

6. At 143 K. the reaction of XeF_4 with O_2F_2 produces a xenon compound **Y**. The total number of lone pair(s) of electrons present on the whole molecule of **Y** is _____

Ans. (19.00)