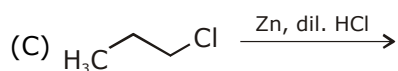
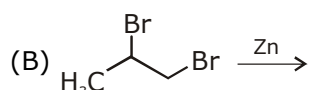


CHEMISTRY [JEE ADVANCED - 2019] PAPER - 2

Section 1 (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 mark;
choosing ONLY (B) will get +1 mark;
choosing ONLY (D) will get +1 mark;
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. Which of the following reactions produce(s) propane as a major product ?

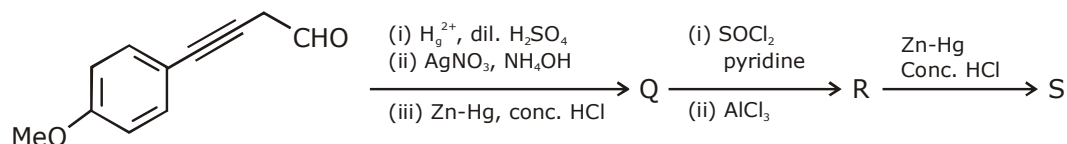


Ans. **C,D**

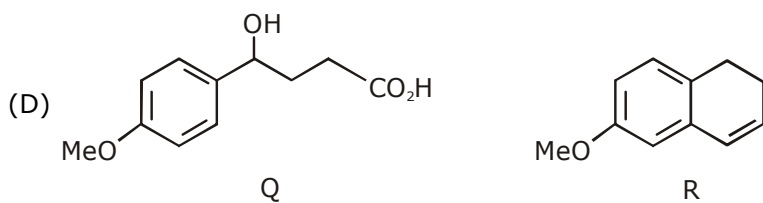
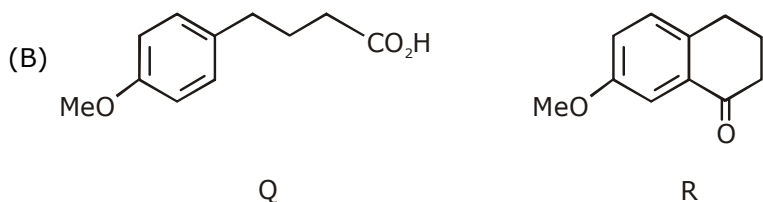
2. With reference to aqua regia, choose the correct option(s)
- (A) The yellow colour of aqua regia is due to the presence of NOCl and Cl₂
 - (B) Reaction of gold with aqua regia produces an anion having Au in +3 oxidation state
 - (C) Reaction of gold with aqua regia produces NO₂ in the absence of air
 - (D) Aqua regia is prepared by mixing conc. HCl and conc. HNO₃ in 3 : 1 (v/v) ratio

Ans. **A,B,D**

3. Choose the correct option(s) for the following reaction sequence



Consider Q, R and S as major products.



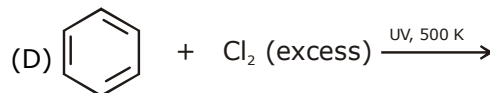
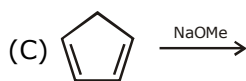
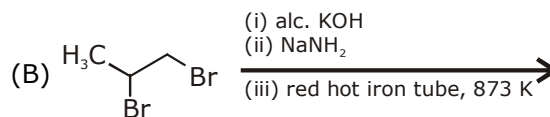
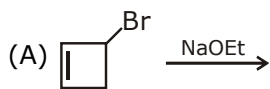
Ans. B,C

4. The ground state energy of hydrogen atom is -13.6 eV. Consider an electronic state ψ of He^+ whose energy, azimuthal quantum number and magnetic quantum number are -3.4 eV, 2 and 0, respectively. Which of the following statement(s) is(are) true for the state ψ ?

- (A) The nuclear charge experienced by the electron in this state is less than $2e$, where e is the magnitude of the electronic charge
 (B) It has 3 radial nodes
 (C) It is a 4d state
 (D) It has 2 angular nodes

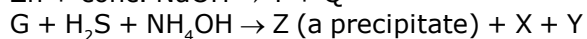
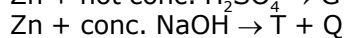
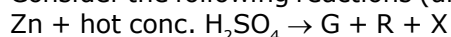
Ans. C or C, D

5. Choose the correct option(s) that give(s) an aromatic compound as the major product



Ans. **B,C**

6. Consider the following reactions (unbalanced)



Choose the correct option(s)

(A) R is a V-shaped molecule

(B) The oxidation state of Zn in T is +1

(C) Bond order of Q is 1 in its ground state

(D) Z is dirty white in colour

Ans. **A,C,D**

7. Choose the correct option(s) from the following

(A) Teflon is prepared by heating tetrafluoroethene in presence of a persulphate catalyst at high pressure

(B) Natural rubber is polyisoprene containing trans alkene units

(C) Nylon-6 has amide linkages

(D) Cellulose has only α -D-glucose units that are joined by glycosidic linkages

Ans. **A,C**

8. The cyanide process of gold extraction involves leaching out gold from its ore with CN^- in the presence of Q in water to form R. Subsequently R is treated with T to obtain Au and Z. Choose the correct option(s)

(A) Z is $[Zn(CN)_4]^{2-}$ (B) R is $[Au(CN)_4]^-$ (C) T is Zn (D) Q is O_2

Ans. **A,C,D**

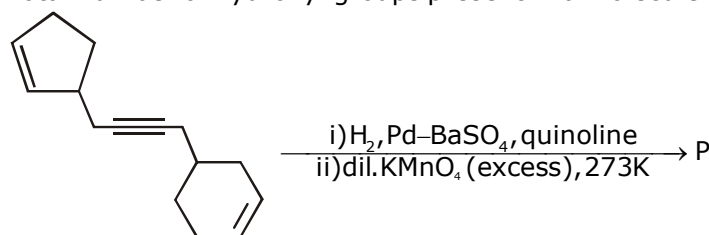
SECTION 2 (Maximum Marks: 18)

- 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. Total number of hydroxyl groups present in a molecule of the major product P is



Ans. **6**

2. Total number of cis N-Mn-Cl bond angles (that is, Mn-N and Mn-Cl bonds in cis positions) present in a molecule of cis-[Mn(en)₂Cl₂] complex is (en = NH₂CH₂CH₂NH₂)

Ans. 6

3. The amount of water produced (in g) in the oxidation of 1 mole rhombic sulphur by conc. HNO₃ to a compound with the highest oxidation state of sulphur is
(Given data. Molar mass of water = 18 g mol⁻¹)

Ans. 288

4. The decomposition reaction $2\text{N}_2\text{O}_5(\text{g}) \xrightarrow{\Delta} 2\text{N}_2\text{O}_4(\text{g}) + \text{O}_2(\text{g})$ is started in a closed cylinder under isothermal isochoric condition at an initial of 1 atm. After Y × 10³ s, the pressure inside the cylinder is found to be 1.45 atm. If the rate constant of the reaction is 5 × 10⁻⁴ s⁻¹, assuming ideal gas behavior, the value of Y is

Ans. 2.3 or 4.6

5. Total number of isomers, considering both structural and stereoisomers, of cyclic ethers with the molecular formula C₄H₈O is

Ans. 10

6. The mole fraction of urea in an aqueous urea solution containing 900 g of water is 0.05. If the density of the solution is 1.2 g cm⁻³, the molarity of urea solution is
(Given data: Molar masses of urea and water are 60 g mol⁻¹ and 18 g mol⁻¹, respectively)

Ans. 2.98

SECTION 3 (Maximum Marks: 12)

- This section contains Two (02) List-Match sets,
- Each List-Match set has Two (02) Multiple Choice Questions.
- Each List-Match set has two lists. List-I and List-II
- **List-I** has **Four** entries (I), (II), (III) and (IV) and List-II has six entries (P), (Q), (R), (S), (T) and (U).
- FOUR options are given in each Multiple Choice Question based on List-I and List-II and **ONLY ONE** of these four options satisfies the condition asked in the Multiple Choice Question.
- Answer to each question will be evaluated according to the following marking scheme:
Full Marks : +3 If ONLY the option corresponding to the correct combination 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. Answer is following by appropriately matching the lists based on the information given in the paragraph

Consider the Bohr's model of a one-electron atom where the electron moves around the nucleus. In the following, List-I contains some quantities for the nth orbit of the atom and List-II contains options showing how they depend on n.

List - I	List - II
(I) Radius of the n th orbit	(P) ∝ n ⁻²
(II) Angular momentum of the electron in the n th orbit	(Q) ∝ n ⁻¹
(III) Kinetic energy of the electron in the n th orbit	(R) ∝ n ⁰
(IV) Potential energy of the electron in the n th orbit	(S) ∝ n ¹
	(T) ∝ n ²
	(U) ∝ n ^{1/2}

Which of the following options has the correct combination considering List-I and List-II ?

- | | |
|---------------|---------------|
| (A) (II), (R) | (B) (I), (P) |
| (C) (I), (T) | (D) (II), (Q) |

Ans. C

2. Answer is following by appropriately matching the lists based on the information given in the paragraph
 Consider the Bohr's model of a one-electron atom where the electron moves around the nucleus. In the following, List-I contains some quantities for the n^{th} orbit of the atom and List-II contains options showing how they depend on n .

List - I

- (I) Radius of the n^{th} orbit
 (II) Angular momentum of the electron in the n^{th} orbit
 (III) Kinetic energy of the electron in the n^{th} orbit
 (IV) Potential energy of the electron in the n^{th} orbit

List - II

- (P) $\propto n^{-2}$
 (Q) $\propto n^{-1}$
 (R) $\propto n^0$
 (S) $\propto n^1$
 (T) $\propto n^2$
 (U) $\propto n^{1/2}$

Which of the following options has the correct combination considering List-I and List-II ?

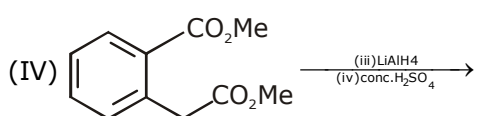
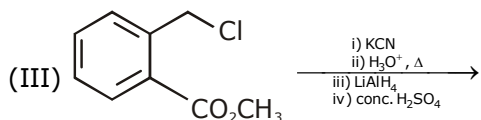
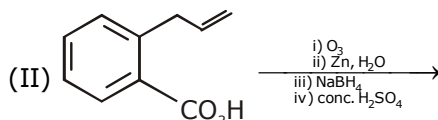
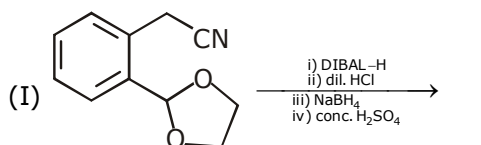
- (A) (III), (P) (B) (IV), (Q) (C) (IV), (U) (D) (III), (S)

Ans. A

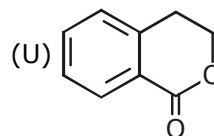
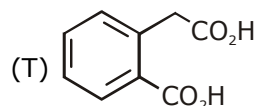
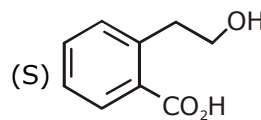
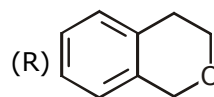
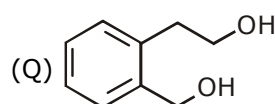
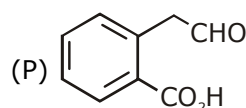
3. Answer is following by appropriately matching the lists based on the information given in the paragraph

List - I includes starting materials and reagents of selected chemical reactions. List - II gives structures of compounds that may be formed as intermediate products and/or final products from the reactions of List-I

List - I



List - II



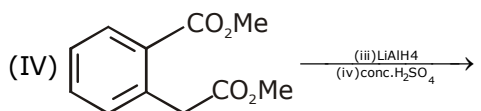
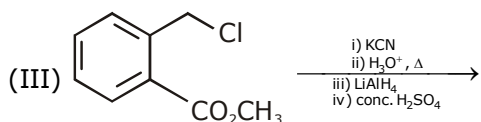
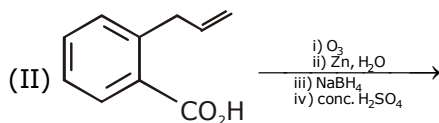
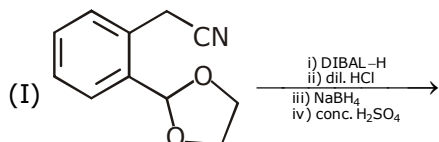
Which of the following options has correct combination considering List-I and List-II ?

- (A) (III), (T), (U) (B) (IV), (Q), (U) (C) (III), (S), (R) (D) (IV), (Q), (R)

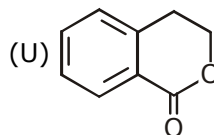
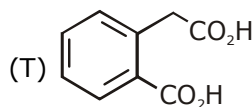
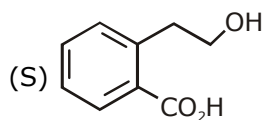
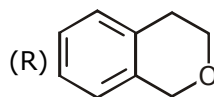
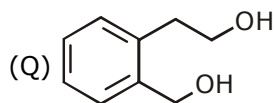
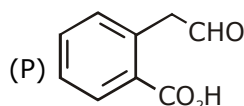
Ans. D

4. Answer is following by appropriately matching the lists based on the information given in the paragraph
 List - I includes starting materials and reagents of selected chemical reactions. List - II gives structures of compounds that may be formed as intermediate products and/or final products from the reactions of List-I

List - I



List - II



(A) (I), (Q), (T), (U)
 (C) (II), (P), (S), (U)

(B) (I), (S), (Q), (R)
 (D) (II), (P), (S), (T)

Ans C