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PAPER WITH SOLUTION

# JEE Advanced 2019 CHEMISTRY PAPER - 2

IIT/NIT | NEET / AIIMS | NTSE / IJSO / OLYMPIADS

कोटा का **रिपिटर्स (12th पास)**  
का सर्वश्रेष्ठ रिजल्ट देने वाला संस्थान

## JEE ADVANCED 2018 RESULT



AIR  
**82**  
Sarthak  
Behera



AIR  
**120**  
Pankaj



AIR  
**146**  
Varun  
Goyal



AIR  
**148**  
Mukul  
Kumar

Total Selection

709/2084 = **34.02%**

## JEE MAIN 2019 RESULT



AIR  
**79**  
Shiv  
Kumar Modi



AIR  
**85**  
Anuj  
Chaudhary



AIR  
**96**  
Shubham  
Kumar



AIR  
**120**  
Eshaan  
Jain

Students Qualified for JEE ADVANCED

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## CRITERIA FOR DIRECT ADMISSION IN STAR BATCHES

### V STAR BATCH XII Pass (JEE M+A)

#### ELIGIBILITY

**JEE Main'19**  
%tile > 98%tile

**JEE Advanced'19**  
Rank (Gen.) < 15,000

### J STAR BATCH XII Pass (NEET/AIIMS)

#### ELIGIBILITY

**NEET'19 Score > 450 Marks**

**AIIMS'19 %tile > 98%tile**

### P STAR BATCH XI Moving (JEE M+A)

#### ELIGIBILITY

**NTSE Stage-1 Qualified**  
or **NTSE Score > 160**

**100 marks in Science or**  
**Maths in Board Exam**

### H STAR BATCH XI Moving (NEET/AIIMS)

#### ELIGIBILITY

**NTSE Stage-1 Qualified**  
or **NTSE Score > 160**

**100 marks in Science or**  
**Maths in Board Exam**

### Scholarship Criteria

JEE Main Percentile	SCHOLARSHIP + STIPEND	JEE Advanced Rank	SCHOLARSHIP + STIPEND
98 - 99	100%	10000-20000	100%
Above 99	100% + ₹ 5000/ month	Under 10000	100% + ₹ 5000/ month

NEET 2019 Marks	SCHOLARSHIP + STIPEND	NTSE STAGE-1 2019 Marks	SCHOLARSHIP + STIPEND
450	100%	160-170	100% + ₹ 2000/ month
530-550	100% + ₹ 2000/ month	171-180	100% + ₹ 4000/month
550-560	100% + ₹ 4000/month	180+	100% + ₹ 5000/month
560	100% + ₹ 5000/month		

### FEATURES :

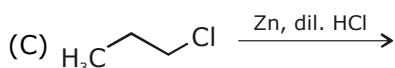
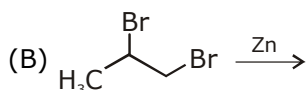
- ◆ Batch will be taught by NV Sir & HOD's Only.
- ◆ Weekly Quizes apart from regular test.
- ◆ Under direct guidance of NV Sir.
- ◆ Residential campus facility available.
- ◆ 20 CBT (Computer Based Test) for better practice.
- ◆ Permanent academic coordinator for personal academic requirement.
- ◆ Small batch with only selected student.
- ◆ All the top brands material will be discussed.

CHEMISTRY [ JEE ADVANCED - 2019 ] PAPER - 2

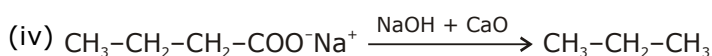
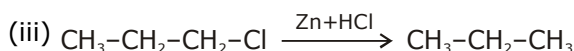
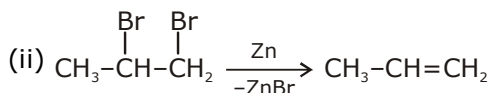
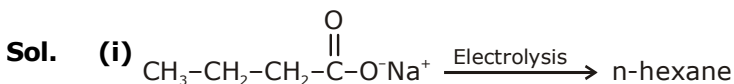
**Section 1 (Maximum Marks : 32)**

- 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 ?

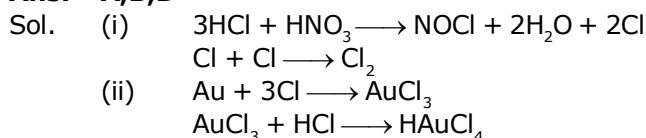


Ans. **C,D**

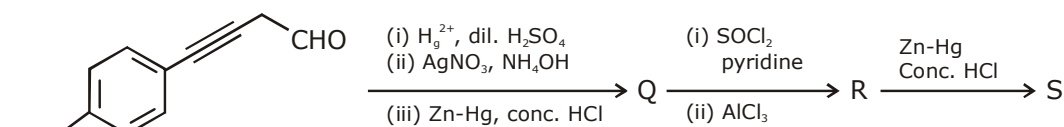


2. With reference to aqua regia, choose the correct option(s)  
 (A) The yellow colour of aqua regia is due to the presence of NOCl and Cl<sub>2</sub>  
 (B) Reaction of gold with aqua regia produces an anion having Au in +3 oxidation state  
 (C) Reaction of gold with aqua regia produces NO<sub>2</sub> in the absence of air  
 (D) Aqua regia is prepared by mixing conc. HCl and conc. HNO<sub>3</sub> in 3 : 1 (v/v) ratio

Ans. **A,B,D**



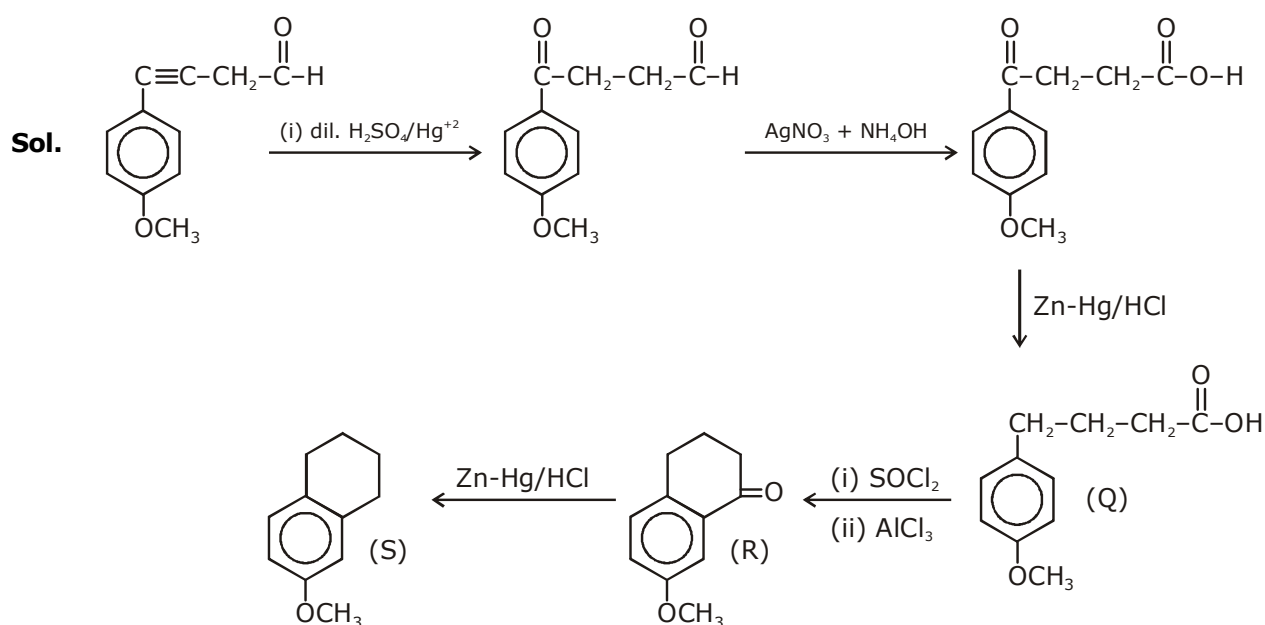
3. Choose the correct option(s) for the following reaction sequence



Consider Q, R and S as major products.

- (A) R S
- (B) Q R
- (C) R S
- (D) Q R

Ans. B,C



4. The ground state energy of hydrogen atom is  $-13.6$  eV. Consider an electronic state  $\psi$  of  $\text{He}^+$  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  $\psi$ ?

- (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

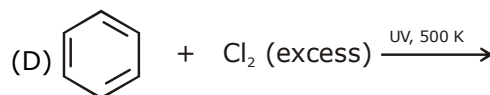
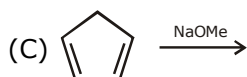
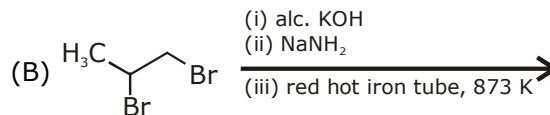
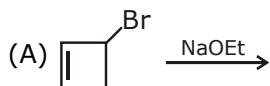
**Sol.**  $E_{n,2} = -3.4 \text{ eV} = -13.6 \times \frac{4}{n^2}$

$$l = 2 \quad \frac{1}{n^2} = 13.6 \times \frac{1}{4} \times \frac{1}{13.6 \times 4}$$

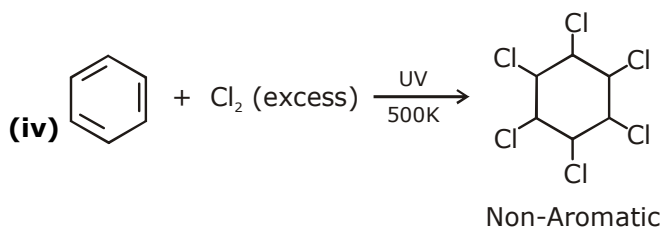
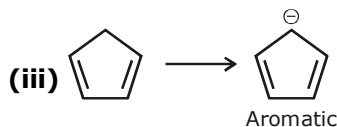
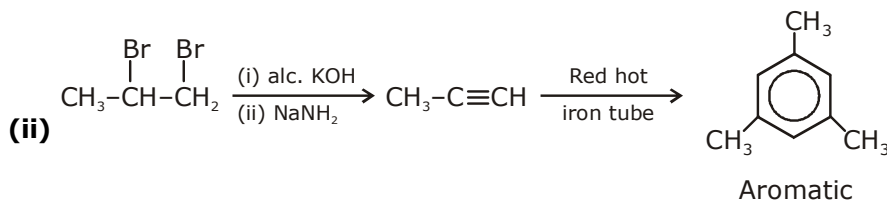
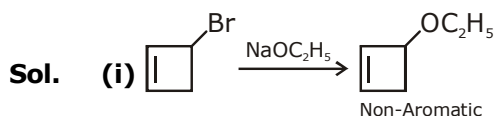
$$m = 0 \quad n = 4; l = 2$$

$$\text{No. of Radial Node} = n - l - 1 = 4 - 2 - 1 = 1$$

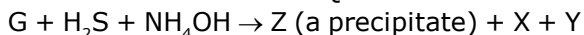
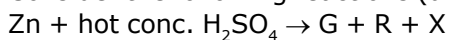
5. Choose the correct option(s) that give(s) an aromatic compound as the major product



Ans. B,C



6. Consider the following reactions (unbalanced)



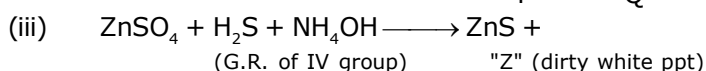
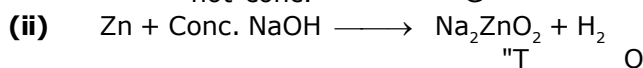
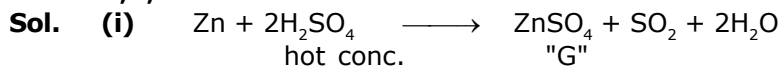
Choose the correct option(s)

(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

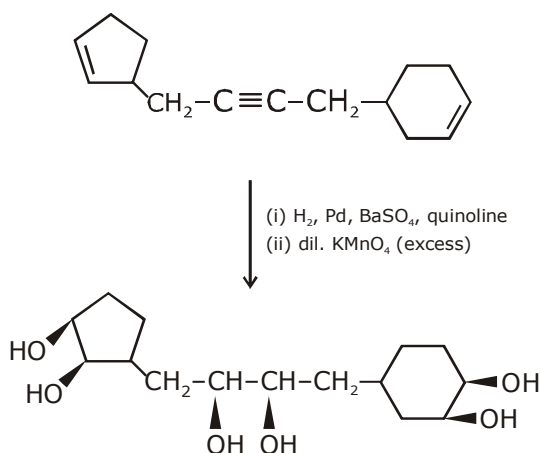




7. Choose the correct option(s) from the following  
 (A) Teflon is prepared by heating tetrafluoroethene in presence of a persulphate catalyst at high pressure  
 (B) Natural rubber is polyisoprene containing trans alkene units  
 (C) Nylon-6 has amide linkages  
 (D) Cellulose has only  $\alpha$ -D-glucose units that are joined by glycosidic linkages

Ans. A,C

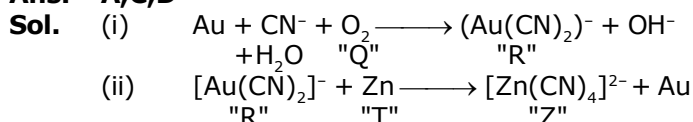
Sol.



8. The cyanide process of gold extraction involves leaching out gold from its ore with  $\text{CN}^-$  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  $[\text{Zn}(\text{CN})_4]^{2-}$  (B) R is  $[\text{Au}(\text{CN})_2]^-$  (C) T is Zn (D) Q is  $\text{O}_2$

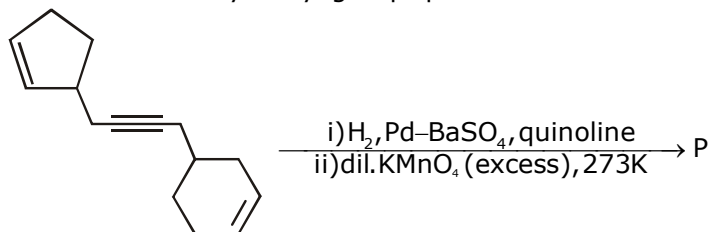
Ans. A,C,D



### 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 .....

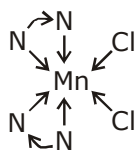


Ans. 6

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)<sub>2</sub>Cl<sub>2</sub>] complex is ..... (en = NH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>NH<sub>2</sub>)

Ans. 6

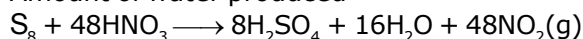
Sol.



3. The amount of water produced (in g) in the oxidation of 1 mole rhombic sulphur by conc. HNO<sub>3</sub> to a compound with the highest oxidation state of sulphur is .....  
(Given data. Molar mass of water = 18 g mol<sup>-1</sup>)

Ans. 288

Sol. Amount of water produced

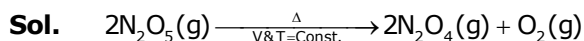


Moles of H<sub>2</sub>O Produced = 16 mol

Mass of H<sub>2</sub>O produced = (16 mol) × (18 amu) = 288 gm

4. The decomposition reaction  $2N_2O_5(g) \xrightarrow{\Delta} 2N_2O_4(g) + O_2(g)$  is started in a closed cylinder under isothermal isochoric condition at an initial of 1 atm. After  $Y \times 10^3$  s, the pressure inside the cylinder is found to be 1.45 atm. If the rate constant of the reaction is  $5 \times 10^{-4} \text{ s}^{-1}$ , assuming ideal gas behavior, the value of Y is .....

Ans. 2.3 or 4.6



t = 0    1 atm

't'       1-2x               2x               x  
1 + x = 1.45  $\Rightarrow$  x = 0.45 atm

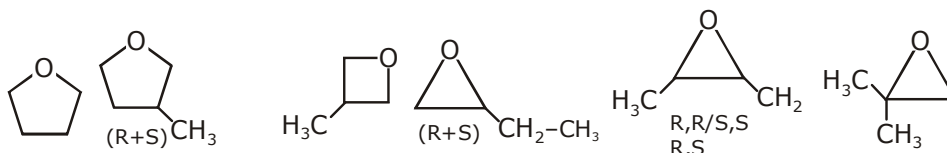
$$2 \times Y \times 10^3 \times 5 \times 10^{-4} = \ln \left[ \frac{1}{0.1} \right]$$

Y = 2.3

5. Total number of isomers, considering both structural and stereoisomers, of cyclic ethers with the molecular formula C<sub>4</sub>H<sub>8</sub>O is .....

Ans. 10

Sol.



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<sup>-3</sup>, the molarity of urea solution is .....  
(Given data: Molar masses of urea and water are 60 g mol<sup>-1</sup> and 18 g mol<sup>-1</sup>, respectively)

Ans. 2.98



**Sol.**  $X_{\text{ureareq}} = \frac{1}{20}$   $d_{\text{sol.}} = 1.2 \text{ g / ml.}$

$$\frac{1}{20} = \frac{n_{\text{urea}}}{n_{\text{urea}} + 50} \Rightarrow 50 = 19n_{\text{urea}}$$

$$n_{\text{urea}} = \frac{50}{19} \text{ mol}$$

$$n_{\text{sol.}} = \frac{1057.90}{1.2} \text{ ml}$$

$$\text{Molarity} = \frac{\frac{50}{19}}{\frac{1057.90}{1.2}} \times 1000 = \frac{50,000 \times 1.2}{19 \times 1057.90}$$

$$= \frac{60,000}{19 \times 1057.90} = 2.98 \text{ or } 2.99$$

### 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  $n^{\text{th}}$  orbit of the atom and List-II contains options showing how they depend on  $n$ .

List - I

- (I) Radius of the  $n^{\text{th}}$  orbit  
(II) Angular momentum of the electron in the  $n^{\text{th}}$  orbit  
(III) Kinetic energy of the electron in the  $n^{\text{th}}$  orbit  
(IV) Potential energy of the electron in the  $n^{\text{th}}$  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) (II), (R)                      (B) (I), (P)  
(C) (I), (T)                      (D) (II), (Q)

**Ans. C**

**Sol.**

List - I

- A  $R_{n,z}$
- B Avg. Momentum
- C KE
- D PE

List - II

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

$$R_{n,z} \propto n^2 \Rightarrow \text{(I) - T}$$

$$\text{Avg. Momentum} \propto n \Rightarrow \text{(II) - S}$$

$$\text{KE} \propto \frac{1}{n^2} \Rightarrow \text{(III) - P}$$

$$\text{PE} \propto \frac{1}{n^2} \Rightarrow \text{(IV) - P}$$

- 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  $n^{\text{th}}$  orbit of the atom and List-II contains options showing how they depend on  $n$ .

List - I

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

**Sol.**

List - I

- A  $R_{n,z}$
- B Avg. Momentum
- C KE
- D PE

List - II

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

$$R_{n,z} \propto n^2 \Rightarrow \text{(I) - T}$$

$$\text{Avg. Momentum} \propto n \Rightarrow \text{(II) - S}$$

$$\text{KE} \propto \frac{1}{n^2} \Rightarrow \text{(III) - P}$$

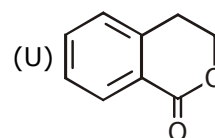
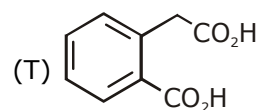
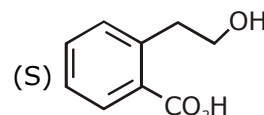
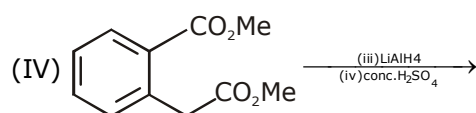
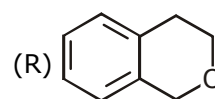
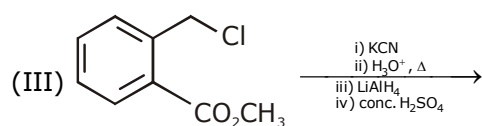
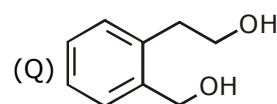
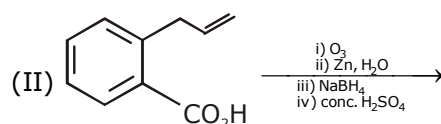
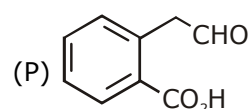
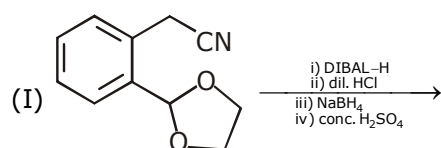
$$\text{PE} \propto \frac{1}{n^2} \Rightarrow \text{(IV) - P}$$

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

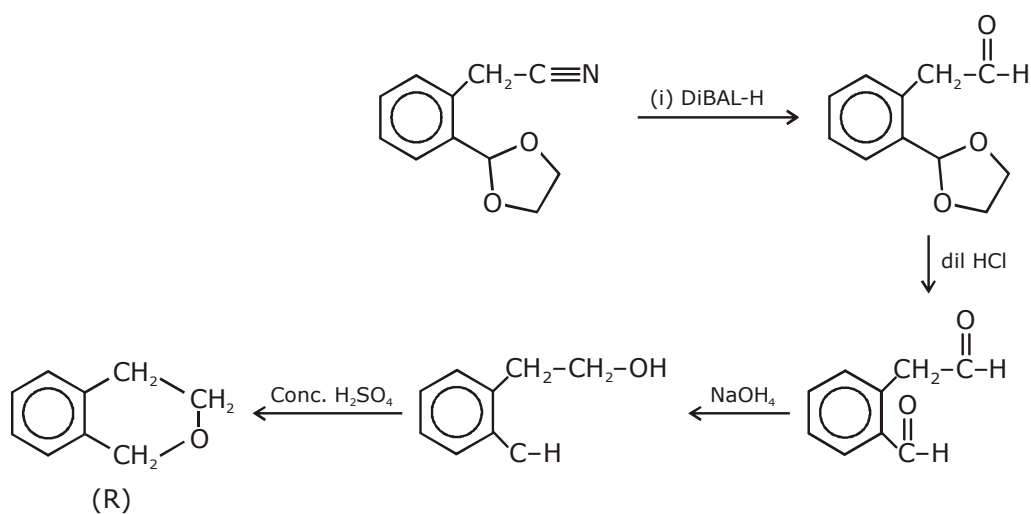


Which of the following options has correct combination considering List-I and List-II ?

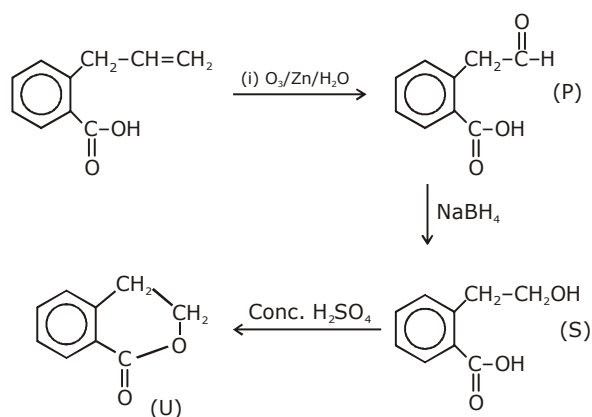
- (A) (III), (T), (U)                      (B) (IV), (Q), (U)  
(C) (III), (S), (R)                      (D) (IV), (Q), (R)

Ans. D

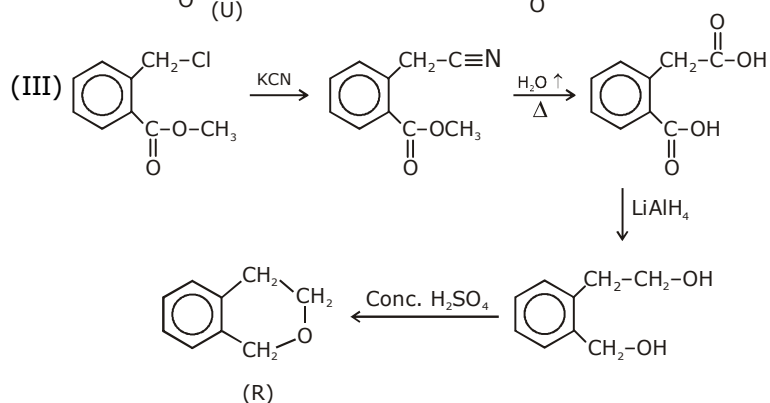
Sol. (I)

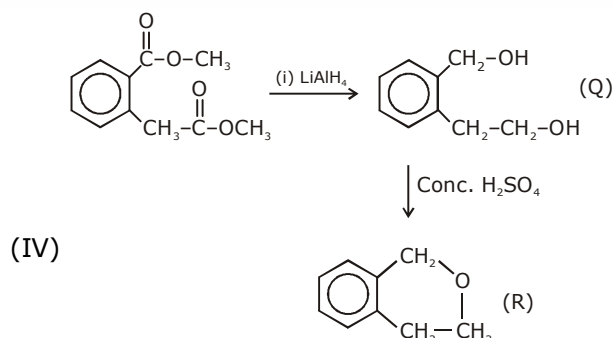


(II)



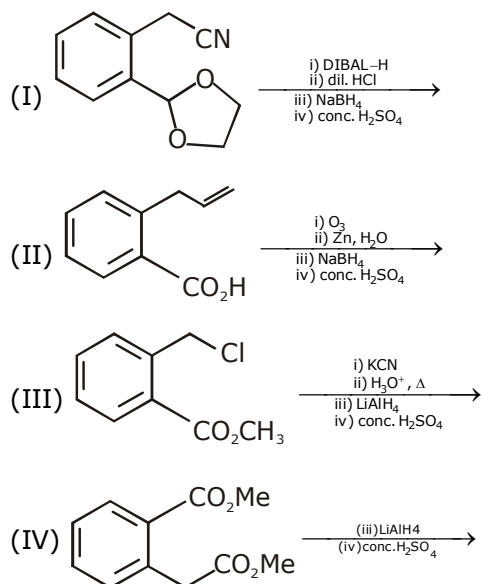
(III)



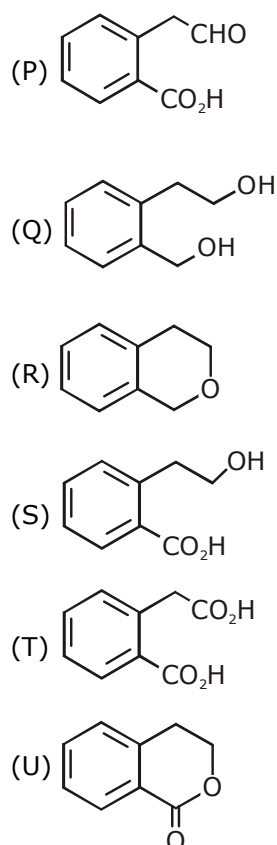


4. Answer is following by appropriately matching the lists based on the information given in the paragraph  
List - I includes starting materials and reagents of selected chemical reactions. List - II gives structures of compounds that may be formed as intermediate products and/or final products from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

List - I



List - II



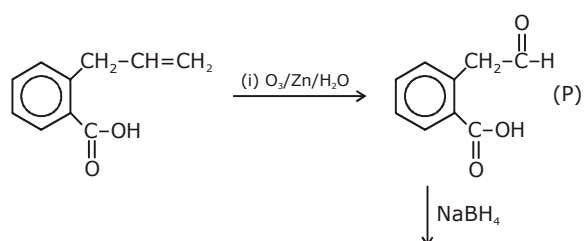
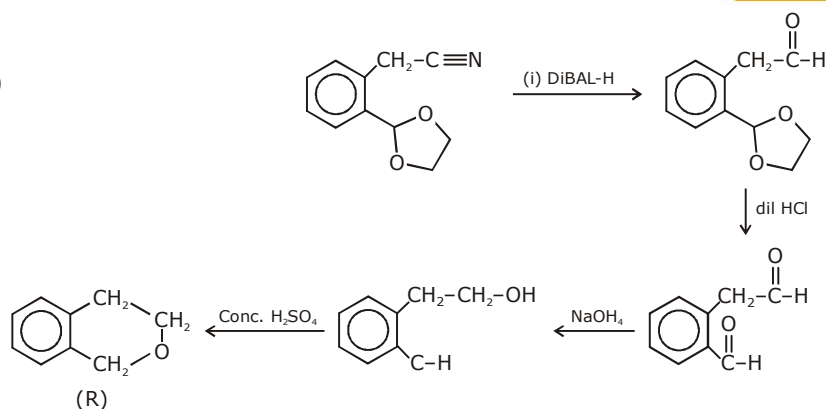
- (A) (I), (Q), (T), (U)  
 (C) (II), (P), (S), (U)

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

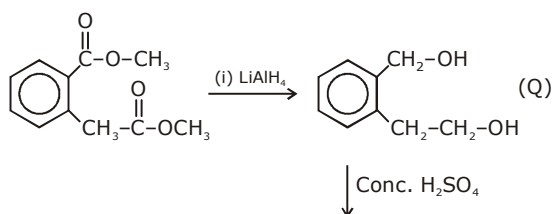
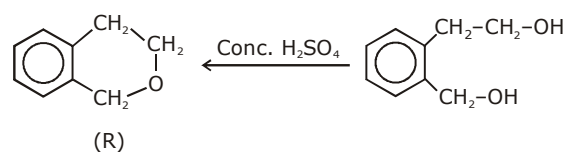
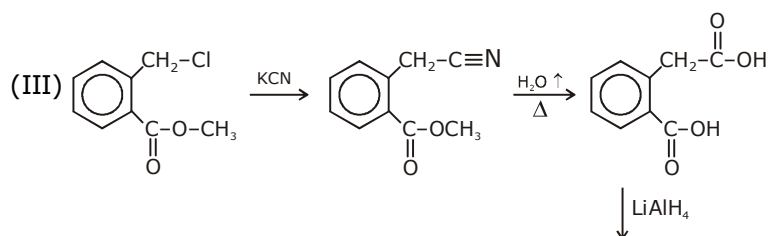
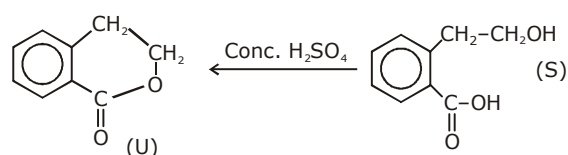
Ans

C

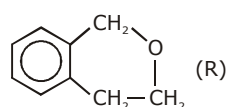
Sol. (I)



(II)



(IV)





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\*Scholarship Applicable at Kota Center Only

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97 To 97.5	₹ 14,500	₹ 14,500
96.5 To 97	₹ 29,000	₹ 29,000
96 To 96.5	₹ 58,000	₹ 58,000
95.5 To 96	₹ 65,250	₹ 65,250
95 To 95.5	₹ 72,500	₹ 72,500
93 To 95	₹ 87,000	₹ 87,000
90 To 93	₹ 1,01,500	₹ 94,250
85 To 90	₹ 1,08,750	₹ 1,01,500
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75 To 80	₹ 1,30,500	₹ 1,23,250



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