

Chemistry

Chapterwise Practise Problems (CPP) for JEE (Main & Advanced)

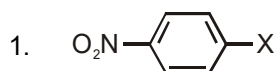
Chapter - Haloalkanes and Haloarenes

Level-1

SECTION - A

Straight Objective Type

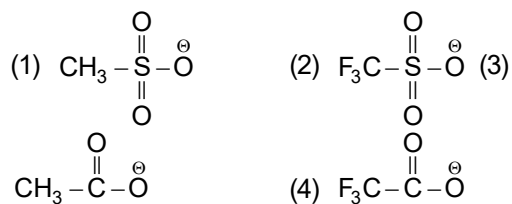
This section contains multiple choice questions. Each question has 4 choices (A), (B), (C) and (D) for its answer, out of which **ONLY ONE** is correct.



Options given below are the relative reactivity of the above compound towards sodium methoxide in methanol (50°). Choose the correct option.

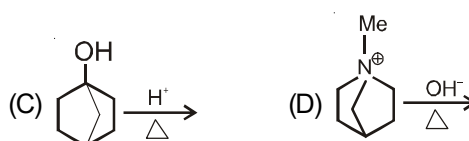
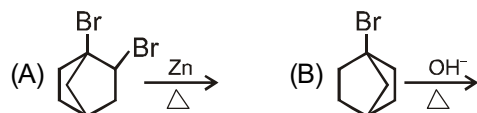
- (A) $X = F \rightarrow 312$ (B) $X = F \rightarrow 0.4$
 $X = Cl \rightarrow 1.0$ $X = Cl \rightarrow 0.8$
 $X = Br \rightarrow 0.8$ $X = Br \rightarrow 1.0$
 $X = I \rightarrow 0.4$ $X = I \rightarrow 3$
 (C) $X = F \rightarrow 312$ (D) Rate is same in all
 $X = Cl \rightarrow 0.8$ the cases
 $X = Br \rightarrow 1.0$
 $X = I \rightarrow 0.4$

2. Arrange leaving power of given nucleofuge : (best first)

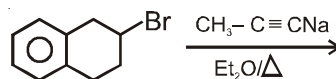


- (A) 2, 1, 4, 3 (B) 2, 4, 1, 3
 (C) 2, 1, 3, 4 (D) 2, 4, 3, 1

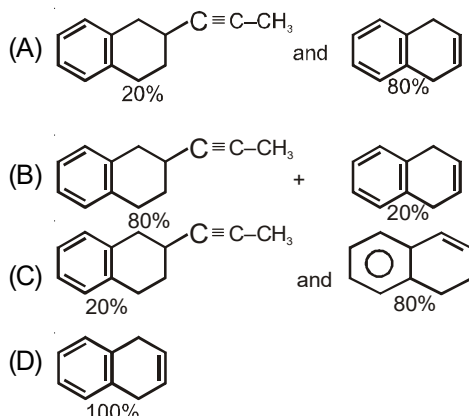
3. In which of the following reaction alkene is obtained ?



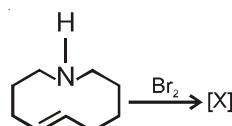
4. In the given reaction :



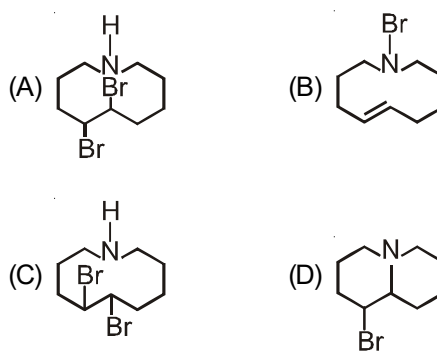
the products are :



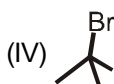
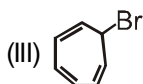
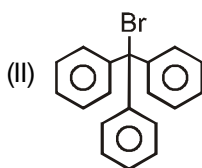
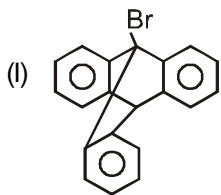
5. In the given reaction :



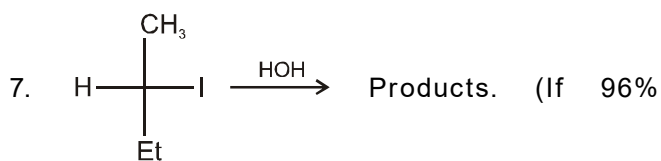
[X] is :



6. Correct order of rate of hydrolysis for following compounds is:

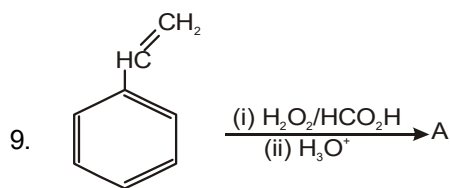
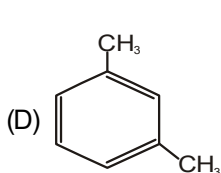
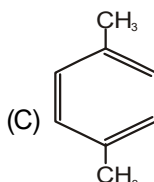
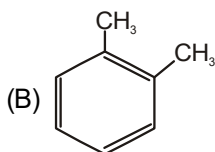
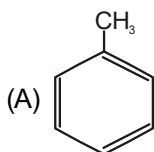


- (A) III > II > IV > I
(B) I > II > III > IV
(C) III > I > II > IV
(D) III > II > I > IV

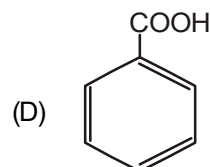
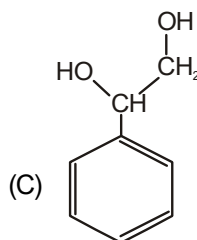
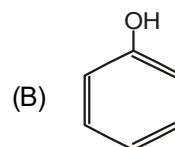
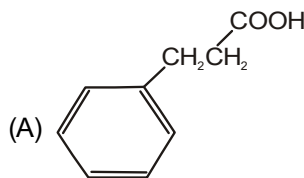


Find out the correct statement about the reaction.

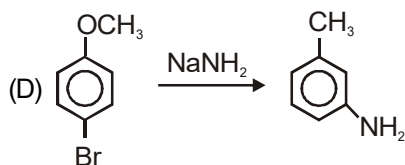
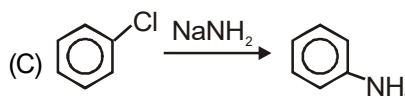
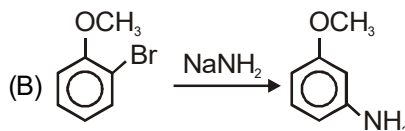
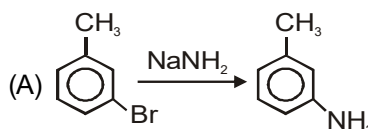
- (A) Among the products 48% S and 48% R configuration containing molecules are present
(B) Among the products 50% S and 50% R configuration containing molecules are present
(C) Among the products 48% S and 52% R configuration containing molecules are present
(D) Among the products 52% S and 48% R configuration containing molecules are present
8. Terephthalic acid is obtained by oxidation of which of the following compounds.



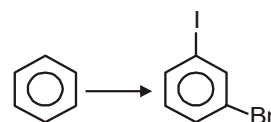
Identify A,



10. Which among the following reaction given is incorrect for major product?

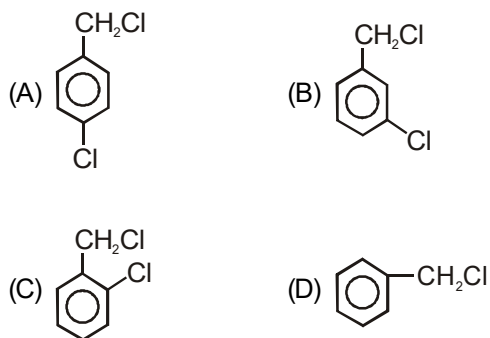


11. Find the correct sequence of reagents to convert

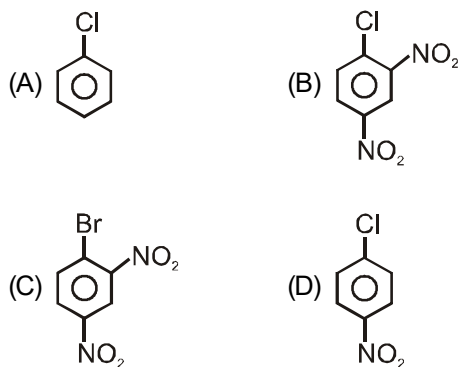


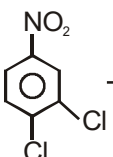
- (A) $\text{H}_2\text{SO}_4/\text{HNO}_3$, Br_2/Fe , Sn/HCl , NaNO_2/HCl ($0-5^\circ\text{C}$), KI
(B) I_2/Fe , Br_2/Fe
(C) $\text{H}_2\text{SO}_4/\text{HNO}_3$, Br_2/Fe , Sn/HCl , KI
(D) $\text{H}_2\text{SO}_4/\text{HNO}_3$, KI , Sn/HCl , Br_2/Fe

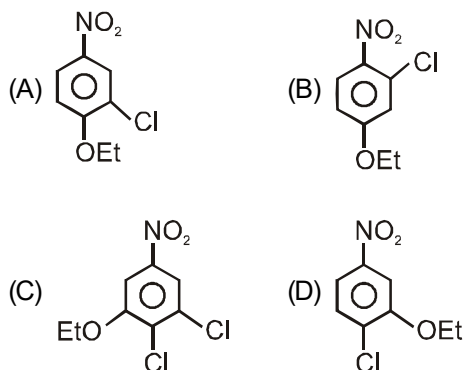
12. An aromatic compound 'A' $C_7H_6Cl_2$, gives AgCl on boiling with alcoholic $AgNO_3$ solution, and yields C_7H_7OCl on treatment with sodium hydroxide. 'A' on oxidation gives a mono chlorobenzoic acid which affords only one mononitro derivative. The compound A is :

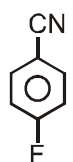


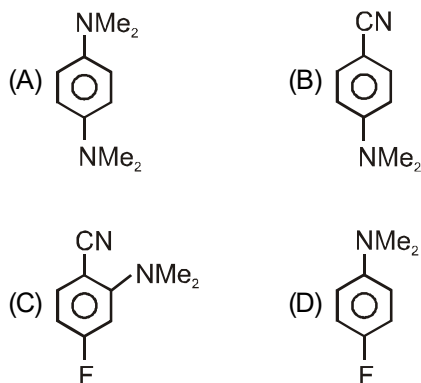
13. In which case S_N2 Ar reaction is fastest?



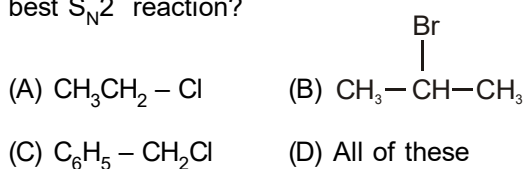
14.  $\xrightarrow[(1 \text{ mol}), \Delta]{EtONa}$ The product is :

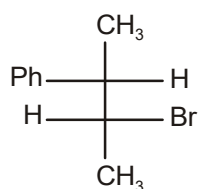


15.  $\xrightarrow[Cu_2O, \Delta]{(CH_3)_2NH}$ The product is :

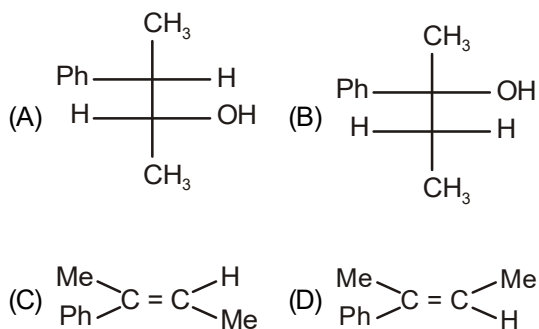


16. Which one of the following compounds will give best S_N2 reaction?

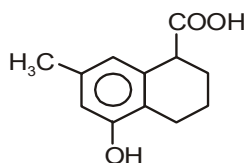


17.  $\xrightarrow[\Delta]{alc. KOH}$ (A) Major product

- Which of the following represents major product (A)?



18. How many mL of CH_4 is obtained at STP when 1 millimole of following compound is treated with excess methyl magnesium bromide?



- (A) 22.4 mL (B) 44.8 mL
(C) 67.2 mL (D) 11.2 mL

SECTION - B

Multiple Correct Answer Type

This section contains multiple choice questions. Each question has 4 choices (A), (B), (C) and (D) for its answer, out of which **ONE OR MORE** is/are correct.

19. The correct nucleophilicity order is/are

- (A) $(\text{CH}_3)_3\text{O}^\ominus > \text{CH}_3^\ominus$
(B) $\text{CH}_3\text{S}^\ominus > \text{CH}_3\text{SH}$
(C) $\text{CH}_3\text{CH}_2\text{CH}_2\text{O}^\ominus > (\text{CH}_3)_3\text{CO}^\ominus$
(D) $(\text{CH}_3\text{CH}_2)_3\text{N} > (\text{CH}_3\text{CH}_2)_3\text{P}$ (in PAS)

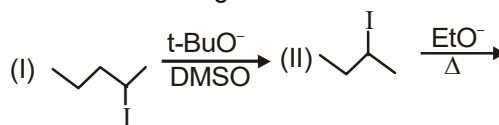
20. X and Y are:

- (A) (B)
(C) (D)

21. Which of the following order is/are correct for the rate of E2 reaction ?

- (A) 5-Bromocycloheptene > 4-Bromocycloheptene
(B) 2-Bromo-1-phenylbutane > 3-Bromo-1-phenylbutane
(C) 3-Bromocyclohexene > Bromocyclohexene
(D) 3-Bromo-2-methylpentane > 2-Bromo-4-methylpentane

22. Which of the following statement (s) is/are true about the following eliminations ?



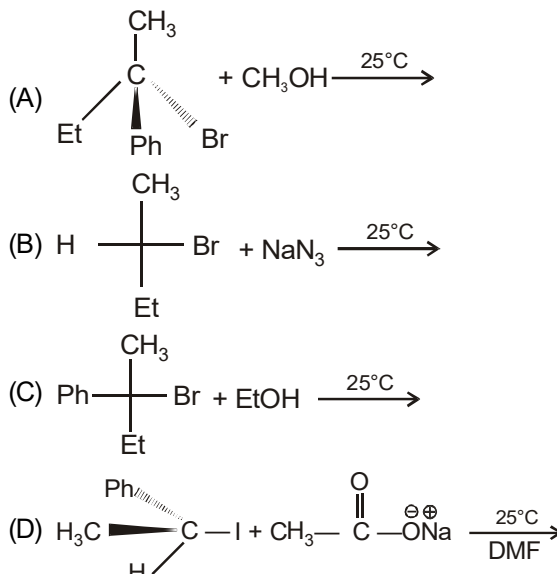
- (A) Hoffmann product is major product in I
(B) Saytzeff product is major product in I
(C) Hoffmann product is major product in II
(D) Saytzeff product is major product in II

23. Of the species PhSH , PhSR , $\text{PhS}^\ominus\text{R}$ and $\text{Ph-S(=O)}_2\text{-OR}$

the meta-substituted product is obtained from

- (A) PhSH (B) PhSR
(C) $\text{PhS}^\ominus\text{R}$ (D) $\text{Ph-S(=O)}_2\text{-OR}$

24. Only Inversion of configuration will take place in



25. $\text{CH}_3 - \text{C}(\text{CH}_3)_2 - \text{Cl} \xrightarrow[\text{CH}_3\text{OH}, \Delta]{\text{CH}_3\text{O}^\ominus\text{Na}^+}$ Major product is

- (A) $\text{CH}_3 - \text{C}(\text{CH}_3) = \text{CH}_2$ (B) $\text{CH}_3 - \text{C}(\text{CH}_3)_2 - \text{O} - \text{CH}_3$
(C) $\text{CH}_3 - \text{C}(\text{CH}_3)_2 - \text{H}$ (D) $\text{CH}_3 - \text{OH}$

SECTION - C

Linked Comprehension Type

This section contains paragraphs. Based upon this paragraph, multiple choice questions have to be answered. Each question has 4 choices (A), (B), (C) and (D) for its answer, out of which **ONE/MORE** is/are correct.

Paragraph for Question Nos. 26 and 27

Two isomeric compounds ($C_{11}H_{13}OCl$) gave the following results

A $\xrightarrow{Br_2/CCl_4}$ A pair of enantiomer

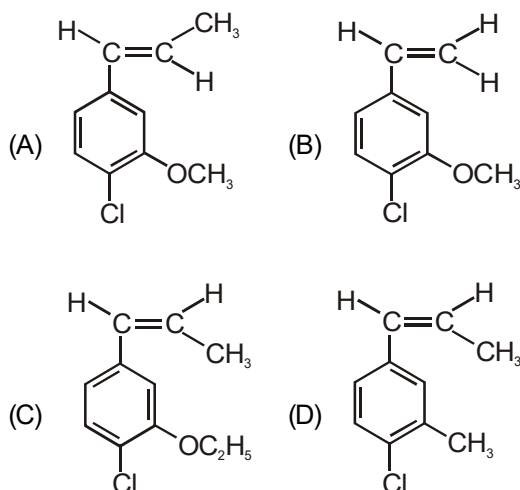
B $\xrightarrow{Br_2/CCl_4}$ Another pair of enantiomer

These two pairs of enantiomers are stereoisomers of each other.

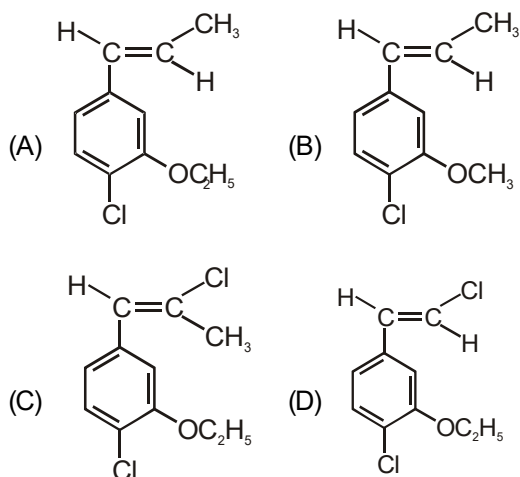
A or B $\xrightarrow{\text{oxidation}}$ 4-chloro-3-ethoxybenzoic acid

'A' has more heat of hydrogenation than that of B

26. The compound 'A' is



27. Compound 'B' is



SECTION-D

Matrix-Match Type

This Section D have "match the following" type question. Question contains two columns, **Col-I** and **Col-II**. Match the entries in **Col-I** with the entries in **Col-II**. One or more entries in **Col-I** may match with one or more entries in **Col-II**.

28. Match the **Column-I** with **Column-II** :

Column-I	Column-II
(A) Westron	(p) $CHCl_2 - CHCl_2$
(B) Westrosol	(q) $CFCl_3$
(C) Freon - 11	(r) CF_2Cl_2
(D) Freon - 12	(s) $CHCl = CCl_2$
	(t) Used as solvent

29. Match the **Column-I** with **Column-II** :

Column-I (Reaction)	Column-II (Products)
(A) Chloroform reacts with HNO_3 acid to form an insecticide.	(p) Gammaxene
(B) Silver acetate gets converted into methyl bromide on reaction with Br_2 in CCl_4	(q) Dichloro diphenyl trichloro ethane
(C) Chrobenzene in the presence of conc. H_2SO_4 Reacts with trichloro acetaldehyde	(r) Chloropicrin
(D) Benzene reacts with Cl_2 in presence of sun light.	(s) Compound containing Oxygen
	(t) Borodiene Hunsdiecker reaction

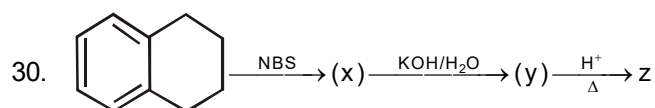
SECTION-E

Integer Answer Type

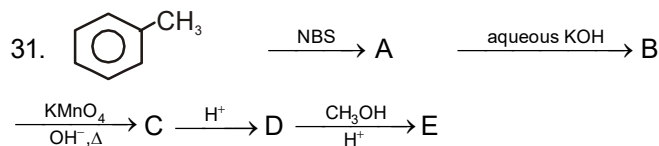
This section contains Integer type questions. The answer to each of the questions is a single digit integer, ranging from 0 to 9. The appropriate bubbles below the respective question numbers in the ORS have to be darkened. For

example, if the correct answers to question numbers X, Y and Z(say) are 6, 0 and 9, respectively, then the correct darkening of bubbles will look like the following :

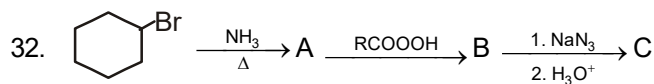
X	Y	Z
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9



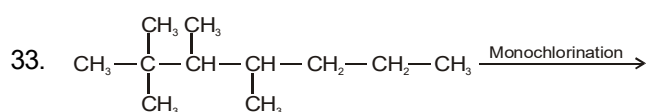
The sp^2 -hybridised carbon atoms present in one molecule of the end product z is :



Number of 'O' atoms in final product E is



Number of C – O bonds in 'C' is



Number of structural isomers possible for the above reaction is :

34. Total number of stereoisomeric products obtained by adding two moles of Br_2 to 2-bromohexa-1,5-diene is

☐ ☐ ☐

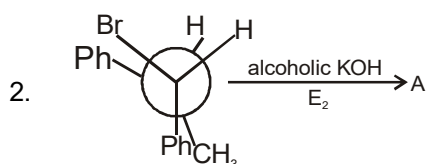
SECTION - A

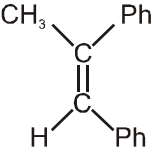
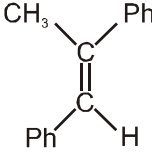
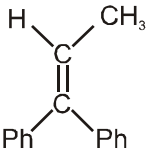
Straight Objective Type

This section contains multiple choice questions. Each question has 4 choices (A), (B), (C) and (D) for its answer, out of which **ONLY ONE** is correct.

1. Two isomeric halo alkenes (A) and (B) have molecular formula C_5H_9Cl . (A) gives optically inactive compound while (B) gives optically active compound on hydrogenation. The two isomers respectively are :

- (A) 3-chloro-1-pentene and 4-chloro-2-pentene
 (B) 4-chloro-1-pentene and 2-chloro-2-pentene
 (C) 3-chloro-2-pentene and 1-chloro-2-pentene
 (D) 1-chloro-1-pentene and 5-chloro-1-pentene

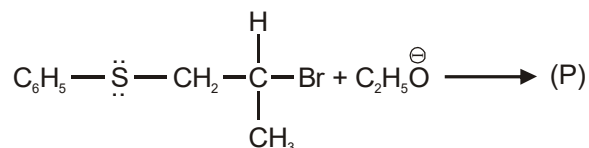


- (A)  (B) 
 (C)  (D) None is correct

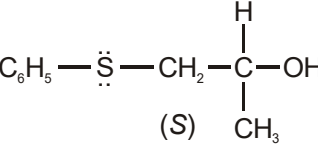
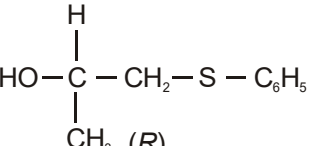
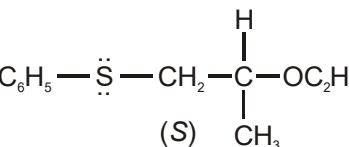
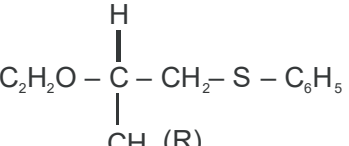
3. Which statement is not correct?

- (A) S_N2 reaction is first order with respect to the substrate and first order with respect to nucleophile
 (B) Presence of hetero atom at α - carbon increases the reactivity of substrate of S_N1
 (C) Presence of electron withdrawing group at α - carbon decreases reactivity of S_N1
 (D) Presence of π bond on β - carbon decreases reactivity of substrate of S_N1

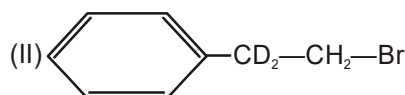
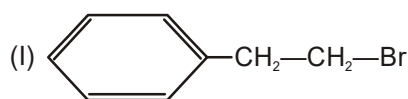
4. In the given reaction



the product is :

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

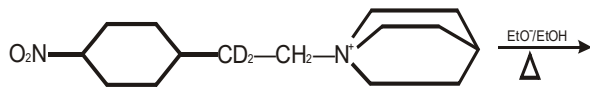
5. For the given compound I and II the rate of elimination in presence of $EtO^-/EtOH$ shows $\frac{K_H}{K_D} = 7:1$. What is true about this reaction?



- (A) H (or D) is eliminated in the rate determining step
 (B) Only Br^- is eliminated in rate determining step
 (C) Both C - H (D) and C - Br bonds are breaking one after another in the reaction
 (D) The reaction intermediate is resonance stabilized

6. Observe the given reaction. Given : $\frac{K_H}{K_D} = 1$.

Identify the incorrect statement about this reaction



- (A) The nucleofuge is
- (B) The product is
- (C) In EtO^-/EtOH , H-exchange will be observed
- (D) In EtO^-/EtOH the rate of reaction will be faster as compared to EtO^-/EtOD
7. Consider the following statement, "In 80% aqueous ethanol, t-butyl iodide solvolyses 100 times as rapidly as t-butyl chloride, but the ratio of elimination to substitution product is the same for chloride and iodide".

This statement indicates that

- (A) For elimination product $\text{C}_\beta\text{-H}$ and $\text{C}_\alpha\text{-X}$ are eliminated in the same step
- (B) The nucleofugality order is $\text{Cl}^- = \text{I}^-$
- (C) The percentage of substitution product is equal to percentage of elimination product
- (D) Only the nucleofuge departs in the slow step

SECTION - B

Multiple Correct Answer Type

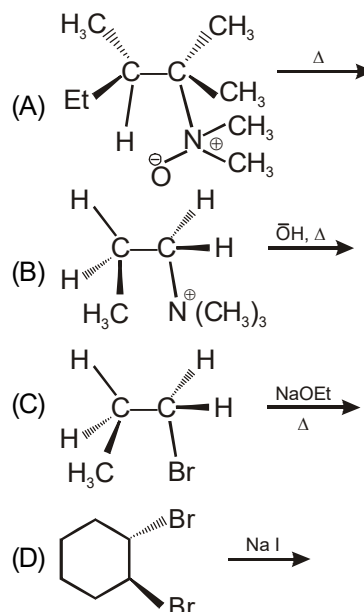
This section contains multiple choice questions. Each question has 4 choices (A), (B), (C) and (D) for its answer, out of which **ONE OR MORE** is/are correct.

8. Which of the following order is/are correct for the solvolysis in 50% aqueous ethanol at 44.6°C ?
- (A) $<$ $<$
- (B) $<$ $<$
- (C) $<$ $<$
- (D) $<$ $<$

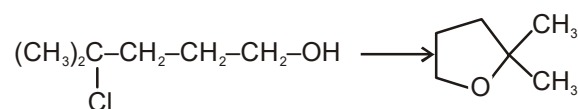
9. $\text{Y} \xleftarrow[\text{H}^+]{\text{CH}_3\text{OH}} \text{CH}_3 - \text{C}(\text{CH}_3) - \text{CH}_2 \xrightarrow[\text{H}^+]{\text{H}_2\text{O}^{18}} \text{X}$. Identify X and Y:

- (A) $\text{X} = \text{CH}_3 - \text{C}(\text{CH}_3)(\text{OH}) - \text{CH}_2^{18}\text{OH}$
- (B) $\text{Y} = \text{CH}_3 - \text{C}(\text{CH}_3)(\text{OH}) - \text{CH}_2\text{OCH}_3$
- (C) $\text{X} = \text{CH}_3 - \text{C}(\text{CH}_3)(\text{OH}) - \text{CH}_2^{18}\text{OH}$
- (D) $\text{Y} = \text{CH}_3 - \text{C}(\text{CH}_3)(\text{OH}) - \text{CH}_2\text{OCH}_3$

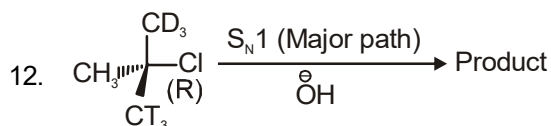
10. Which of the following elimination reactions show anti-elimination?



11. Look at the following reaction and select the correct statement (s)



- (A) It is an internal $\text{S}_{\text{N}}2$ reaction
- (B) Buffer (neutral pH) in polar conditions promote it
- (C) It is an internal $\text{S}_{\text{N}}1$ reaction
- (D) Cl^- is the nucleophile



Which of the following is/are correct statement(s) about the product of reaction:

- (A) It is a 100% racemic mixture
 (B) It has enantiomeric excess in which % of R-form is more than S-form
 (C) It has enantiomeric excess in which % of S-form is more than R-form
 (D) The overall product is optically active

SECTION - C

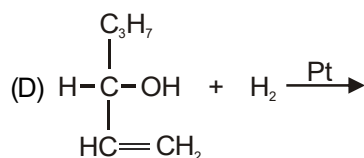
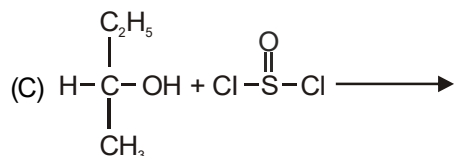
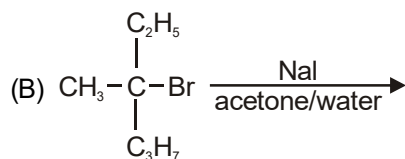
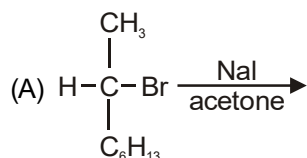
Linked Comprehension Type

This section contains paragraphs. Based upon this paragraph, multiple choice questions have to be answered. Each question has 4 choices (A), (B), (C) and (D) for its answer, out of which **ONE/MORE** is/are correct.

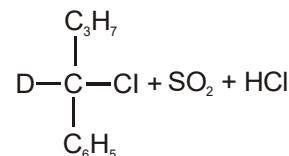
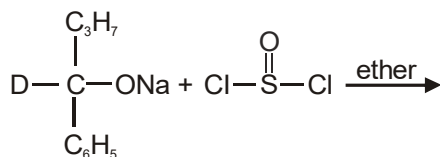
Paragraph for Question Nos. 13 to 15

One of the most interesting and useful aspects of stereochemistry is the study of what happens to optically active molecules when they react. The product isolated from the reaction of a chiral starting material can tell us a great deal about the reaction mechanism.

13. In which reaction inversion of configuration takes place ?

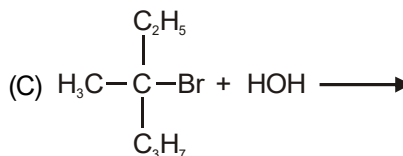
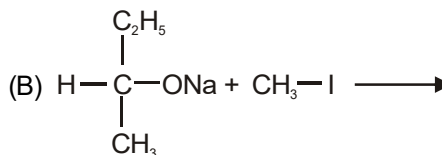
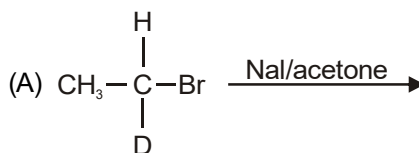


14. The given reaction is an example of which type of reaction?



- (A) $\text{S}_\text{N}2$ (B) $\text{S}_\text{N}1$
 (C) S_Ni (D) $\text{S}_\text{N}1'$

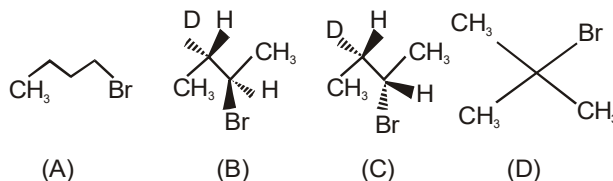
15. In which reaction there is retention of configuration?



- (D) All of these

Paragraph for Question Nos. 16 and 17

Check the following four substrates



Answer the following questions

16. Using CH_3O^- as base, under heating condition which of the above substrates can give more than one products?

- (A) Only A (B) Only D
 (C) Only C (D) Both B and C

17. Using CH_3OH as the nucleophile and solvent, which of the above substrate is least reactive?

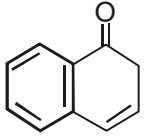
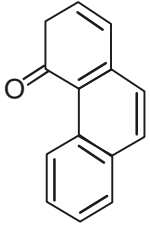
- (A) Only A (B) Only B
(C) Only D (D) Both C and D

SECTION-D

Matrix-Match Type

This **Section D** have "match the following" type question. Question contains two columns, **Col-I** and **Col-II**. Match the entries in **Col-I** with the entries in **Col-II**. One or more entries in **Col-I** may match with one or more entries in **Col-II**.

18. Match the following :

- | Column I | Column II |
|--|--|
| (A) Compounds which on reaction | (p) $\text{Ph}-\text{C}(=\text{O})-\text{CH}_2-\text{C}(=\text{O})-\text{Ph}$
with neutral FeCl_3 gives characteristic colouration |
| (B) Compounds which on reaction with | (q) 
$\text{NaO}_3\text{S}-\text{C}_6\text{H}_4-\text{N}_2\text{Cl}$ gives para red dye. |
| (C) Compounds which do not give yellow ppt. | (r) 
on reaction with NaOI |
| (D) Percentage enol content is higher than enol content of | (s) $\text{CH}_3-\text{C}(\text{OH})=\text{CH}-\text{C}(=\text{O})-\text{OC}_2\text{H}_5$
acetyl acetone |

SECTION-E

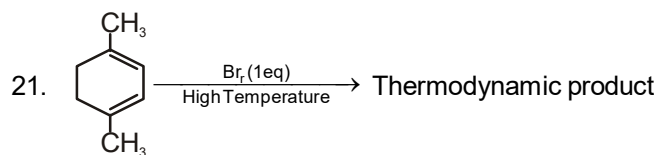
Integer Answer Type

This section contains Integer type questions. The answer to each of the questions is a single digit integer, ranging from 0 to 9. The appropriate bubbles below the respective question numbers in the ORS have to be darkened. For example, if the correct answers to question numbers X, Y and Z(say) are 6, 0 and 9, respectively, then the correct darkening of bubbles will look like the following :

X	Y	Z
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9

19. A compound (A) having molecular formula $\text{C}_7\text{H}_{11}\text{Br}$ is optically active. A reacts with HBr in the absence of peroxide to give isomeric products (B) and (C). Treating (A) with potassium-t- butoxide gives (D). (D) on reductive ozonolysis gives two moles of formaldehyde and one mole 1, 3 cyclopentane dione. (A) in the presence of peroxide reacts with HBr to give (E). The total number of chiral carbon in one molecule of (E) is :

20. $\text{H}_3\text{C}-\underset{\text{Br}}{\text{CH}}-\overset{\text{CH}_3}{\text{CH}}-\text{CH}_3 \xrightarrow{\text{EtOH}} (\text{X}) (\text{S}_\text{N}1 + \text{E}_1)$
considering all products (including stereoisomers) total number of products are :



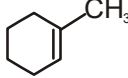
Number of hyperconjugative hydrogen atoms in the product is

22. Number of compounds, which have density higher than water from the following list is

CH_3F , CH_3Cl , CH_2Cl_2 , CHCl_3 , CCl_4 , CH_3Br , CH_3I , CH_2Br_2

23. Number of compounds, which have boiling points lower than H_2O

$\text{CH}_3\text{CH}_2\text{OH}$, $\text{CH}_3(\text{CH}_2)_5\text{CH}_3$, $\text{CF}_3(\text{CF}_2)_5\text{CF}_3$, CH_3OH , CH_3COOH , CH_3NH_2 , CH_3COCH_3 , CH_3Cl

24. Total number of monobromo derivatives (structural and stereoisomers) form when  reacts with NBS in presence of light is



ANSWERS

LEVEL-1

- | | | | | | |
|-------------------------|------------|-------------|-------------------------------|-----------|-----------|
| 1. (A) | 2. (A) | 3. (D) | 4. (C) | 5. (D) | 6. (A) |
| 7. (C) | 8. (C) | 9. (C) | 10. (D) | 11. (A) | 12. (A) |
| 13. (B) | 14. (A) | 15. (B) | 16. (C) | 17. (C) | 18. (B) |
| 19. (B,C,D) | 20. (A, B) | 21. (B,C,D) | 22. (A,D) | 23. (C,D) | 24. (B,D) |
| 25. (A) | 26. (C) | 27. (A) | 28. (A-p,t,B-s,t,C-q,t,D-r,t) | | |
| 29. (A-r,s,B-t,C-q,D-p) | 30. (8) | 31. (2) | 32. (1) | 33. (8) | |
| 34. (2) | | | | | |

LEVEL-2

- | | | | | | |
|-------------------------------------|---------|----------|-------------|-----------|-----------|
| 1. (A) | 2. (B) | 3. (D) | 4. (C) | 5. (A) | 6. (B) |
| 7. (D) | 8. (C) | 9. (A,D) | 10. (B,C,D) | 11. (B,C) | 12. (C,D) |
| 13. (A,B) | 14. (C) | 15. (B) | 16. (D) | 17. (A) | |
| 18. (A-p,q,r,s,B-q,r,C-q,r,D-p,q,r) | 19. (2) | 20. (6) | 21. (6) | 22. (6) | |
| 23. (7) | 24. (9) | | | | |

