



CHEMISTRY

BOOKS - CENGAGE CHEMISTRY (ENGLISH)

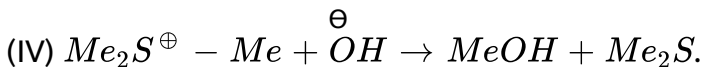
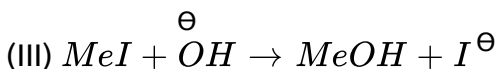
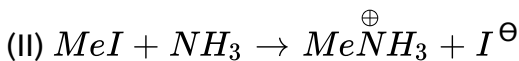
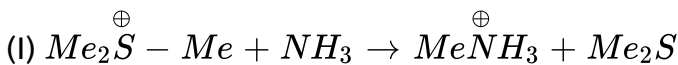
ORGANIC REACTION MECHANISM

Illustration

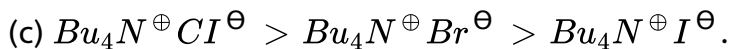
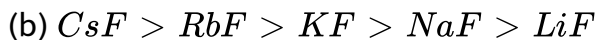
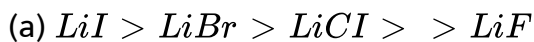
1. Explain the effect of SN^2 rates for the following reactions :

(a) Increasing the polarity of solvent.

(b) Show the T . S with all partial charges for each reaction type.

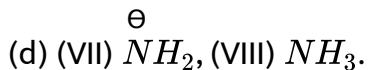
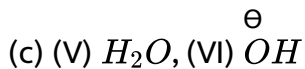
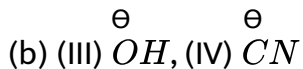
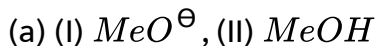


2. Explain the order of the following nucleophiles in weakly polar aprotic solvents, e.g., acetone.



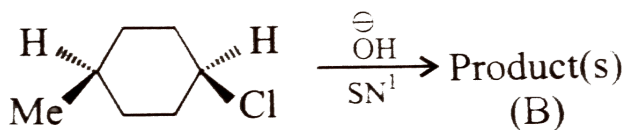
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3. Of the following pairs, which one is the stronger base and stronger nucleophile ?



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4. (a) Give the products of the following reactions :



cis-1-Chloro-4-methyl
cyclohexane

(A)



Product(s)

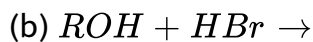
(C)



(c) The reaction of $\text{C}_2\text{H}_5\text{OH}$ with NaBr in the presence of H_2SO_4 is slow, but when trimethyl silyl chloride (Me_3SiCl) is added to it, reaction proceeds very fast. Why ?

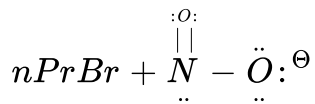
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5. Explain the reaction :



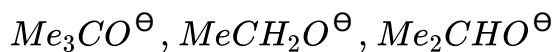
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6. Give the organic products of the following reactions :



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7. Give the decreasing order of SN^2 reactivity of the following alkoxide nucleophile.



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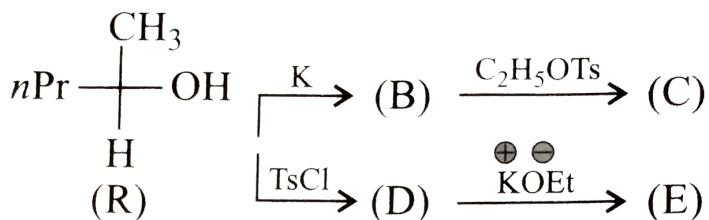
8. Optically pure (+) - 2 -chlorooctane, $[\alpha] = +40^\circ$, reacts with aq. $NaOH$ in acetone to give optically pure (-) - 2 -octanol, $[\alpha] = -12.0^\circ$. With partially racemised chloro compound whose $[\alpha] = +30^\circ$, the $[\alpha]$ of alcohol product is -6.0° . Calculate :

- The percentage optical purity of partially racemised chloro compound and alcohol.
- The percentage of inversion and racemisation.
- The percentage of front-side and back-side attacks.
- What interference can be drawn from the data in part (a) of the above example, about the mode of 2° alkyl halide.
- Give the rate expression.

In terms of the expression, decrease the experimental changes for encourage (i) SN^1 , (ii) SN^2 ,

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9. Explain the stereochemistry of the intermediates and products in the following reaction and give their *R* and *S* configurations.



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10. Predict the effect of increasing the percentage of H_2O in acetone – H_2O solvent mixture in :

(a) $\text{S}_{\text{N}}1$ solvolysis of $\text{Me}_3\text{C} - \text{Br}$

(b) $\text{S}_{\text{N}}2$ reaction of K1 and EtCl .

(c) Predict the relative yields of the product of Me_3CBr in 80 % EtOH and 20 % H_2O .

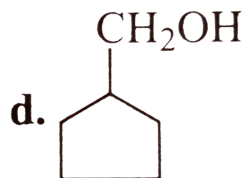
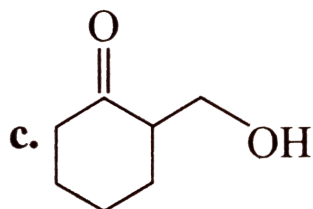
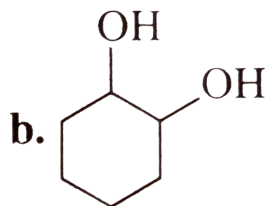
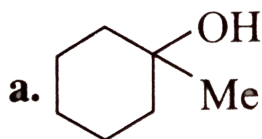
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11. Account for the following observations :

$t - BuF$ is solvolysed only in very acidic solution.

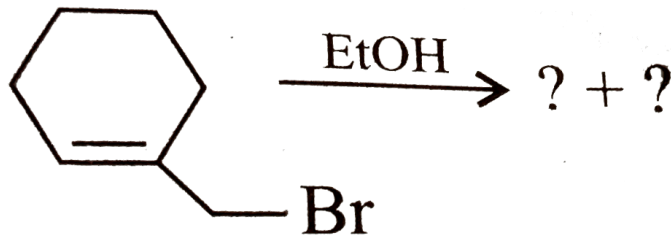
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12. Identify the products of dehydration of following alcohols.



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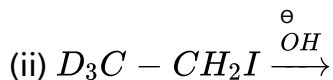
13. Give all the possible major and minor products (SN^1 and $E1$) in the following. Explain.



(b) If t-pentyl chloride reacts with 25 % H_2O and 75 % C_2H_5OH in $NaOH$, what are the possible products formed ? Explain with mechanism.

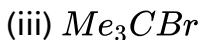
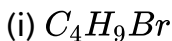
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14. Give the product and find out which is faster ?



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15. (a) Give the products of the reaction of KOH with

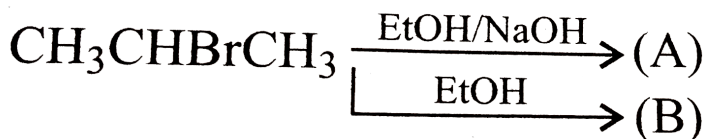


(b) Give the reactivity order.

(c) Give the factors that determine the major product.

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16. 1. Give the products in the following reaction.



2. Give the products of $MeONa$ with

(i) cis and

(ii) trans-2-Bromomethyl cyclohexane.

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17. (a) Compare the reactivity of $Me_3CO^\ominus K^\oplus$ and $EtNH_2$ in $E2$ reaction.

(b) Why is $Me_3CO^\ominus K^\oplus$ superior to EtO^\ominus in $E2$ reaction ?

(c) Compare the effectiveness of $Me_3CO^\ominus K^\oplus$ in $DMSO$ and Me_3COH as solvents.

(d) $Me_2CClCH_2CH_3 \xrightarrow{Me_3CO^\ominus K^\oplus}$ Major alkene.

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18. Complete the following and point out the mechanism as SN^2 , SN^1 , $E1$, $E2$, or none.

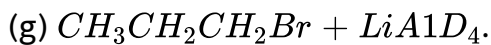
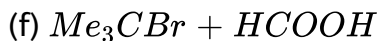
(a) $Me_2C = CHCl + NaNH_2$

(b) $CH_3CH_2Br + \ddot{P}me_3$

(c) $BrCH_2CH_2CH_2Br + I^\ominus$

(d) $BrCH_2(CH_2)_2CH_2Br + Mg$ (ether)

(e) $Me_3CBr + HCOOH + HCOO^\ominus$ (small amount)



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19. Give the symbol SN^1 , SN^2 , $E1$, and $E2$ (more than one symbol may be used).

(a) Rates are same.

(b) Electrophilic catalysis is possible.

(c) With a given substrate some pairs of these may be concurrent.

(d) Rearrangement of the R skeleton may occur.

(e) $R1$ reacts faster with $RC1$

(f) R^\oplus are intermediates.

(g) With saturated R' 's, a Saytzeff product is always formed.

(h) Reactions are stereospecific.

(i) Reactions are concerted.

(j) Unhindered $1^\circ RX$ reacts with $NaOEt$ | $EtOH$.

(k) $t - BuBr$ reacts with $CH_3COOH + CH_3COO^\ominus Na^\oplus$ (small).

(l) $t - BuBr$ reacts with CN^{\ominus} .

(m) $t - BuBr$ reacts in $EtOH$.

(n) $2^{\circ} RC1$ reacts with $NaOEt$ | $EtOH$.

(o) $2^{\circ} RC1$ reacts with $HCOOH$ and has high dielectric constant.

(p) $2^{\circ} RC1$ reacts with I^{\ominus} in acetone.

(q) MeX cannot react.

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20. When *cis*-2,3-dibromopent-2-ene is hydrogenated with H_2/Pt ,

The product is :

(i) *Meso* - 2, 3 -Dibromopentane

(ii) (+)2, 3 -Dibromopentane

(iii) (-)2, 3 -Dibromopentane

(iv) (\pm)2, 3 -Dibromopentane

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Solved Example

1. Explain how the stereochemistry of SN^1 and SN^2 differs.

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2. (a) Define dielectric constant.

(b) How does dielectric constant affect SN^1 rates ?

(c) Explain why solvolyses are much faster in *EtOH* than in acetone even though both solvents have the same dielectric constants.

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3. Give the equation of methanolysis of $[Me_3CSMe_2]^{\oplus} Br^{\ominus}$.

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4. Hydrolysis of 2-bromo-3-methyl butane (2°) yields only 2-methy-2-butanol (3°), explain.

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5. Write structure for the solvolysis of $Et_3C - Cl$ with :

(a) $MeOH$

(b) $MeCOOH$

(c) $HCOOH$.

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6. Explain the relative rates of RX with $H_2O + EtOH$ at $25^\circ C$ as given :

(i) $MeBr$ (2140)

(ii) $MeCH_2Br$ (171)

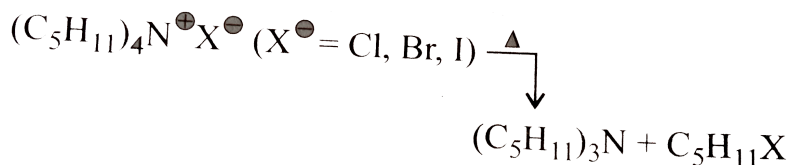
(iii) Me_2CHBr (4.99)

(iv) Me_3CBr (1010)

(b) Why is $EtOH$ added to water ?

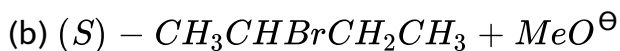
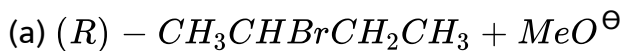
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7. Predict the order of nucleophilicity of X^\ominus in the following reaction :

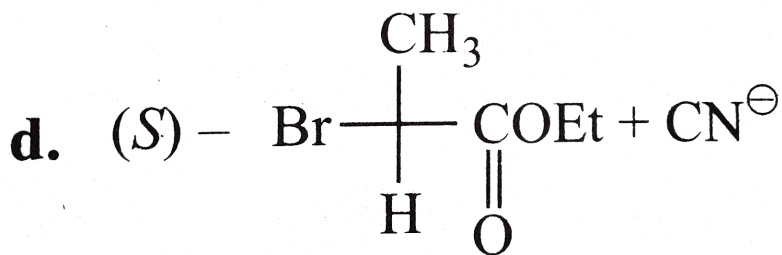


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8. Give the product of the following displacement reactions :



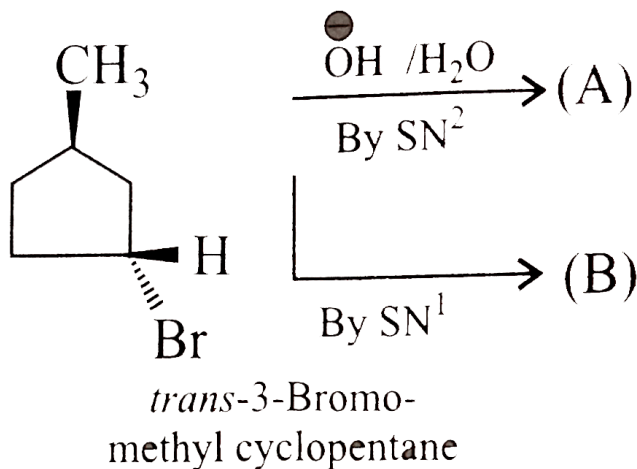
(c) rac, cis-Iodo ethyl cyclohexane + $\overset{\ominus}{O}H$



(d)

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9. Explain



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10. When 3-chlorocyclopropene (A) is treated with $SbCl_5$, it gives a stable salt (B), $C_3H_3SbCl_6$, which is highly polar. Further, when (A) is treated with $AgBF_4$, it gives a white precipitate of $AgCl$ and a crystalline salt (C). Explain.

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11. Explain :

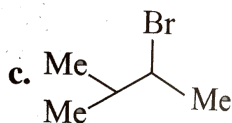
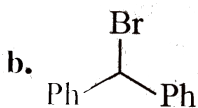
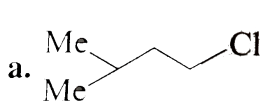
(a) An aq. Solution to tropylium bormide (C_7H_7Br) on treatment with $AgNO_3$ gives a pale yellow precipitate.

(b) Cycloheptatrienyl cation has a low π -electron energy than its open-chain counterparts.

(c) Cyclo-octatetraene reacts with 2 mol of potassium to yield a stable compound.

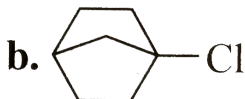
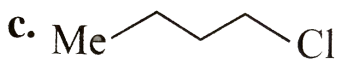
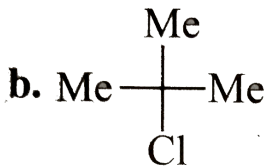
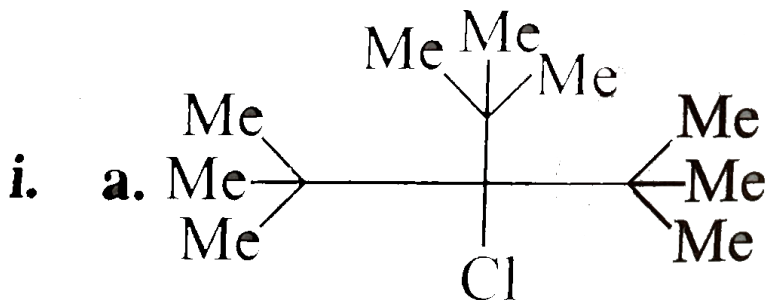
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12. Give the order of reactivity towards aqueous $HCOOH$ of the following.



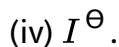
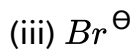
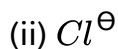
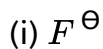
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13. Give the order of hydrolysis in SN^1 process for the following :



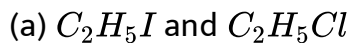
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14. Give the order of (a) nucleophilicity (b) basic character, and (c) fugacity of the following :

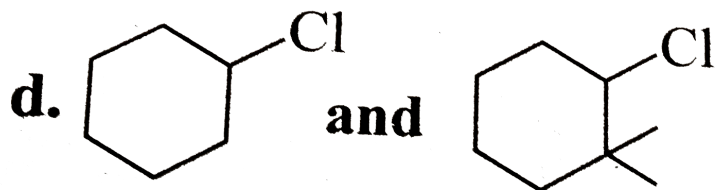


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15. Give the most reactive substrate in each of the following pair with OH^{\ominus} ions under SN^2 conditions.



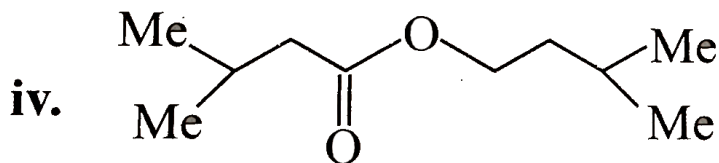
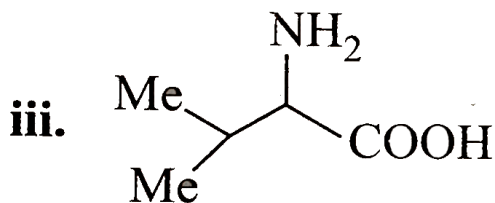
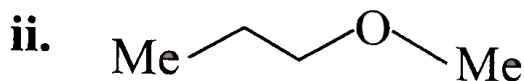
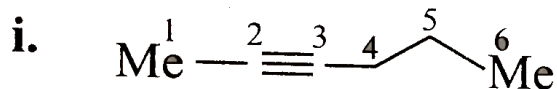
(c) CH_3Cl and CH_2Cl_2



(d)

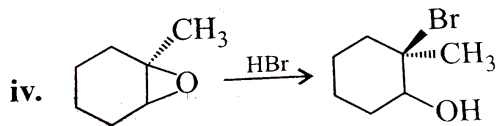
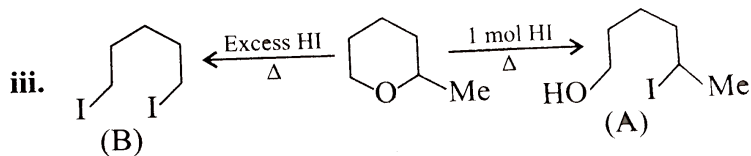
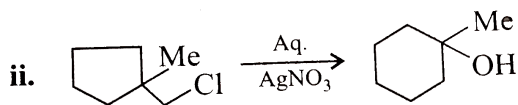
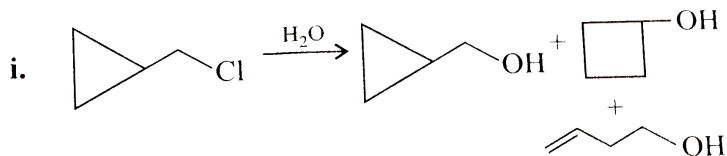
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16. Outline the synthesis of following compounds from suitable nucleophiles and an appropriate halide.



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17. Give a suitable mechanism for the following :



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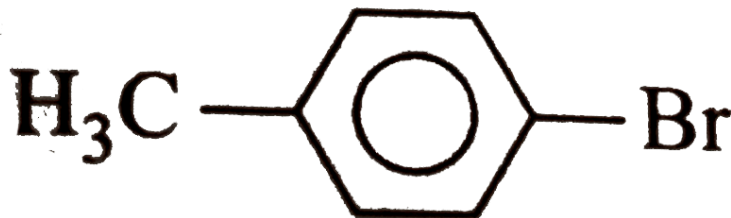
18. Predict the order of reactivity of the following halides with (a) NaI in acetone

(b) aq.alcoholic $AgNO_3$

(i) CH_3Br

(ii) C_2H_5Br

(iii) $PhCH_2Br$



(iv)

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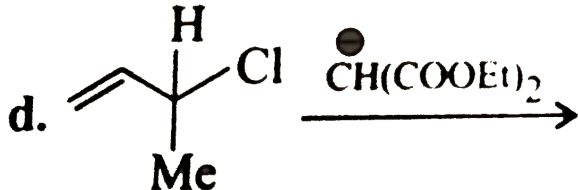
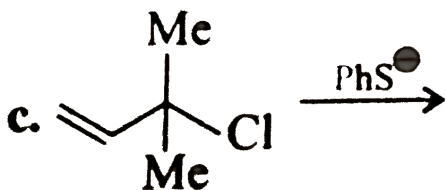
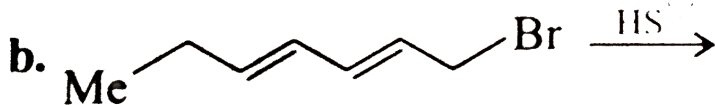
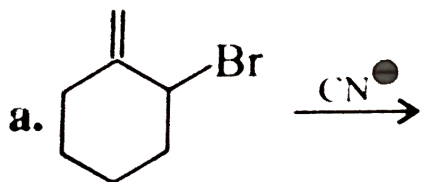
19. Explain :

(a) $ClCH_2OCH_3$ (chloromethyl methyl ether) undergoes SN^1 reaction.

(b) $(+)$ - 4-Bromo-2-pentene forms a racemic mixture on treatment with NaI .

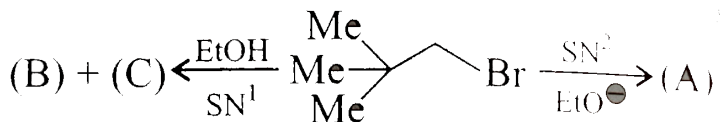
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20. Write the products of the following S_N reactions.



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21. Complete the following reaction

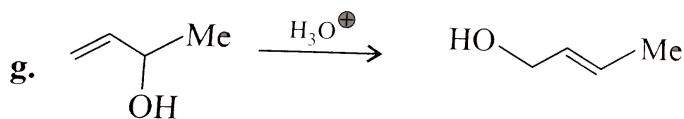
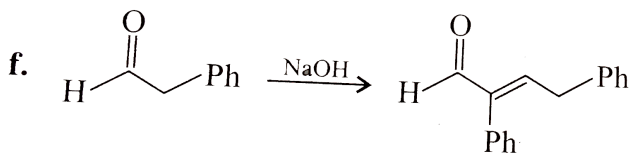
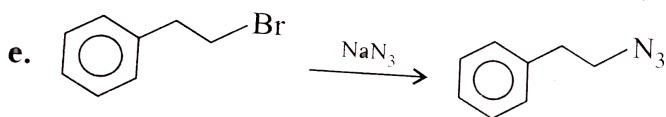
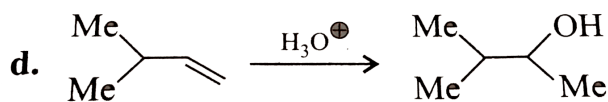
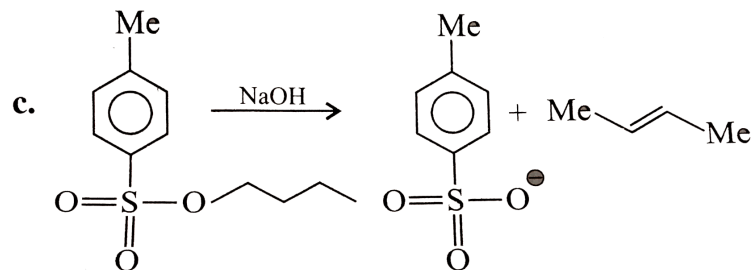
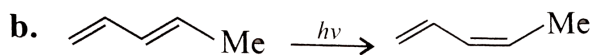
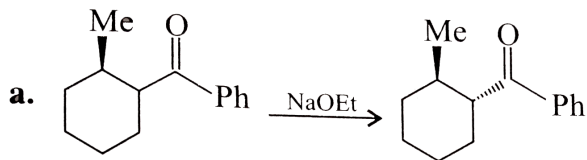


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22. Bromobenzene can be dehydrobrominated to benzyne by three possible routes. Explain. Which paths are desirable ?

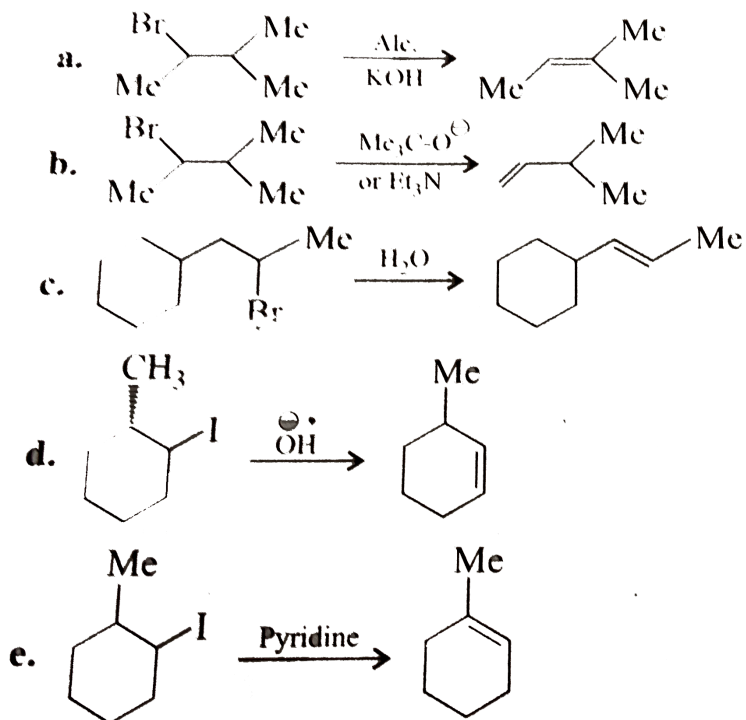
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23. Classify the following reactions as addition, elimination, substitution, condensation, rearrangement, geometric isomerisation, or oxidation/reduction.



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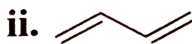
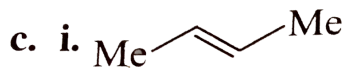
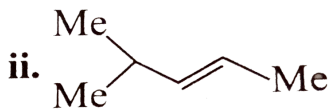
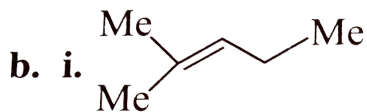
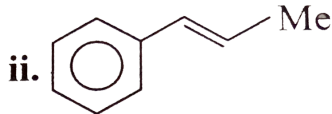
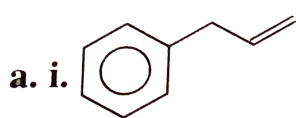
24. From the following elimination reactions, predict which one is Hofmann or Saytzeff (Zaitsev) type.



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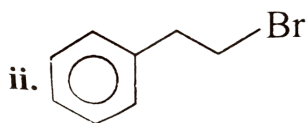
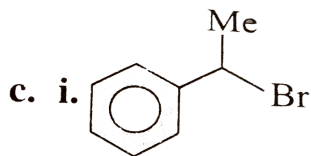
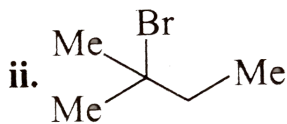
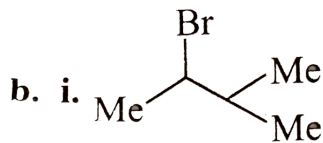
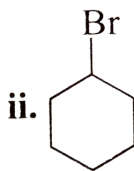
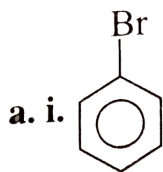
25. Which one is more reactive towards acidcatalysed hydration ?

Predict the stereochemical alcohols formed from the compound.

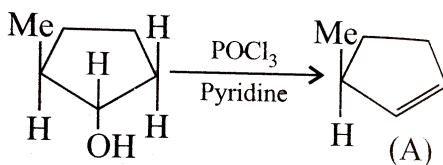


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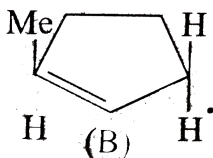
26. Which one hydrolyses at a faster rate by SN^1 mechanism ?



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and not (B), as expected by Saytzeff (Zaitsev)



27. Explain :

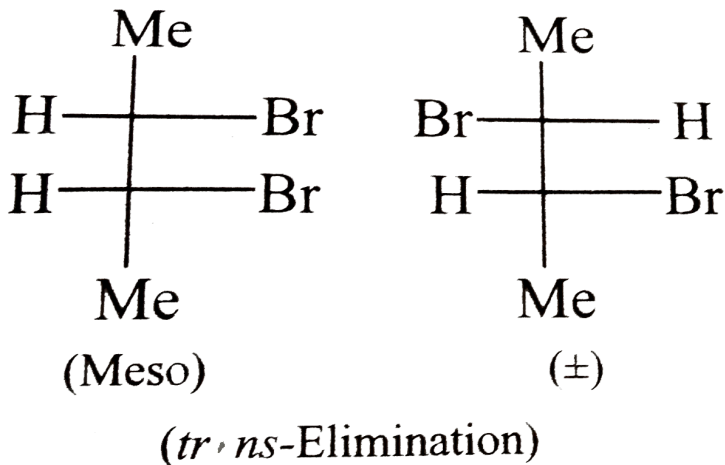
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28. What are the products of addition of D_2 to trans-2-pentene.

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29. Meso-2,3-dibromobutane reacts with iodide ion more rapidly than does (\pm) compounds. What are the respective alkenes formed ?

Explain.



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30. Mustard gas $(\text{ClCH}_2\text{CH}_2)_2 - \text{S}$ hydrolysed by water to $\text{Cl}(\text{CH}_2)_2\text{S}(\text{CH}_2)_2\text{OH}$ much faster than expected for a primary halide. Offer an explanation.

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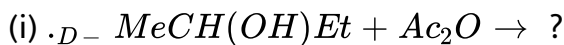
31. Give the product, indicating stereo-chemistry of cyclohexene with Br_2

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32. 1,2-Dimethylcyclohexene undergoes only trans-addition with HBr in non-polar solvents but both cis-and trans-additions occur with aq. Acid. Explain.

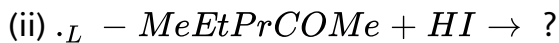
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33. Complete the following and state the relations between configurations of the reactant and products.



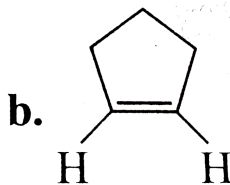
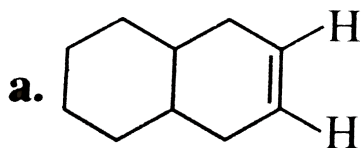
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1. Complete the following and state the relations between configurations of the reactant and products.

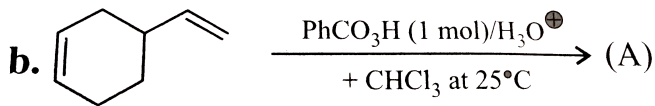
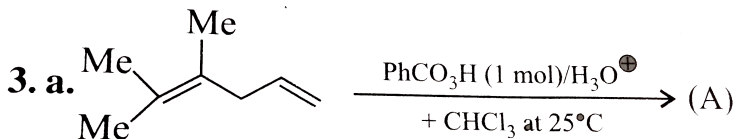


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2. What are the products and types of isomers when Br_2 adds to :



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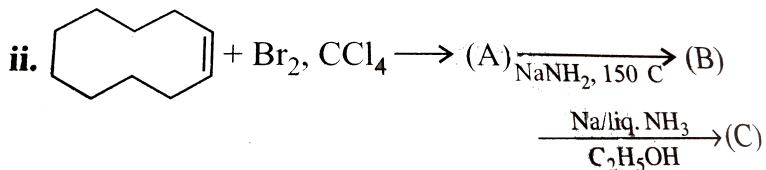
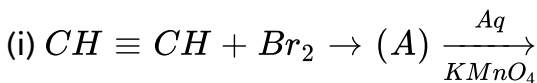


3.

identify the product (A)

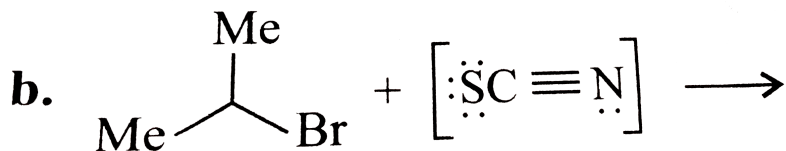
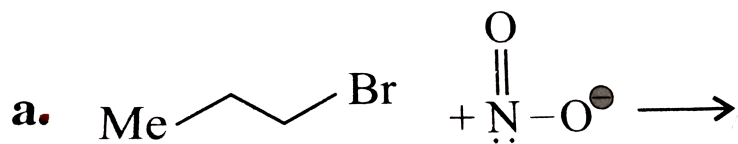
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4. Give the stereochemical products of the following :



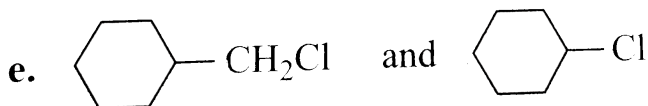
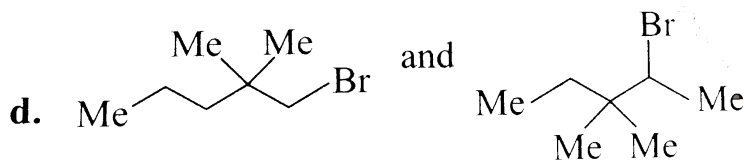
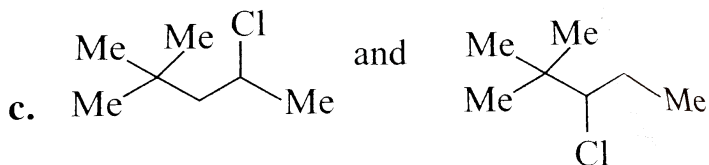
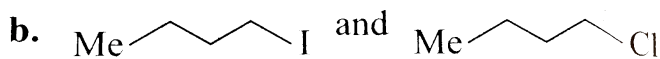
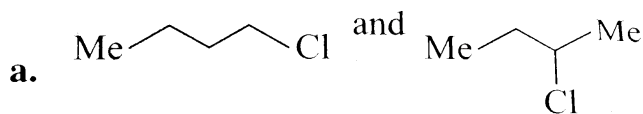
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5. Give the products of the following organic reactions :



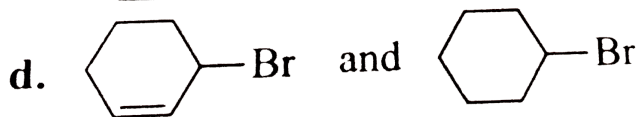
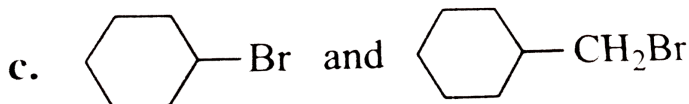
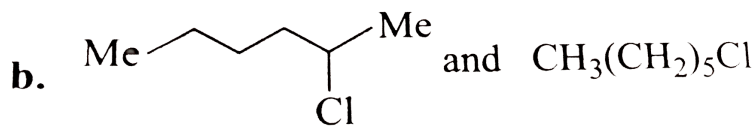
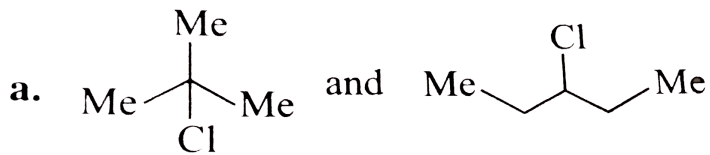
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6. Of the following pairs, which is the faster $\text{S}_{\text{N}}2$ reactions ?



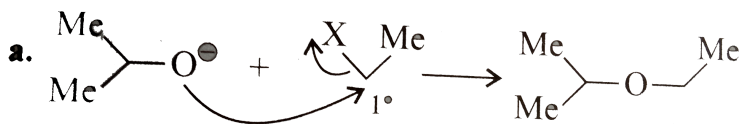
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7. Of the following pairs, which is the faster S_N1 reactions ?



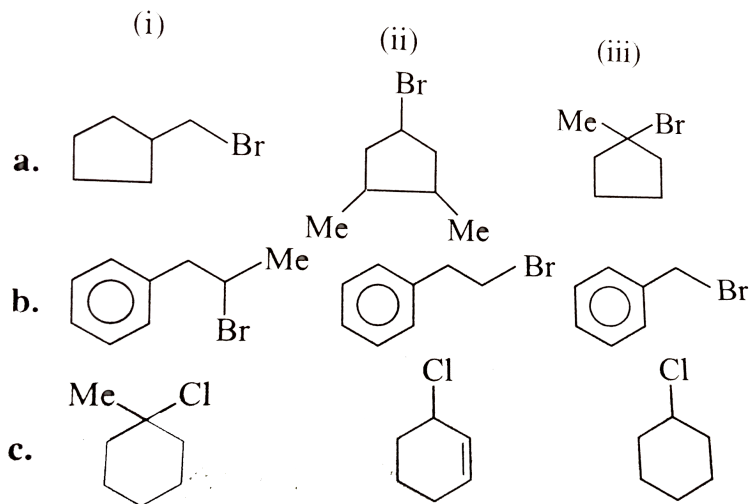
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8. Which of the following would give a better yield of ether ?



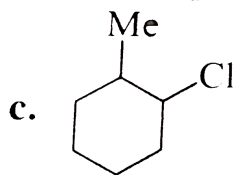
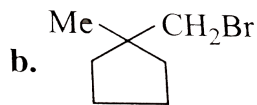
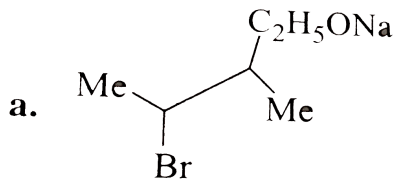
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9. Give the decreasing order of SN^1 reactions of the following compounds in H_2O .



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10. Give the major product when the following compounds are reacted with C_2H_5ONa .

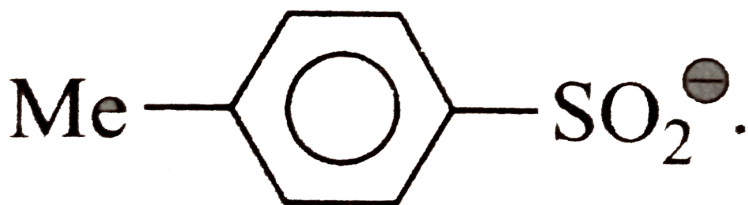
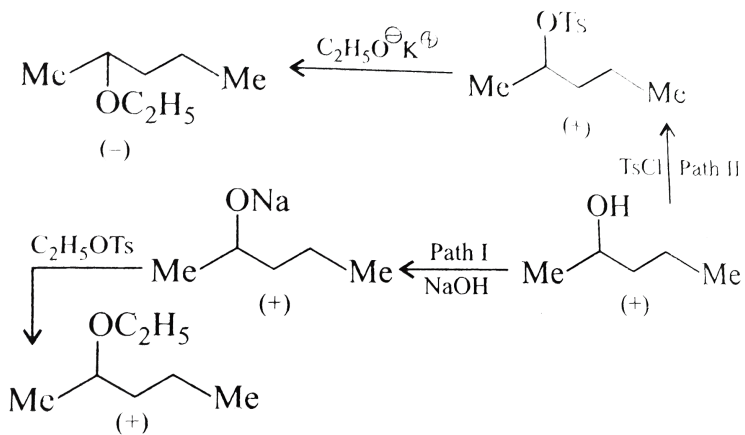


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11. 2-Bromopentane is treated with alcoholic KOH solution. What will be the major product formed in this reaction and what is the type of elimination called?

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12. 2-Pentanol can be converted to 2-ethoxy pentane by two paths. In path *I*, configuration at chiral *C* is retained but at path *II*, configuration is inverted. Explain.



Tosyl (Ts) is

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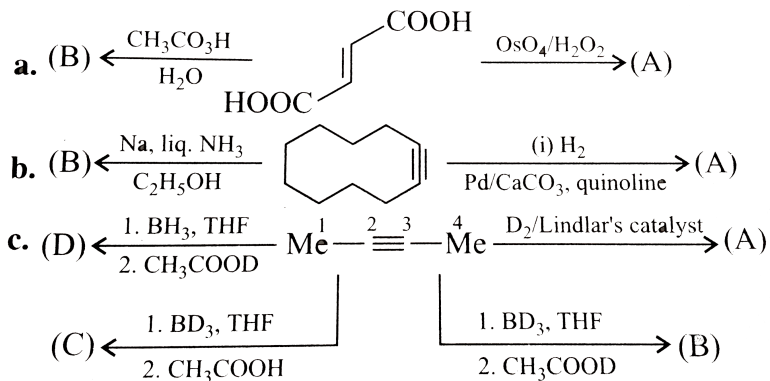


13. When

reacts with alcoholic KCN , a mixture of isomeric products is obtained. Explain.

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14. Give the stereochemical products of the following :



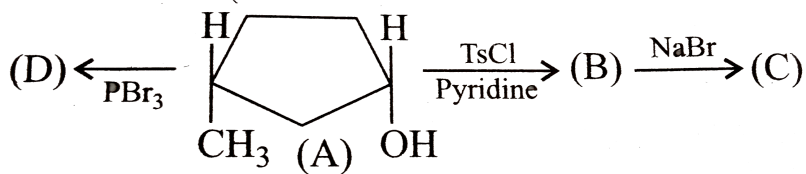
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15. Give the stereochemical products :

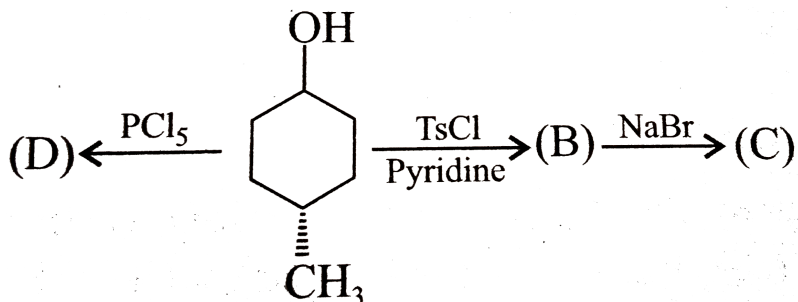


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16. Identify (B), (C), and (D).



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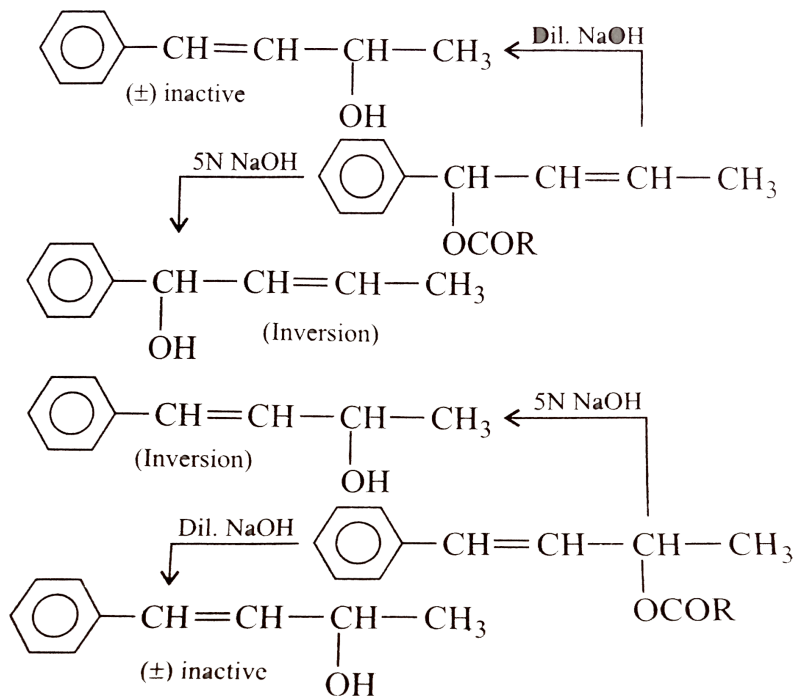


17.

Identify the products

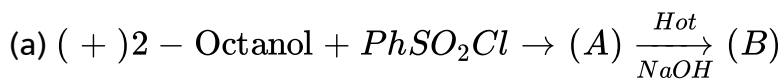
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18. Explain the difference in the following reactions.



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19. Predict the products with configurations in the following.



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Comprehension

1. Which statement is wrong ?

A. In polar aprotic solvents such as *DMSO*, *DMF*, and *DMA*,

the fugacity order is $I^{\ominus} > Br^{\ominus} > Cl^{\ominus} > F^{\ominus}$.

B. Strong bases are good leaving groups.

C. The leaving group order of the following is :

$\overset{\ominus}{OH} > RO^{\ominus} > CH \equiv C^{\ominus} > \overset{\ominus}{NH_2}$.

D. Charged species are good leaving groups than neutral species.

Answer: B

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2. Which statement is correct ?

- A. Only SN^1 reaction depends on the nature of leaving group.
- B. Only SN^1 reaction depends on the nature of leaving group.
- C. Both SN^1 and SN^2 reactions depends on the nature of leaving group.
- D. All

Answer: C

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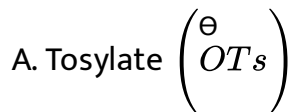
3. The leaving group is that functional group which is ejected with \bar{e} 's of the σ -bond in a reaction. Better the leaving group, faster is the reaction. The relative leaving ability of the leaving group X in $(R - X)$ is increased by :

- (i) The polarisability of $(R - X)$ bond.
- (ii) The stability of X^\ominus .
- (iii) The degree of stabilisation through solvation of X .

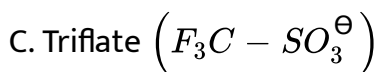
(iv) The strength of ($R - X$) bond.

The leaving group tendency is also called fugacity.

Which one of the followingd has the highest fugacity ?



B. Mesylate



D. All are equal

Answer: C

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4. The leaving group is that functional group which is ejected with \bar{e} 's of the σ -bond in a reaction. Better the leaving group, faster is the reaction. The relative leaving ability of the leaving group X in ($R - X$) is increased by :

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(ii) The stability of X^{\ominus} .

(iii) The degree of stabilisation through solvation of X .

(iv) The strength of ($R - X$) bond.

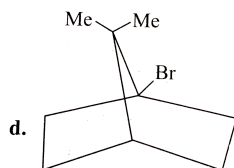
The leaving group tendency is also called fugacity.

Which of the following undergoes SN reaction easily?

A. Vinyl bromide

B. Bromobenzene

C. p-Nitro bromobenzene



D.

Answer: C

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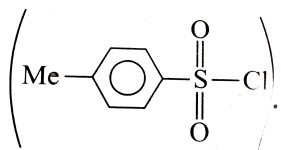
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- (iii) The degree of stabilisation through solvation of X .
- (iv) The strength of $(R - X)$ bond.

The leaving group tendency is also called fugacity.

Which statement is correct ?

- A. EtO^\ominus is a strong base and therefore a good leaving group.
- B. The amine group in $ArNH_2$ is converted into a good leaving group by reacting $ArNH_2$ with $NaNO_2 + HCl$ at $0^\circ C$.
- C. The (OH) group is converted into a good leaving group by reacting alcohols with $TsCl$ (p-toluene sulphonyl chloride)



D. The amine group in RNH_2 is converted into leaving group by reacting RNH_2 with $NaNO_2 + HCl$ at $0^\circ C$.

Answer: C

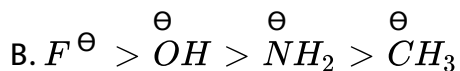
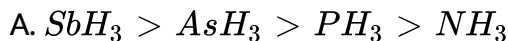
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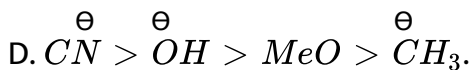
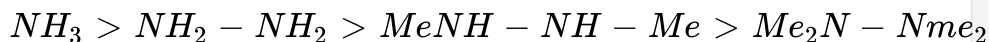
- (i) The polarisability of $(R - X)$ bond.
- (ii) The stability of X^\ominus .
- (iii) The degree of stabilisation through solvation of X .
- (iv) The strength of $(R - X)$ bond.

The leaving group tendency is also called fugacity.

Which of the following is the wrong order of fugacity ?



C.



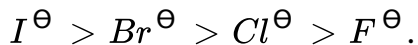
Answer: D

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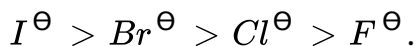
7. Which of the following statements is wrong ?

A. The nucleophilicity order in non-polar solvents (e.g., CCl_4 , CS_2)

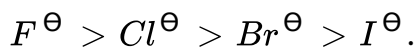
of the following is :



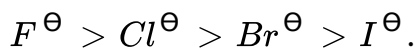
B. The nucleophilicity order in polar protic solvents (e.g., H_2O) of the following is :



C. The nucleophilicity order in weakly polar protic solvents (e.g., nitro benzene, acetone) of the following is :



D. The nucleophilicity order in polar aprotic solvents (e.g., $DMSO$, DMF) of the following is :

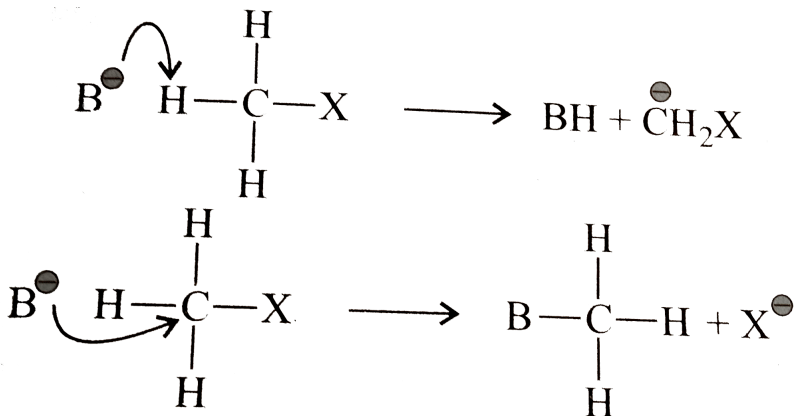


Answer: C



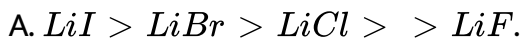
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8. The rate of SN^2 reaction depends on the effectiveness of the nucleophile in ejecting the leaving group. Nucleophilicity is the affinity for C atom, while basicity is the affinity for proton.



In both cases, a new bond is formed. If a new bond is formed between the anion and proton, the species acts as a base. If a new bond is formed between the anion and C atom, the species acts as nucleophile.

Which of the following statements is wrong ? Nucleophile order of the following in weakly polar aprotic solvents, e.g., acetone is :



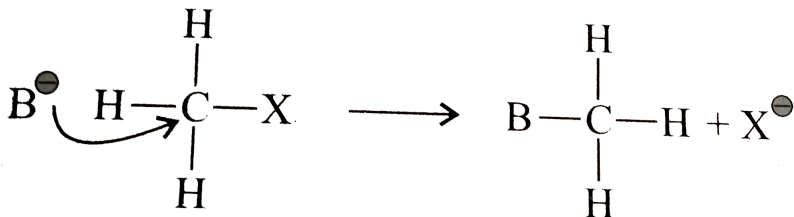
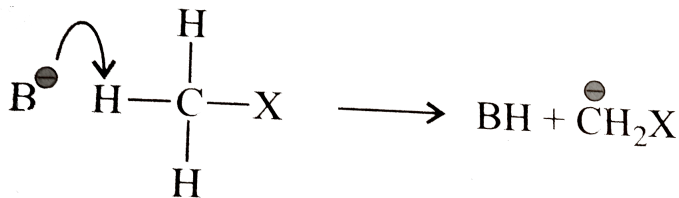
C. $R_4N^{\oplus}I^{\ominus} > R_4N^{\oplus}Br^{\ominus} > R_4N^{\oplus}Cl^{\ominus}$ (R = Butyl group)

D. All

Answer: C

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9. The rate of SN^2 reaction depends on the effectiveness of the nucleophile in ejecting the leaving group. Nucleophilicity is the affinity for C atom, while basicity is the affinity for proton.

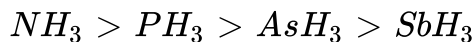


In both cases, a new bond is formed. If a new bond is formed between the anion and proton, the species acts as a base. If a new bond is

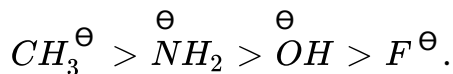
formed between the anion and C atom, the species acts as nucleophile.

Which of the following is wrong ?

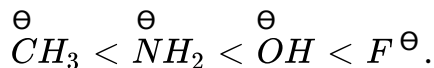
A. The decreasing basic order of the following is :



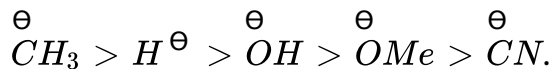
B. The decreasing basic order of the following is :



C. The decreasing nucleophilic order of the following is :



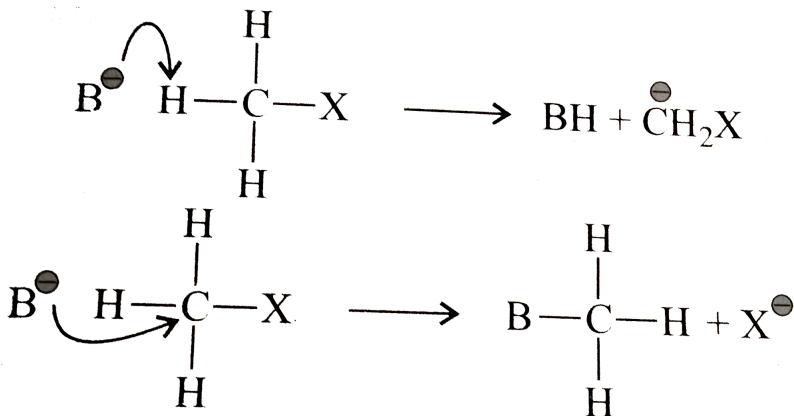
D. The decreasing basic and nucleophilic order of the following is :



Answer: C

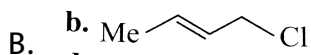
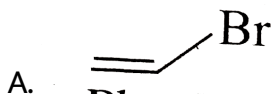
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10. The rate of SN^2 reaction depends on the effectiveness of the nucleophile in ejecting the leaving group. Nucleophilicity is the affinity for C atom, while basicity is the affinity for proton.

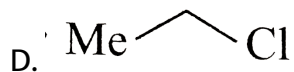


In both cases, a new bond is formed. If a new bond is formed between the anion and proton, the species acts as a base. If a new bond is formed between the anion and C atom, the species acts as nucleophile.

Which of the following compounds gives SN^1 , SN^2 , and SN^2 mechanisms ?

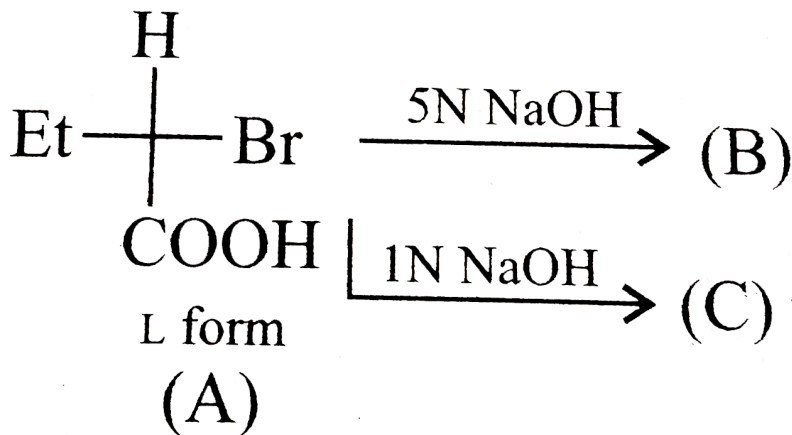


C. Ph-I



Answer: B

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Which statement is wrong in the formation of (B) from (A).

A. It proceeds by SN^2 mechanism.

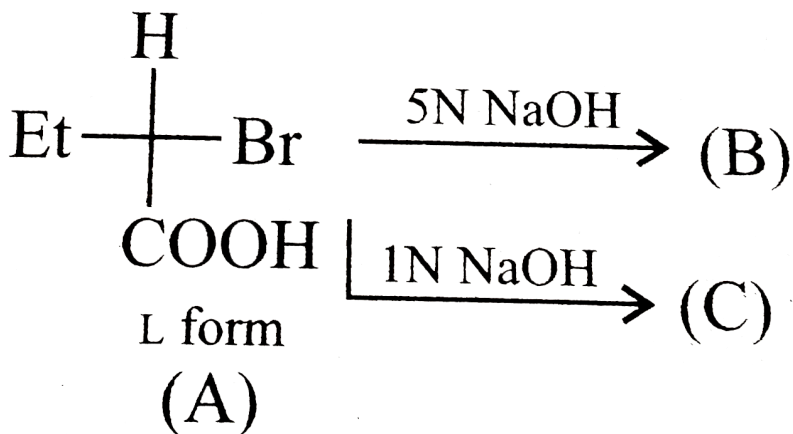
B. The configuration of product (B) is *D* form.

C. It proceeds by SN^1 mechanism

D. The Walden inversion occurs.

Answer: C

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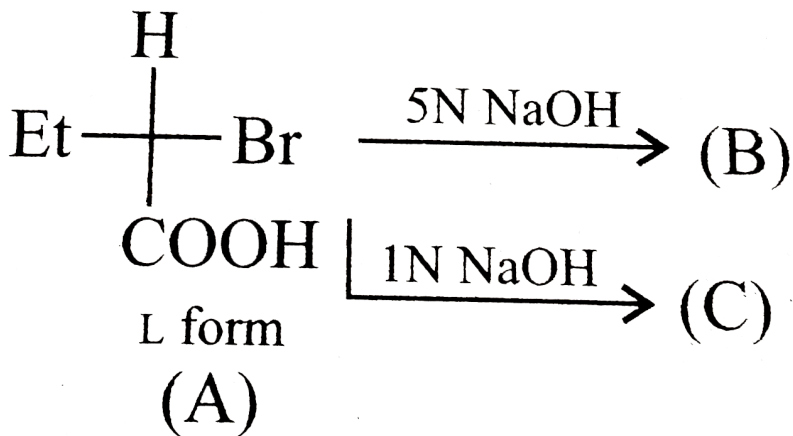
12.

Which is correct in the formation of (C) from (A) ?

- A. It proceeds by SN^1 mechanism.
- B. Retention and racemisation take place.
- C. The configurations of (C) are DL and L .
- D. It proceeds by SN^i mechanism.

Answer: A

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13.

Which statement is wrong in the formation of (C) from (A) ?

A. The retention of configuration of (A) takes place.

B. The configuration of (C) is *L* form.

C. Due to the neighbouring group participation of (COO^\ominus) group,

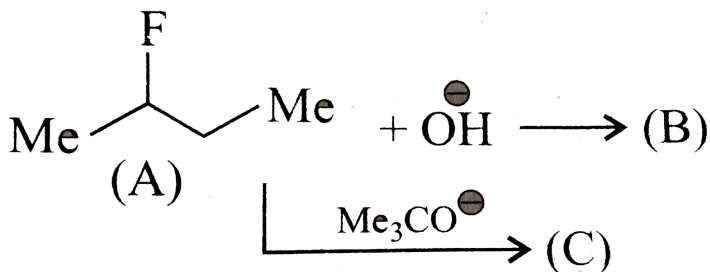
the OH^- ion attacks from the same side and hence retention occurs.

D. The reaction proceeds by SN^2 mechanism.

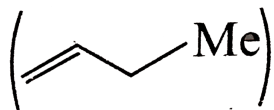
Answer: D

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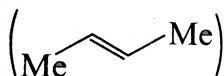
14. In elimination reaction, the major product is either Saytzeff (more-substituted alkene) or Hofmann product (less-substituted alkene) depending on the nature of the substrate and the nature of the base. Which statement is correct about the reactions ?



A. Both products (B) and (c) are Hofmann product.



B. Both products (B) and (c) are Saytzeff product.



C. product (B) is Hofmann and (c) is Saytzeff product.

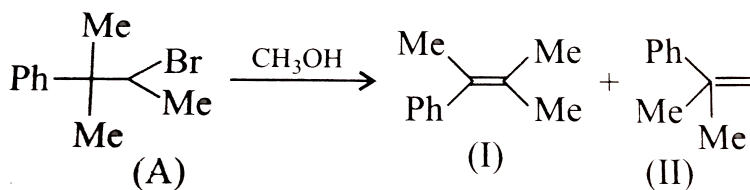
D. Product (B) is Saytzeff and (c) is Hofmann product.

Answer: A

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15. In elimination reaction, the major product is either Saytzeff (more-substituted alkene) or Hofmann product (less-substituted alkene) depending on the nature of the substrate and the nature of the

base. Which statement is correct about the following reactions ?



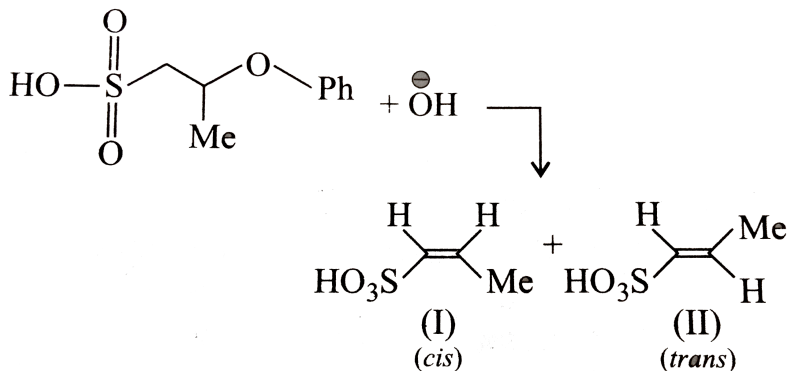
- A. The major product is (I) by *E*1 mechanism.
- B. The major product is (I) by *E*2 mechanism.
- C. The major product is (II) by *E*1 mechanism.
- D. The major product is (II) by *E*2 mechanism.

Answer: A

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16. In elimination reaction, the major product is either Saytzeff (more-substituted alkene) or Hofmann product (less-substituted alkene) depending on the nature of the substrate and the nature of the base.

Which statement is wrong about the given reaction.



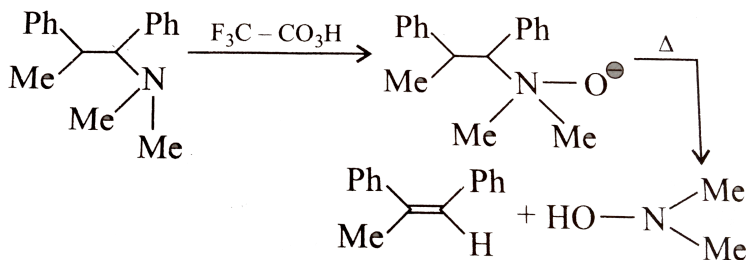
- A. The reaction proceeds by *E1cB* mechanism.
- B. *EWG*(- *SO*₃*H*) stabilizes the carbanion formed in the first step.
- C. The reaction is stereospecific but non-regioselective
- D. *PhO*[⊖] is a stronger base than *OH*[⊖] ion.

Answer: D

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17. In elimination reaction, the major product is either Saytzeff (more-substituted alkene) or Hofmann product (less-substituted alkene) depending on the nature of the substrate and the nature of the base.

Which statement is wrong about the given reaction ?

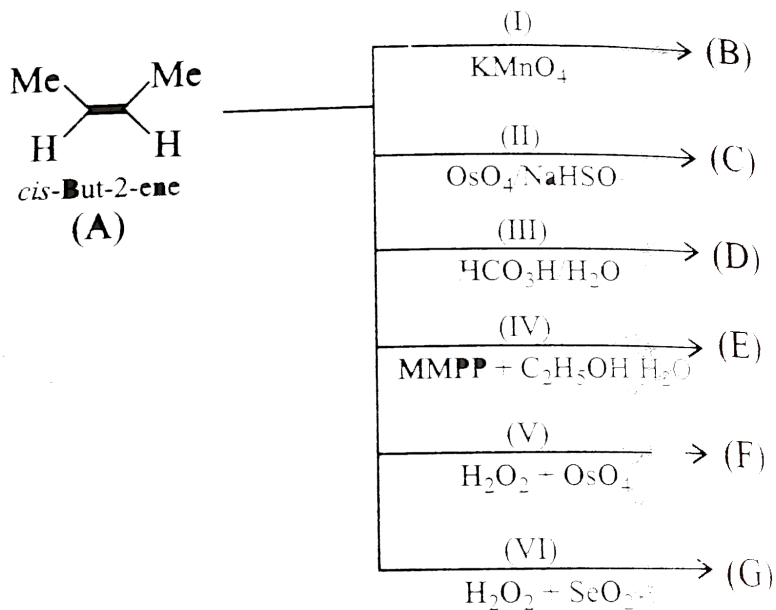


- A. The reaction is called Cope reaction and proceeds by *E1* mechanism.
- B. The reaction proceeds by syn-elimination.
- C. The reaction is stereospecific and stereoselective.
- D. The reaction is non-stereospecific and regioselective.

Answer: D

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18. Consider the following reactions :

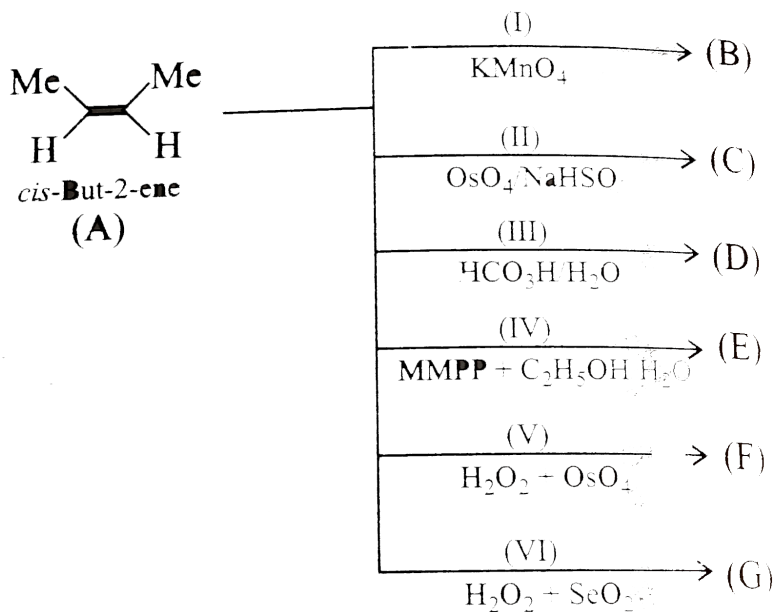


Which of the following are stereospecific reactions ?

- A. (I), (II)
- B. (I), (II), (III)
- C. (III), (IV), (V)
- D. All

Answer: D

19. Consider the following reactions :



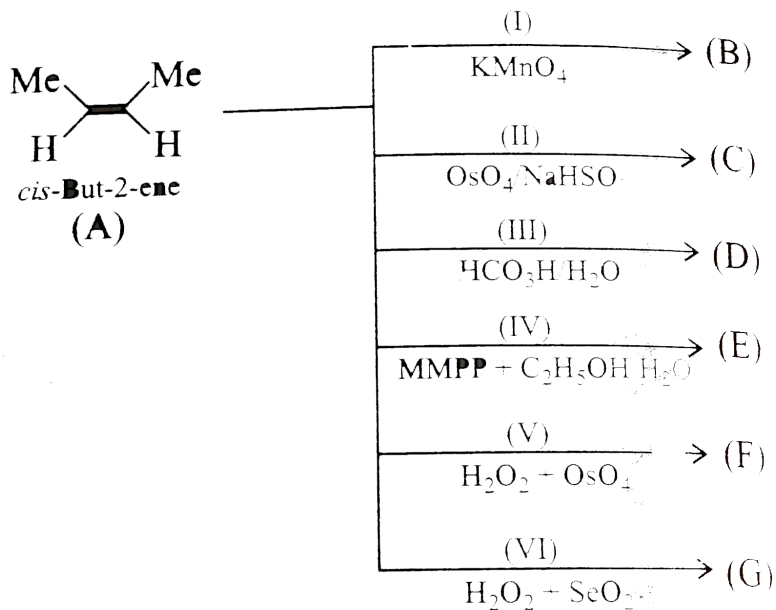
Which of the following regioselective reactions ?

- A. (I), (II), (V)
- B. (III), (IV), (VI)
- C. (I), (II), (IV)
- D. (III), (IV), (V)

Answer: A

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20. Consider the following reactions :



Syn-addition takes place in :

A. (I), (II), (V)

B. (III), (IV), (VI)

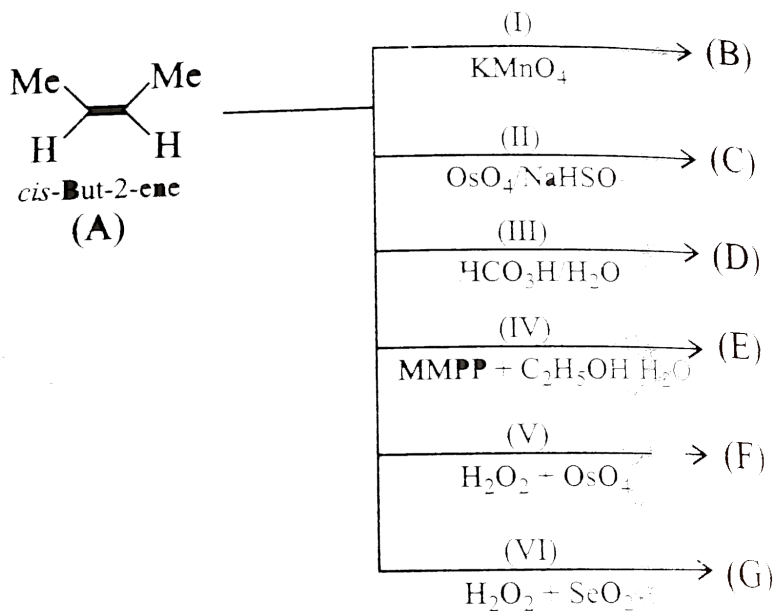
C. (I), (II), (IV)

D. (III), (IV), (V)

Answer: A

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21. Consider the following reactions :



Anti-addition takes place in :

A. (I) , (II) , (V)

B. (III) , (IV) , (VI)

C. (I) , (II) , (IV)

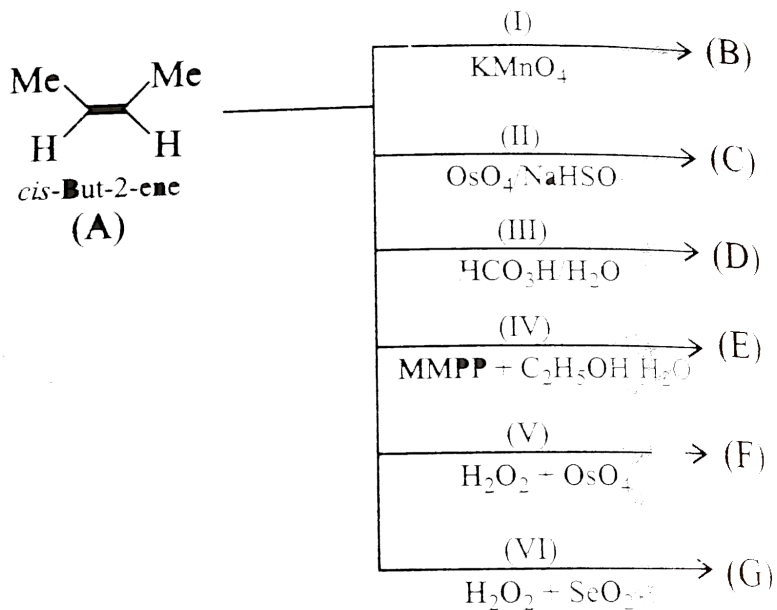
D. (III) , (IV) , (V)

Answer: B



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22. Consider the following reactions :

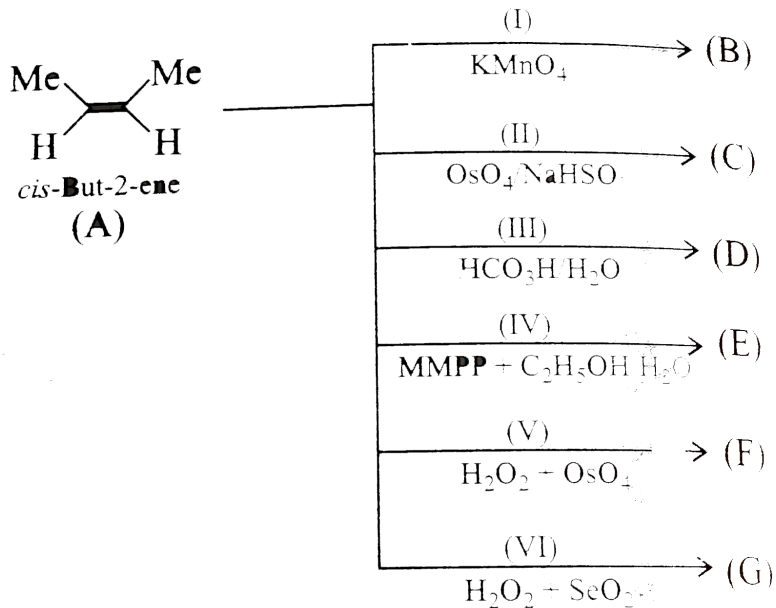


Meso-butan-2,3-diol is formed in :

- A. (I), (II), (V)
- B. (III), (IV), (VI)
- C. (I), (II), (IV)
- D. (III), (IV), (V)

Answer: A

23. Consider the following reactions :



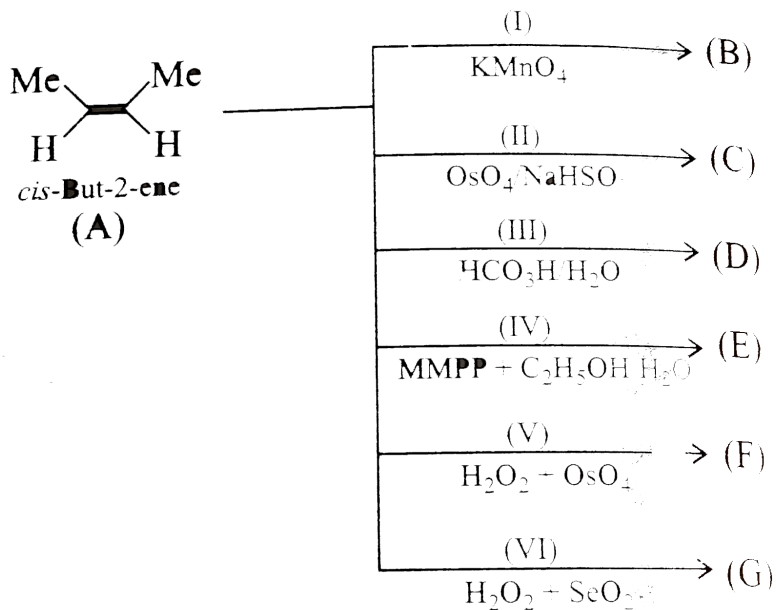
Racemic-butan-2,3-diol is formed in :

- A. (I), (II), (V)
- B. (III), (IV), (VI)
- C. (I), (II), (IV)
- D. (III), (IV), (V)

Answer: B

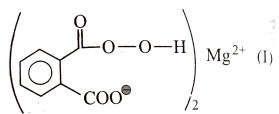
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24. Consider the following reactions :



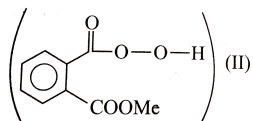
The name of structure of *MMPP* is :

A. Magnesium monoperoxy phthalate



B. Magnesium perphthalate and structure (*I*)

C. Methyl monoperoxy phthalate

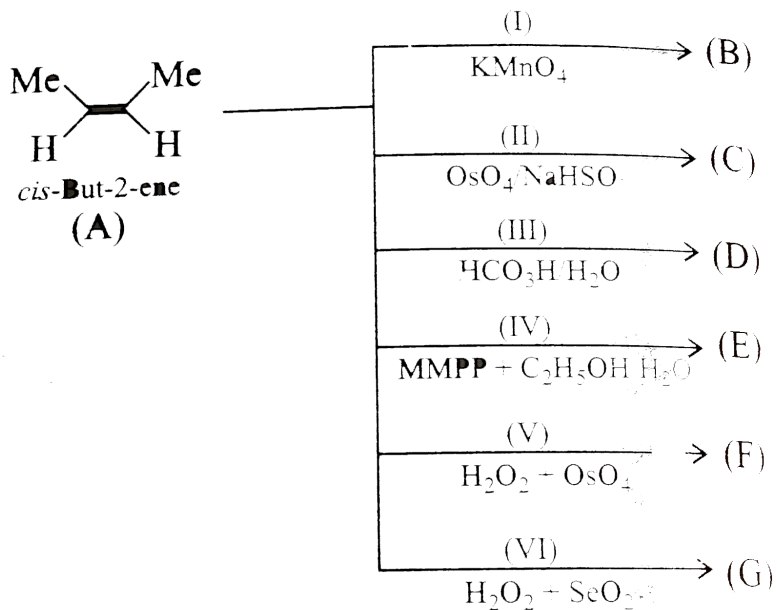


D. Methyl perphthalate and structure (*II*).

Answer: A::B

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25. Consider the following reactions :

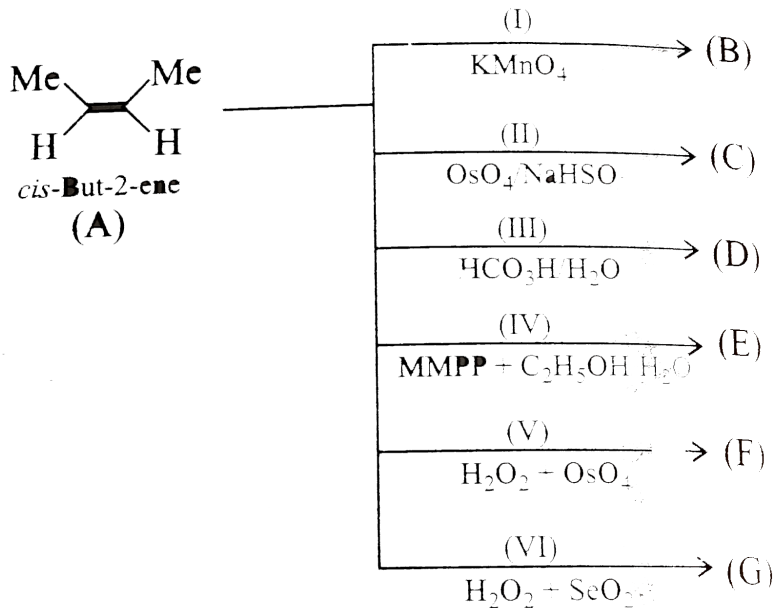


Which of the following are stereospecific reactions ?

- A. (I), (II)
- B. (I), (II), (III)
- C. (III), (IV), (V)
- D. All

Answer: D

26. Consider the following reactions :



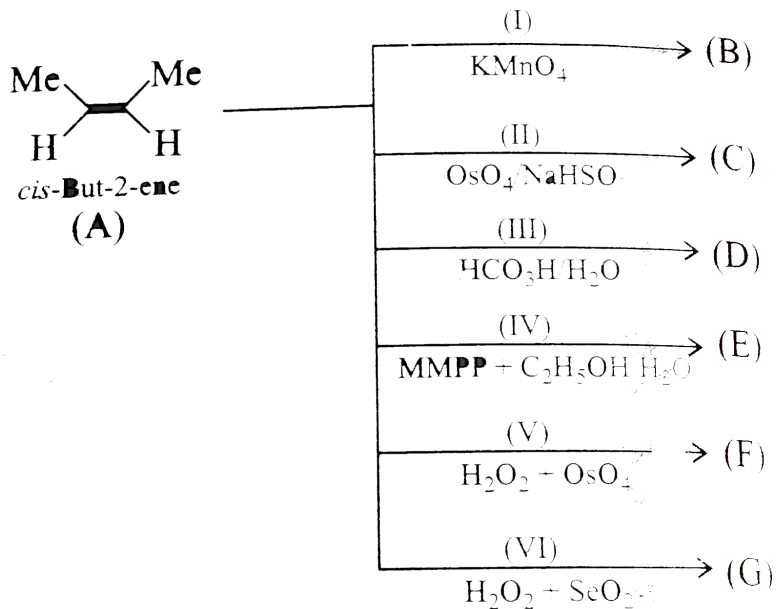
Which of the following regioselective reactions ?

- A. (I), (II), (V)
- B. (III), (IV), (VI)
- C. (I), (II), (IV)
- D. (III), (IV), (V)

Answer: B

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27. Consider the following reactions :



Syn-addition takes place in :

A. (I), (II), (V)

B. (III), (IV), (VI)

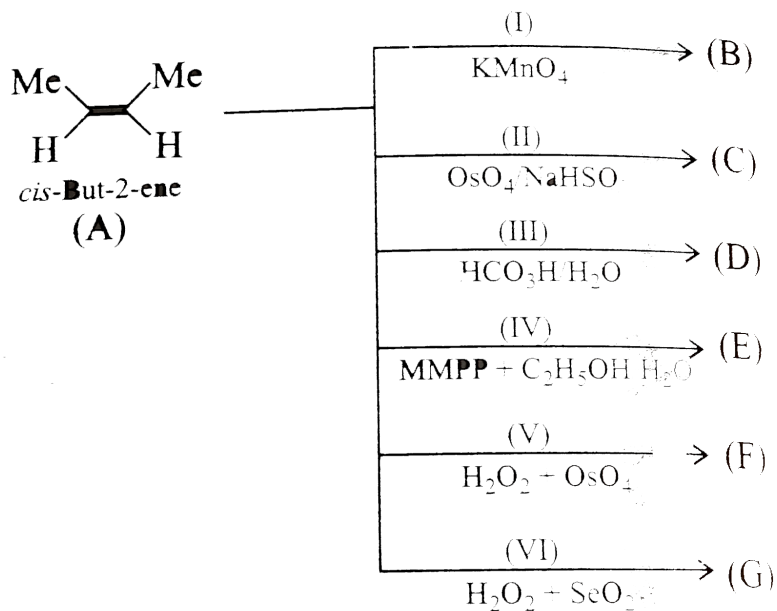
C. (I), (II), (IV)

D. (III), (IV), (V)

Answer: A

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28. Consider the following reactions :



Syn-addition takes place in :

A. (I), (II), (V)

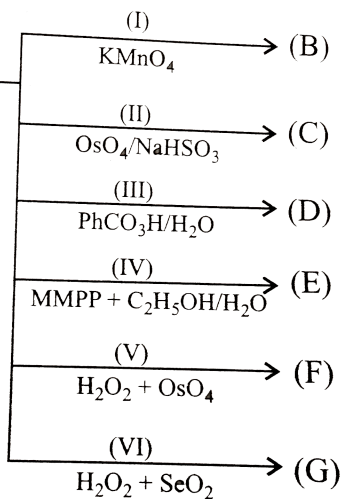
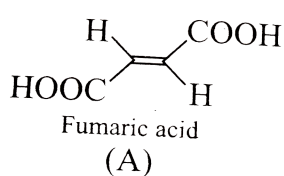
B. (III), (IV), (VI)

C. (I), (II), (IV)

D. (III), (IV), (V)

Answer: B

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29.

Meso-tartaric acid is formed in :

A. (I), (II), (V)

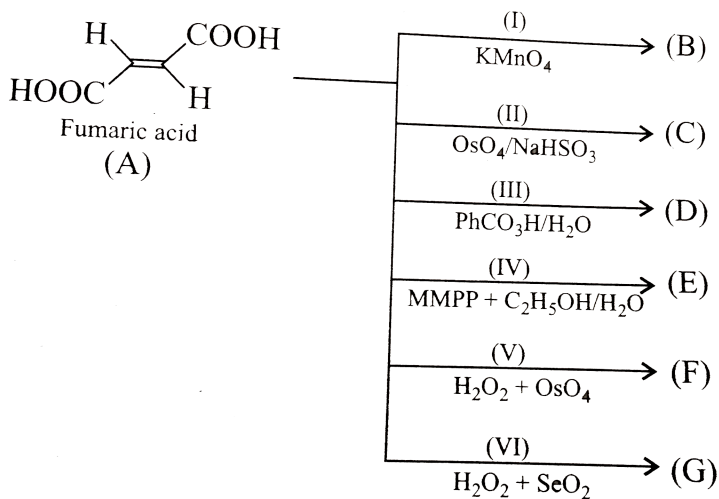
B. (III), (IV), (VI)

C. (I), (II), (IV)

D. (III), (IV), (V)

Answer: B

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30.

(±) -Tartaric acid is formed in :

A. (I), (II), (V)

B. (III), (IV), (VI)

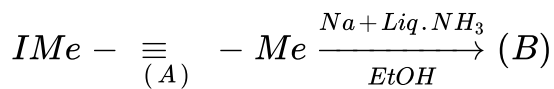
C. (I), (II), (IV)

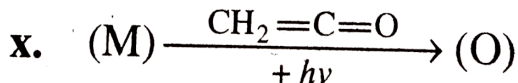
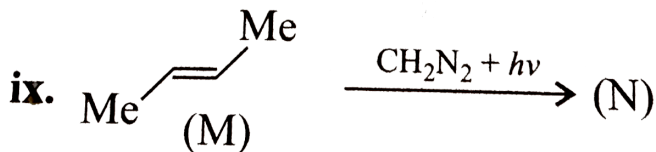
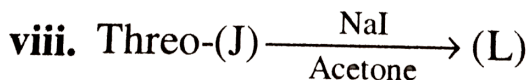
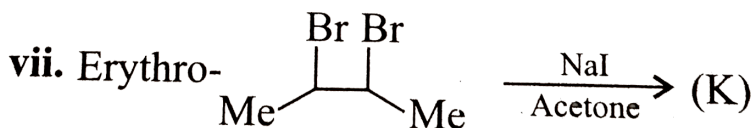
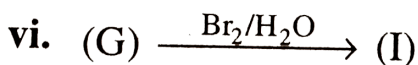
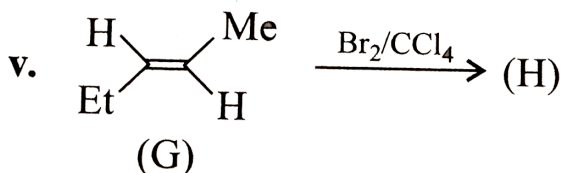
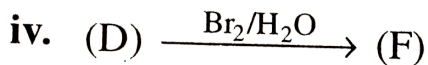
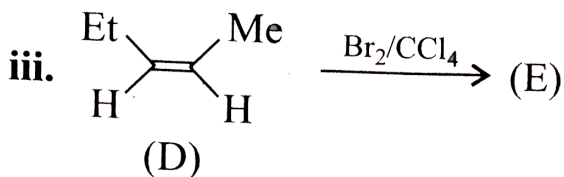
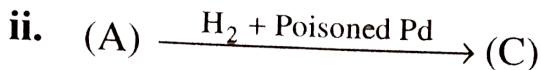
D. (III), (IV), (V)

Answer: A

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31. Consider the following reactions :





Which statement is wrong about the reactions (i) and (ii) ?

A. The product (B) is trans-but-2-ene and (c) is cis-but-2-ene.

B. The product (B) is cis-but-2-ene and (C) is trans-but-2-ene.

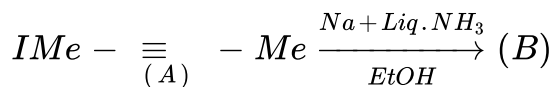
C. The formation of (B) and (c) takes place by anti-and syn-addition of H_2 , respectively.

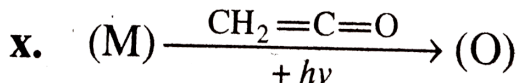
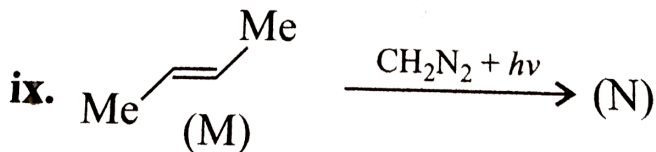
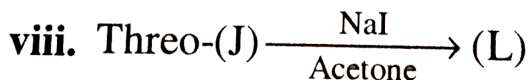
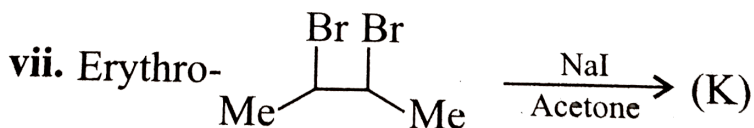
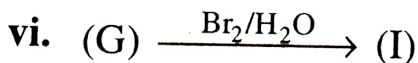
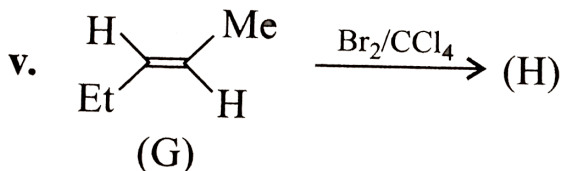
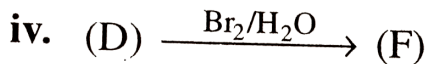
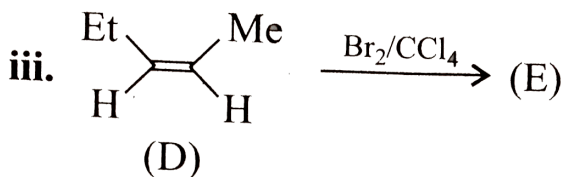
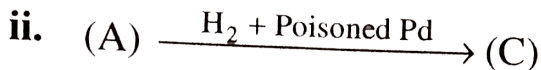
D. In the formation of (B), one of the intermediate species is radical anion.

Answer: B

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32. Consider the following reactions :





Which statement is wrong about the reactions (iii) and (iv) ?

A. Anti-addition takes place in both the reactions.

B. The product in both the reactions is racemic mixture.

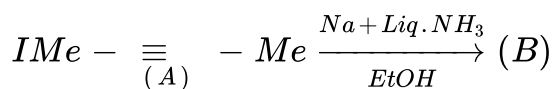
C. Both the reactions are stereospecific and regioselective.

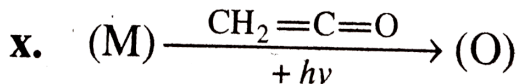
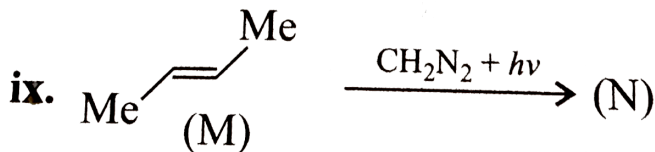
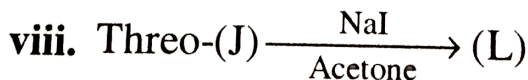
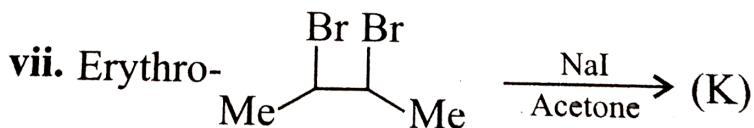
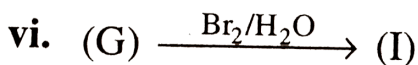
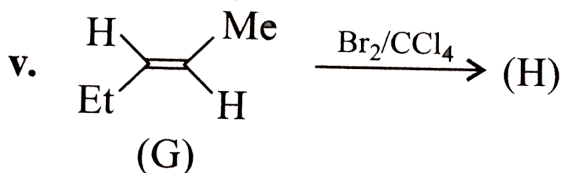
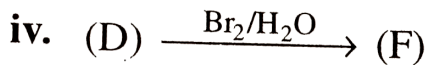
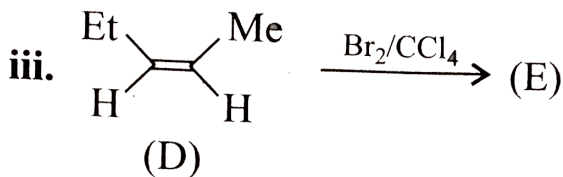
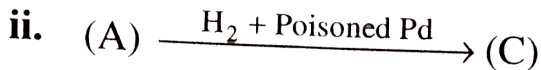
D. Both the reactions are EA (electrophilic addition) reaction.

Answer: C

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33. Consider the following reactions :



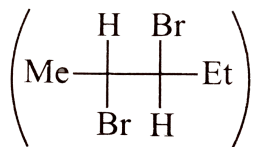


Which statement is wrong about the reaction (v) and (vi) ?

A. Syn-addition takes place in both the reactions.

B. The product in both reactions is racemic mixture.

C. The product (*H*) is (±)

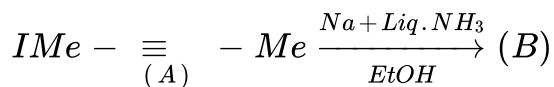


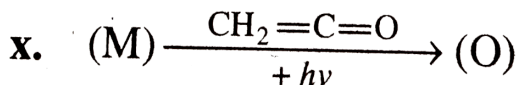
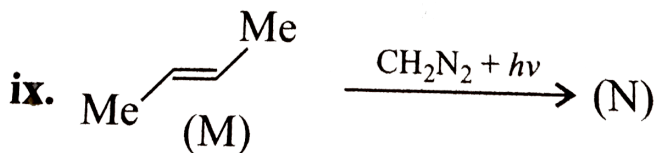
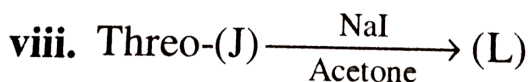
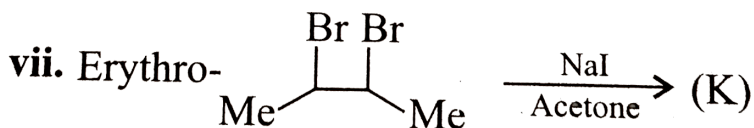
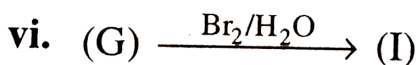
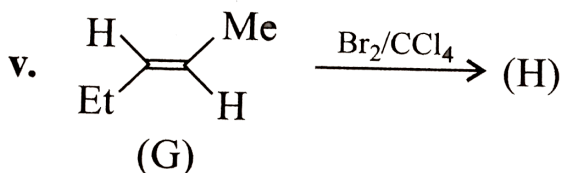
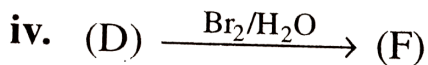
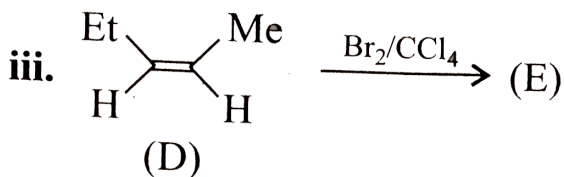
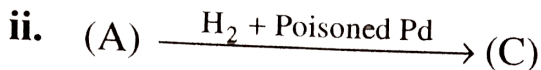
D. The product (*I*) is (±) $\left(\begin{array}{c} \text{H} \quad \text{Br} \\ | \quad | \\ \text{Me} - \text{C} - \text{C} - \text{Et} \\ | \quad | \\ \text{OH} \quad \text{H} \end{array} \right)$.

Answer: A

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34. Consider the following reactions :





Which statement is wrong about the reactions (vii) and (viii) ?

A. The product (K) is trans-but-2-ene and product (L) is cis-but-2-ene.

B. The product (*K*) is cis-but-2-ene and product (*L*) is trans-but-2-ene.

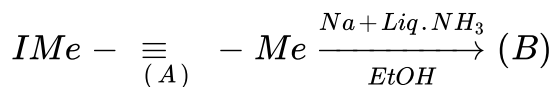
C. Anti-elimination of Br_2 takes place in both the reactions.

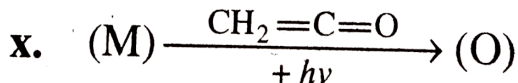
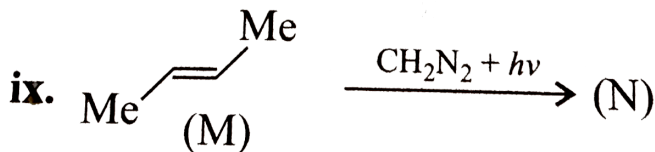
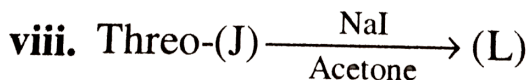
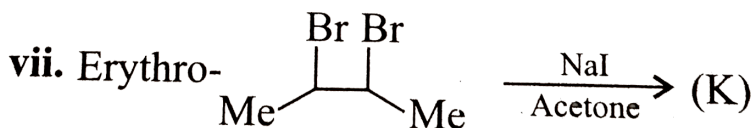
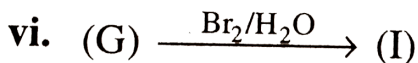
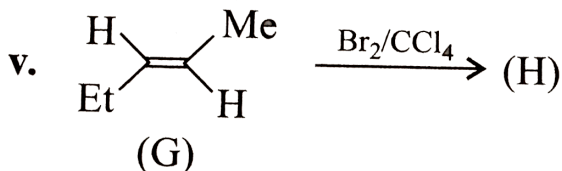
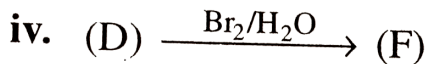
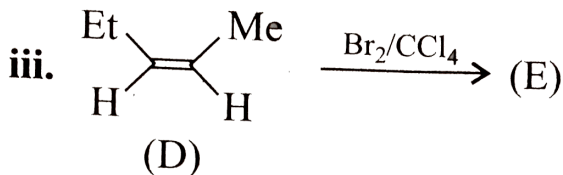
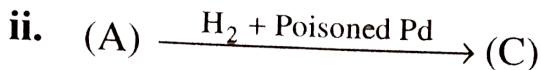
D. Both the reactions proceed by $E2$ mechanism.

Answer: B

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35. Consider the following reactions :





Which statement is wrong about the reactions (ix) and (x) ?

A. Both the reactions are stereospecific and stereoselective.

B. Reaction (ix) is stereospecific and stereoselective.

C. Reaction (x) is neither stereospecific nor stereoselective.

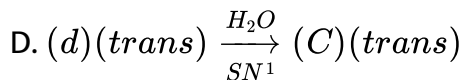
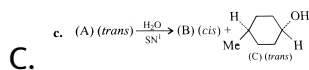
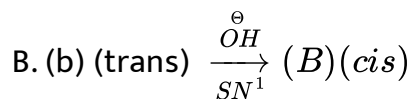
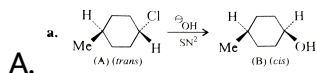
D. Reaction (ix) proceeds by singlet carbene and reaction (x) by triplet carbene.

Answer: A

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Multiple Correct

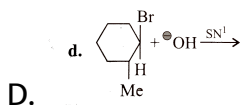
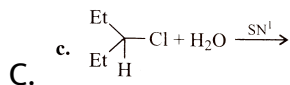
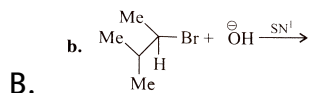
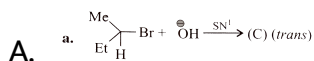
1. Which of the following reactions are correct ?



Answer: A::C

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2. Which of the following reactions would give racemised and retention products ?



Answer: A::C::D

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3. Which of the following statements are correct statements ?

A. Carbocation is less \bar{e} deficient than alkyl radical.

B. Isomerisation of a less stable carbocation to more stable carbocation by 1, 2 - *Me* shift is called Wagner-Meerwein rearrangement.

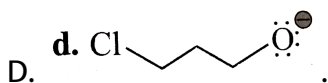
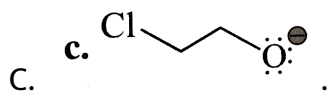
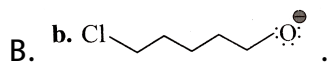
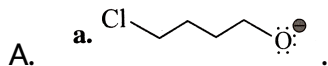
C. Isomerisation to a more stable carbocation is accompanied by decrease in potential energy.

D. Greater stability of benzyl, allyl, and 3° carbocation is due to hyperconjugation.

Answer: A::C::D

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4. In which of the following species containing both nucleophile and leaving group, intramolecular S_N reaction occurs ?



Answer: A::B

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5. Which of the following statements are correct ?

A. The reaction of t-butyl chloride with OH^- follows first-order kinetics.

B. An SN^1 reaction proceeds with the inversion of configuration.

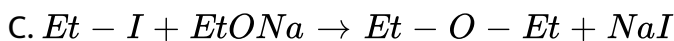
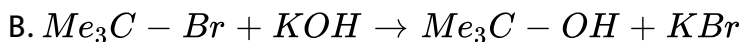
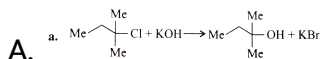
C. An SN^2 reaction follows second-order kinetics.

D. An SN^2 reaction proceeds with stereochemical inversion.

Answer: A::C::D

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6. Which of the following are SN^2 reactions ?



Answer: C::D

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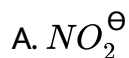
7. Vinyl bromide undergoes :

- A. Addition reaction
- B. Substitution reaction
- C. Elimination reaction
- D. Rearrangement reaction

Answer: A::C

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8. The halogen atom in RX can easily be replaced by nucleophiles such as :



C. CN^{\ominus}

D. None

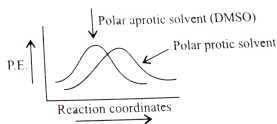
Answer: A::B::C

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9. Which of the following statements are correct ?

A. Polar protic solvents (e.g., $MeOH$, $EtOH$) form H-bonding to nucleophile and stabilise it, thus rate of SN^2 reaction is decreased.

B. Polar aprotic solvents (e.g., $DMSO$, DMF) raise the energy of the nucleophile and thus the rate of SN^2 is increased.



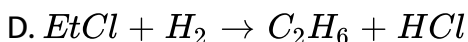
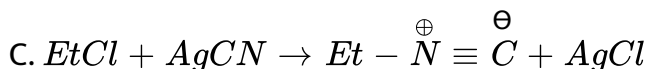
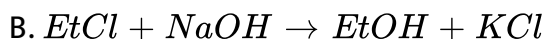
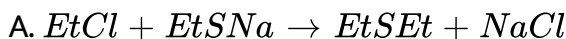
C. Reactivity of nucleophile in the presence of crown ether (solvent) is increased for SN^1 and SN^2 reactions.

D. Reactivity nucleophile in the presence of crown ether (solvent) is decreased for SN^1 and SN^2 reactions.

Answer: A::B::C

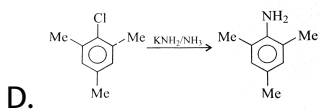
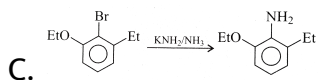
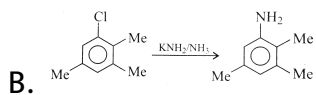
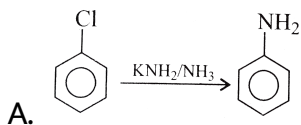
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10. Which of the following reactions represents SN reaction ?



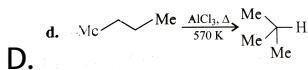
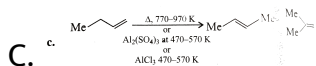
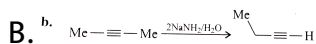
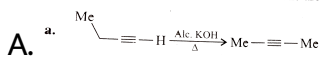
Answer: A::B::C

11. Which of the following reactions are feasible ?



Answer: A::B

12. Which of the following transformations are feasible ?



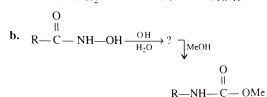
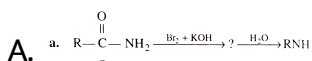
Answer: A::B::C::D

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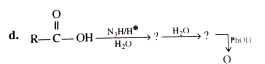
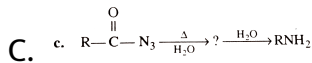
13. In which of the following reactions, the intermediate species acyl

nitrene $\left(R - \overset{\overset{O}{||}}{C} - \ddot{N} : \right)$ and intermediate compound alkyl

isocyanate ($R - N = C = O$) are involved ?



B.



D.

Answer: A::B::C::D

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14. Which of the following statements are correct ?

A. EtO^\ominus is a stronger nucleophile than OH^\ominus .

B. MeO^\ominus is a stronger nucleophile than OH^\ominus .

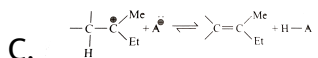
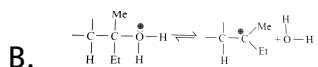
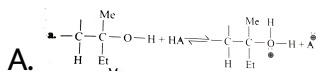
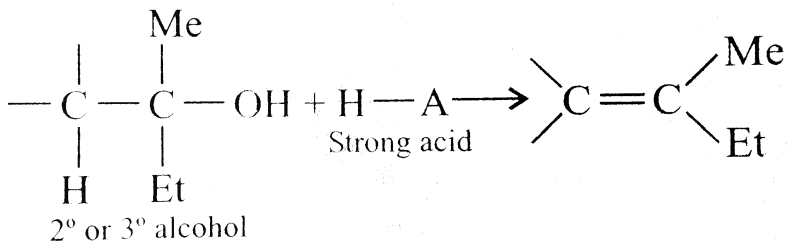
C. RCOO^\ominus is a stronger nucleophile than ROH .

D. MeO^\ominus is a weaker nucleophile than OH^\ominus .

Answer: A::C::D

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15. Which of the following is//are the rate determining step (s) of the given reaction ?

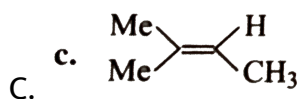
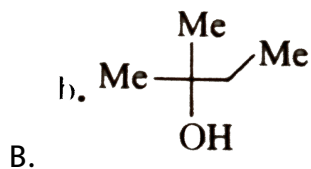
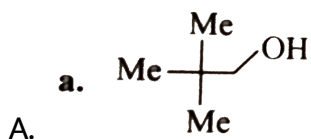
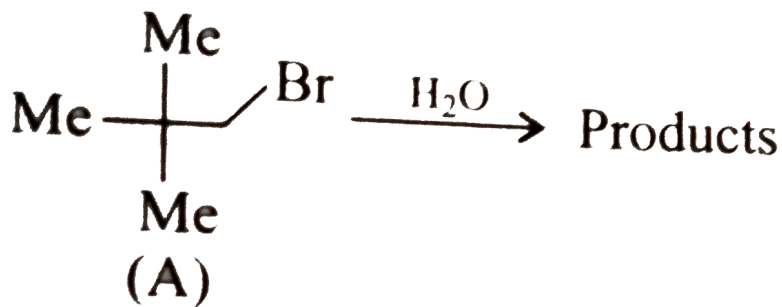


D. All

Answer: B

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16. The products in the given reaction are :

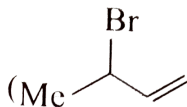


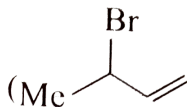
D. d. All

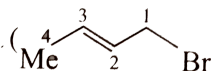
Answer: B::C

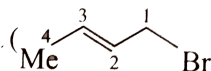
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17. Which of the following statements are correct about the addition of HBr to buta-1,3-diene ?



A. 1,2-Addition product  , 3-bromobut-1-ene) is the major product at lower temperature ($-80^{\circ}C$) and is a kinetic control or rate-controlled product.



B. 1,4-Addition product  , 1-bromobut-2-ene) is the major product at high temperature ($40^{\circ}C$) and is a thermodynamic or equilibrium-controlled product.

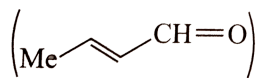
C. In a non-polar solvent (e.g., hexane), 1,2-addition product is predominantly favoured.

D. In a polar solvent (e.g., acetic acid) 1,4-addition product is predominately favoured.

Answer: A::B::C::D

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18. Which of the following statements are correct ?

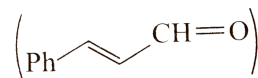


A. The nucleophilic addition of HCN to (I) (I)

results in major addition to ($\text{C} = \text{O}$).

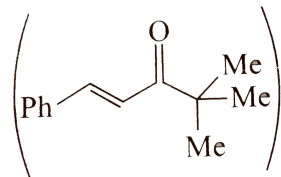
B. The nucleophilic addition of HCN to (I) results in major

addition ($\text{C} = \text{C}$)



C. The nucleophilic addition of PhMgCl to (II) (II)

results of 1,4-addition.



D. The nucleophilic addition of $PhMgCl$ to

(III) results in addition to ($C = C$).

Answer: B::C::D

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19. In which of the following reactions, rearrangement is possible ?

A. $E1$

B. SN^1

C. $SN^{2'}$

D. $E1cB$

Answer: A::B::C

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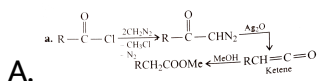
20. Which of the following is an example of nucleophilic addition to acetaldehyde ?

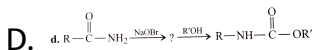
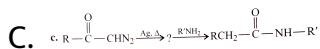
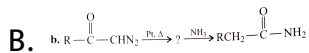
- A. Acetal formation
- B. Cyanohydrin formation
- C. Bisulphite adduct
- D. Wolff-Kishner reaction.

Answer: A::B::C

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21. In which of the reactions, there is a migration of alkyl group to carbene ($\ddot{C}H_2$), i.e., rearrangement occurs ?

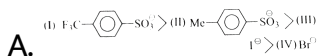




Answer: A::B::C

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22. Which of the following statements are correct ?



B. RS^\ominus is less basic but a stronger nucleophile than RO^\ominus .

C. NH_3 is both a stronger base and a stronger nucleophilic than



D. RO^\ominus and OH^\ominus are both stronger bases and stronger

nucleophile than ROH and H_2O .

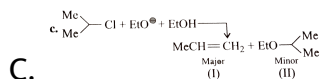
Answer: A::B::C::D

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23. Which of the following statements/reactions are correct ?

A. $SN^2 / E2$ ratio is higher with RS^\ominus than for those with RO^\ominus .

B. $SN^2 / E2$ ratio is highest for $1^\circ RX$ and least for $3^\circ RX$.



D. $Me_3C - Br + KCN \rightarrow Me_3C - CN$.

Answer: A::B::C

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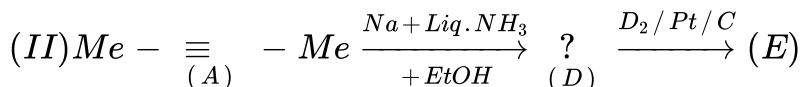
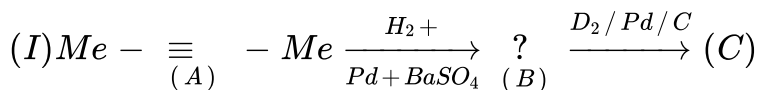
24. Which of the following statements is//are correct ?

- A. Protic solvents solvate the nucleophile, lower enthalpy of nucleophiles, increase ΔG , and decrease the reaction rate of SN^2 reaction.
- B. SN^1 reactions are favoured in protic solvents.
- C. Crown ether increases the reactivity of nucleophile by solvating its cation.
- D. SN^2 reactions are more favoured in protic solvents.

Answer: A::B::C

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25. Consider the following reactions :



Which of the following statements are correct ?

A. (B) is cis-but-2-ene and (D) is trans-but-2-ene.

B. (B) is trans-but-2-ene and (D) is cis-but-2-ene.

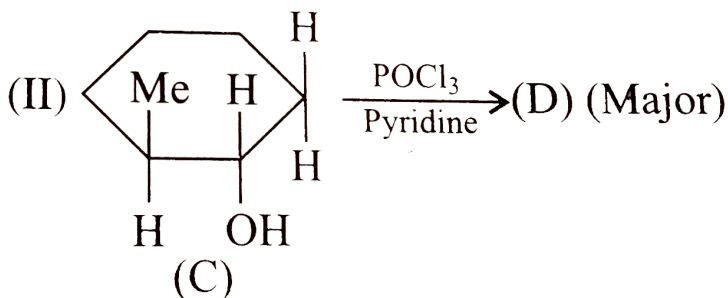
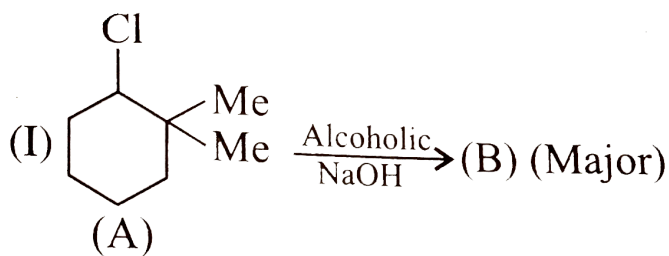
C. (c) is meso form and (E) is racemic form.

D. (C) is racemic form and (E) is meso form.

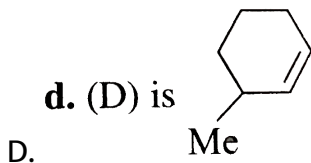
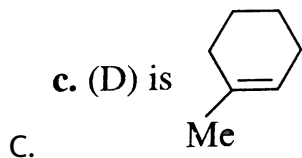
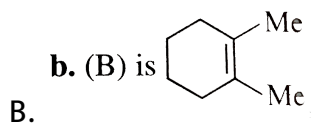
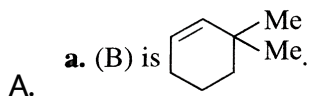
Answer: A::C

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26. Consider the following reactions :



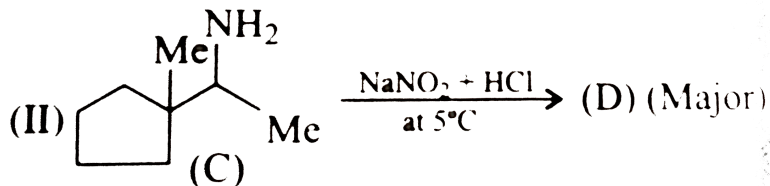
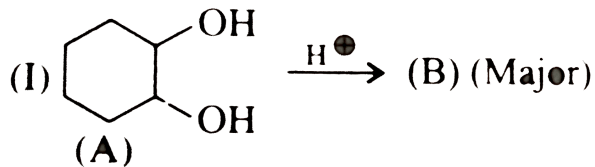
Which of the following statements are correct ?



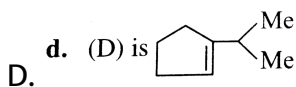
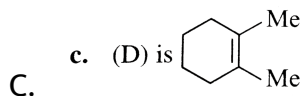
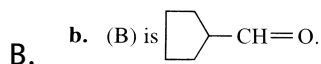
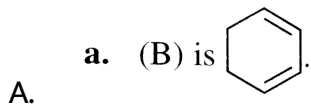
Answer: B::D

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27. Consider the following reactions :



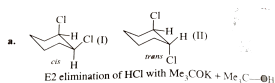
Which of the following statements are correct ?

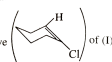


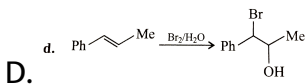
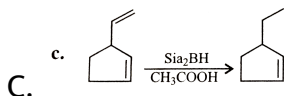
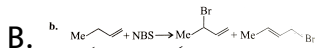
Answer: B::C

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28. Which of the following statements/reactions are correct ?



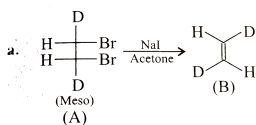
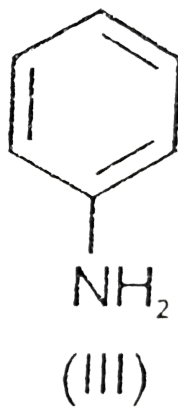
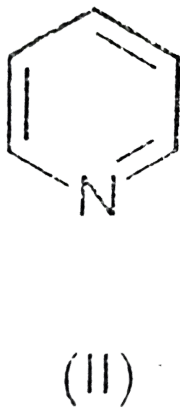
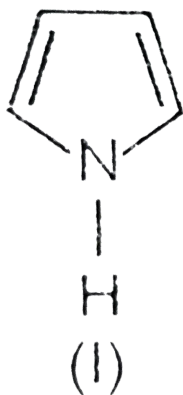
A. to give  of (I) is faster than (II).



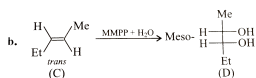
Answer: A::B::C

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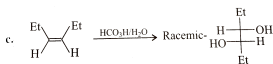
29. Consider the following compounds Which of the following statements are correct?



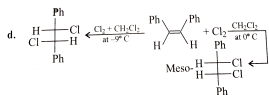
A.



B.



C.

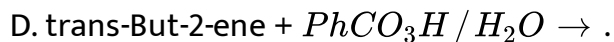
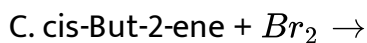
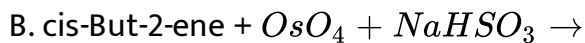
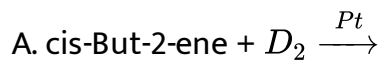


D.

Answer: A::C::D

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30. Which of the following reactions are both stereospecific and regioselective ?

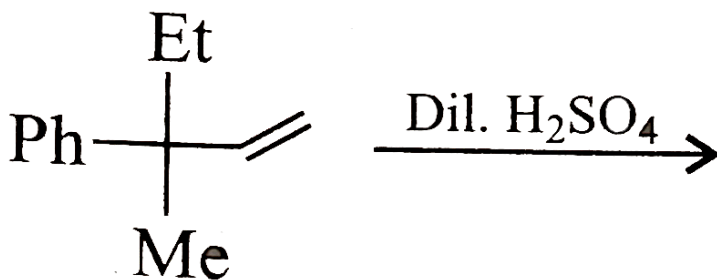


Answer: A::B::C

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Single Correct

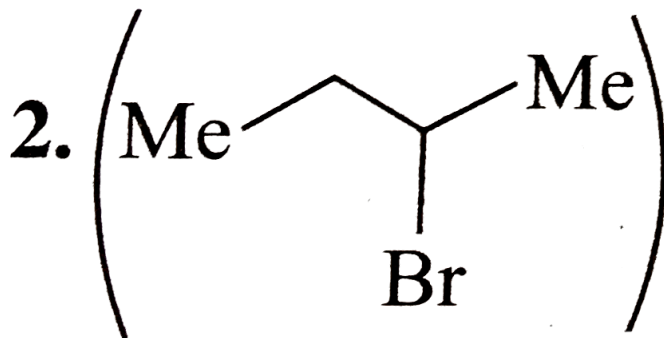
1. The major product in the reaction is :



- A. **a.**
Structure: A central carbon atom is bonded to a phenyl group (Ph), an ethyl group (Et), a methyl group (Me), and a hydroxyl group (OH). The methyl group and hydroxyl group are on the same carbon, making it a tertiary alcohol.
- B. **b.**
Structure: A central carbon atom is bonded to a phenyl group (Ph), an ethyl group (Et), and a methyl group (Me). The third bond is to a CH₂ group, which is further bonded to a hydroxyl group (OH).
- C. **c.**
Structure: A central carbon atom is bonded to a phenyl group (Ph), an ethyl group (Et), a methyl group (Me), and a methoxy group (MeOH).
- D. Both (b) and (c)

Answer: A

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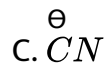
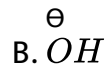
2. (sec-Butyl bromide) undergoes alkaline hydrolysis by :

- A. SN^1
- B. SN^2
- C. Both (a) and (b)
- D. None

Answer: A

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3. Which of the following is the strongest nucleophile ?



Answer: A

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4. Rearrangement reactions are shown by :

A. Carbanion

B. Free radical

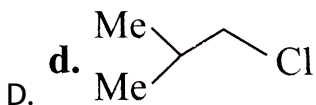
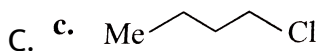
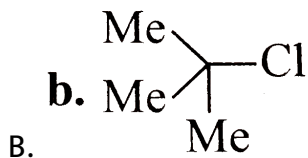
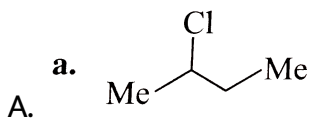
C. Carbene

D. Carbocation

Answer: D

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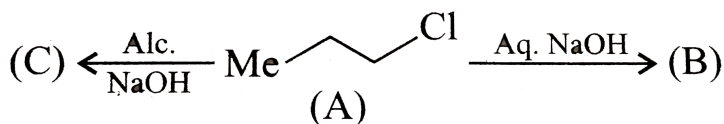
5. Equal amount of an $RCl(C_4H_9Cl)$ is reacted at the same temperature with equal volume of $0.2M$ and $0.4M$ solution of KOH , respectively, in two separate experiments. The time taken for the reaction of 50% of (C_4H_9Cl) was found to be same, the alkyl halide is :



Answer: B

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6. Which of the following statements is correct about the following reactions ?



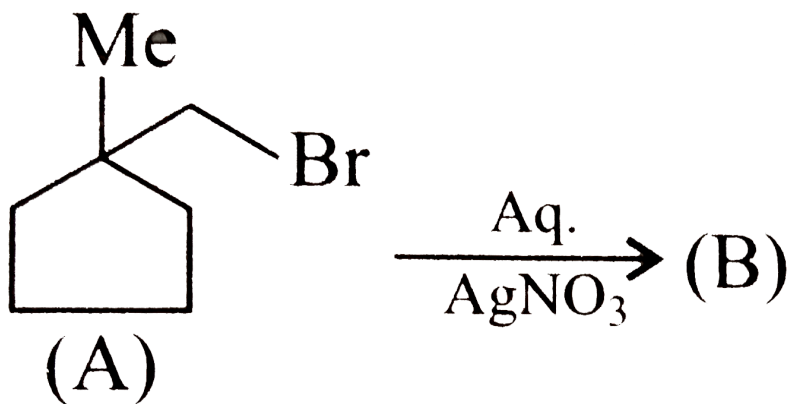
A. (B) is obtained by elimination reaction.

B. (c) is obtained by substitution reaction.

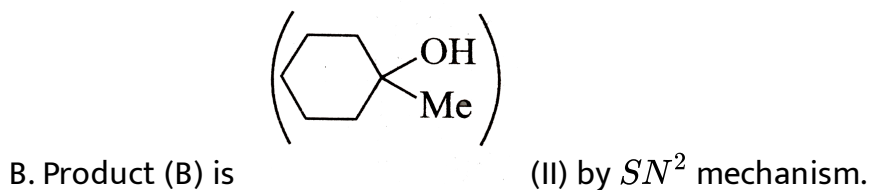
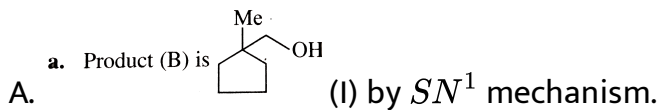
C. The molecular formula of (B) is C_3H_6 and that of (c) is C_3H_8O

D. (B) is an isomer of ethyl methyl ether, while (c) is the dehydrated compound of (B).

Answer: D



Which statement is correct about the above reaction ?



C. Product (B) is (I) by SN^2 mechanism.

D. product (B) is (II) by SN^1 mechanism.

Answer: D



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8. In SN^2 , solvolysis RX in which the solvent is a nucleophile, what is the order and molecularity of the reaction ?

- A. First order , unimolecular
- B. First order , bimolecular
- C. Second order , bimolecular
- D. Pseudo first-order , bimolecular

Answer: D



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9. A partially racemised (+) - 2-bromo-octane ($2^\circ RX$) on reaction with aq. $NaOH$ in acetone gives an alcohol with 80 % inversion and 20 % racemisation. What is the percentage of back-side attack ?

A. 0.4

B. 0.1

C. 0.9

D. 0.8

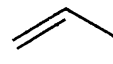
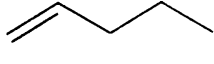
Answer: C

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10. Which of the compound in each of the following pairs will react faster in S_N^2 reaction with OH^\ominus

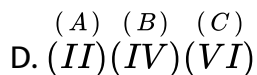
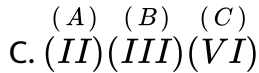
(A) MeBr(I) and MeI(II)

(B) $\text{Me}_3\text{C}-\text{Cl(III)}$ and MeCl(IV)

(C)  Br (V) and  Cl (VI)

A. $\begin{matrix} (A) & (B) & (C) \\ (I) & (III) & (V) \end{matrix}$

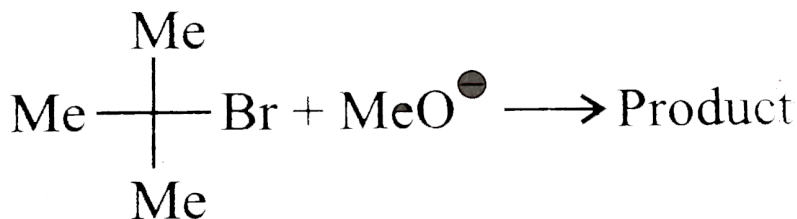
B. $\begin{matrix} (A) & (B) & (C) \\ (I) & (IV) & (V) \end{matrix}$



Answer: D

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11. Which statement is correct about the following reactions ?



A. Product is $\left(\begin{array}{c} \text{Me} \\ \text{Me} \end{array} \right) \text{C} = \text{C}$ by elimination reaction.

B. Product is $\left(\begin{array}{c} \text{Me} \\ \text{Me} - \text{C} - \text{OMe} \\ \text{Me} \end{array} \right)$ by substitution reaction.

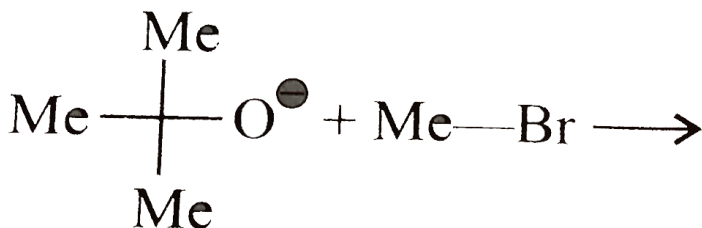
C. Both (a) and (b)

D. None

Answer: A

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12. Which statement is correct about the following reactions ?



A. Product is $\left(\begin{array}{c} \text{Me} \\ \text{Me} \end{array} \right) \text{C} = \text{C}$ by elimination reaction.

B. Product is $\left(\begin{array}{c} \text{Me} \\ \text{Me} - \text{C} - \text{OMe} \\ \text{Me} \end{array} \right)$ (II) by SN^2 reaction.

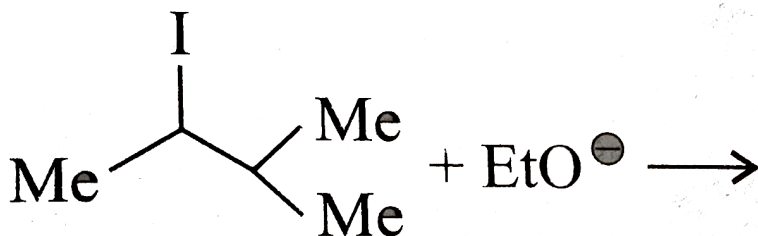
C. Product is (II) by SN^2 reaction

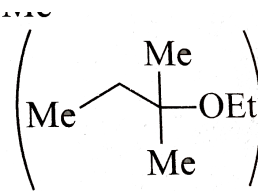
D. Both (a) and (b).

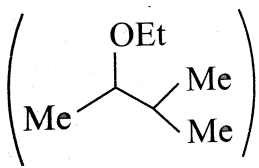
Answer: B

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13. Which statement is correct about the following reactions ?



A. Major product is  (I) and minor

product is  (II) by SN^1 mechanism.

B. Major product is (I) and minor product is (II) by SN^2 mechanism.

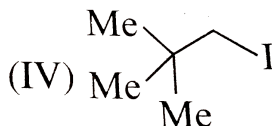
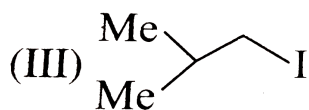
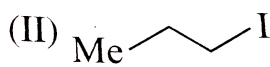
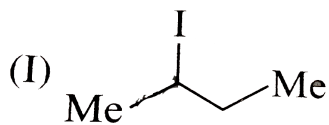
C. Major product is (II) and minor product is (I) by SN^1 mechanism.

D. Major product is (II) and minor product is (I) by SN^2 mechanism.

Answer: A

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14. The decreasing order of dehydrohalogenation of the following compounds is :



A. (I) > (II) > (III) > (IV)

B. (IV) > (III) > (I) > (II)

C. (II) > (I) > (III) > (IV)

D. (IV) > (III) > (II) > (I)

Answer: B

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15. The decreasing order of nucleophilicities of the following is :

(I) Br^{\ominus}

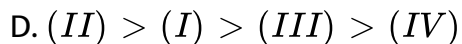
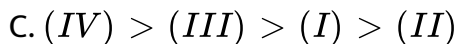
(II) MeO^{\ominus}

(III) Me_2N^{\ominus}

(IV) Me_3C^{\ominus} .

A. (I) > (II) > (III) > (IV)

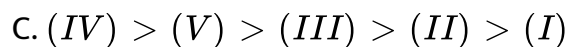
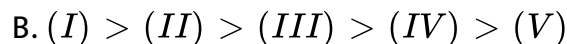
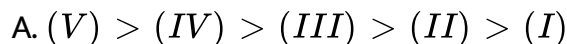
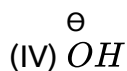
B. (IV) > (III) > (II) > (I)

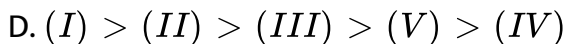


Answer: B

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16. The decreasing order of nucleophilicities of the following is :

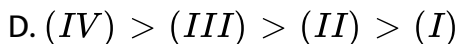
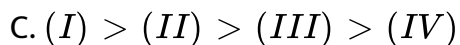
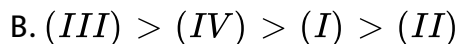
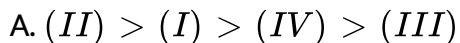
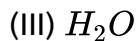
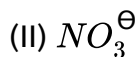
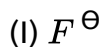




Answer: A

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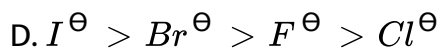
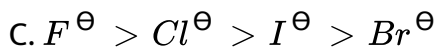
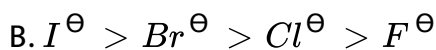
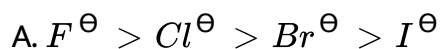
17. The decreasing order of the basic character of the following is :



Answer: C

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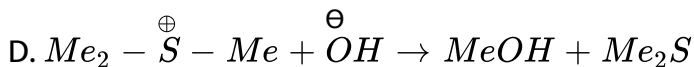
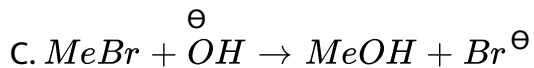
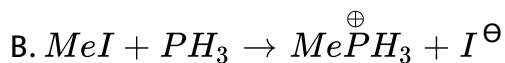
18. The decreasing order of nucleophilicities in *DMSO* (dimethylsulphoxide) is :



Answer: A

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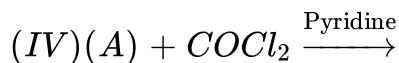
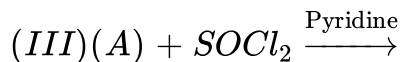
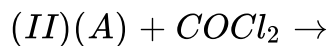
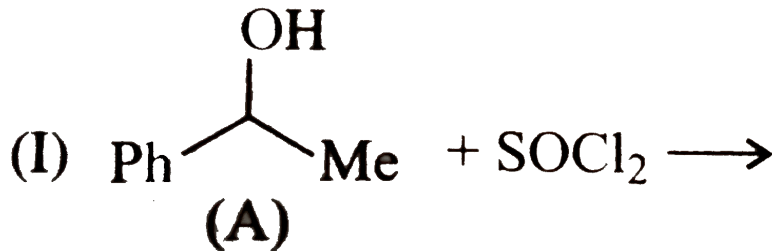
19. In which of the following reactions, SN^2 rate increases on changing the solvent from (95 % acetone + 5 % H_2O) to (80 % acetone + 20 % H_2O) ?



Answer: B

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20. In which of the following reactions, retention of configuration takes place ?



A. (I), (III)

B. (I), (II)

C. (III), (IV)

D. (I), (IV)

Answer: B

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21. Necessary conditions for Fiels-Alder reactions are :

A. (I), (II), (III)

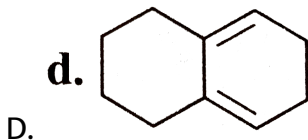
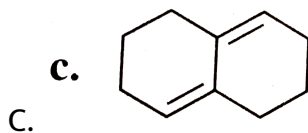
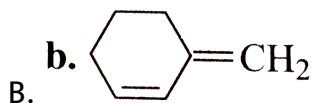
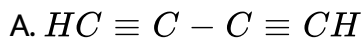
B. (I), (II), (IV)

C. (II), (III)

D. (II), (IV)

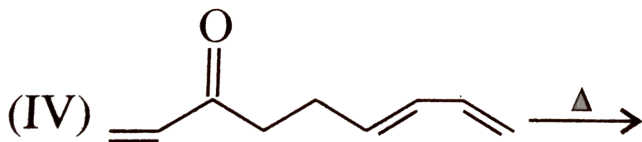
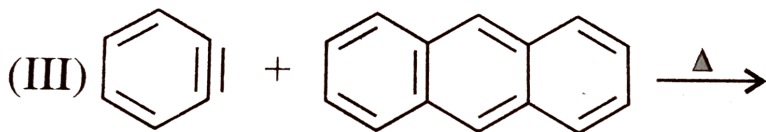
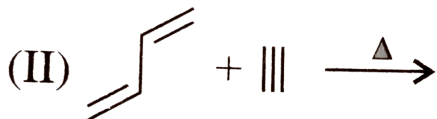
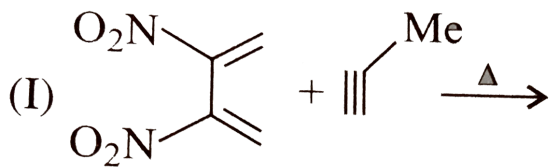
Answer: A

22. Which of the following compounds would undergo Diels-Alder reaction with dienophile (e.g., Maleic anhydride) ?



Answer: D

23. Which of the following reaction would undergo Diels-Alder reaction ?



A. All

B. (II), (III), (IV)

C. (III), (IV)

D. (II)

Answer: C



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24. The decreasing order of reactivity towards SE (substitution by electrophile) of the following is :

(I) Nitrobenzene

(II) Chlorobenzene

(III) Toluene

(IV) Benzene.

A. $(I) > (II) > (III) > (IV)$

B. $(IV) > (III) > (II) > (I)$

C. $(III) > (IV) > (II) > (I)$

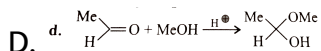
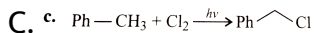
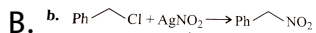
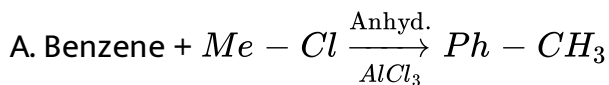
D. $(I) > (II) > (IV) > (III)$

Answer: C



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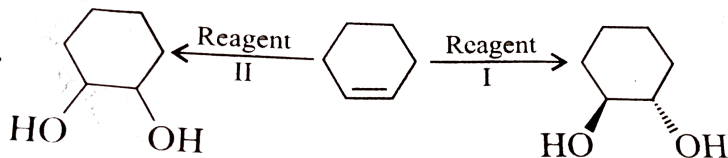
25. Which of the following is a free radical substitution reaction ?



Answer: C

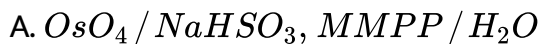
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33.



26.

Reagent I and II, respectively, are :



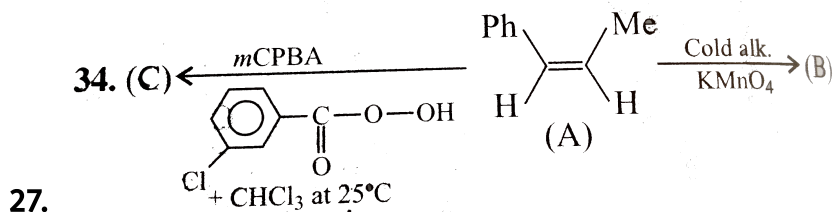
B. Cold alkaline $KMnO_4$, OsO_4 / $NaHSO_3$

C. $PhCO_3H$ / H_2O , Cold alkaline $KMnO_4$

D. $MMPP$ / H_2O , HCO_3H / H_2O

Answer: C

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Which product is racemic in the above reaction ?

A. Product B

B. Product C

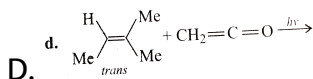
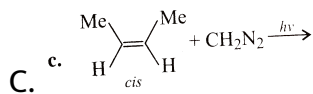
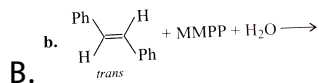
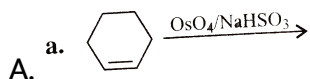
C. Both

D. None

Answer: C

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28. Consider the following reactions.

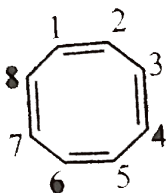


Answer: D

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29. Which of the following is a non-aromatic compound ?

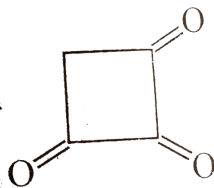
a.



A.

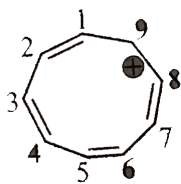
of

B.



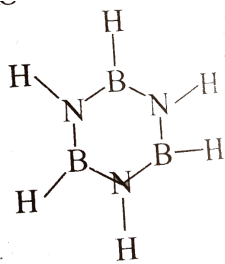
c.

C.



d.

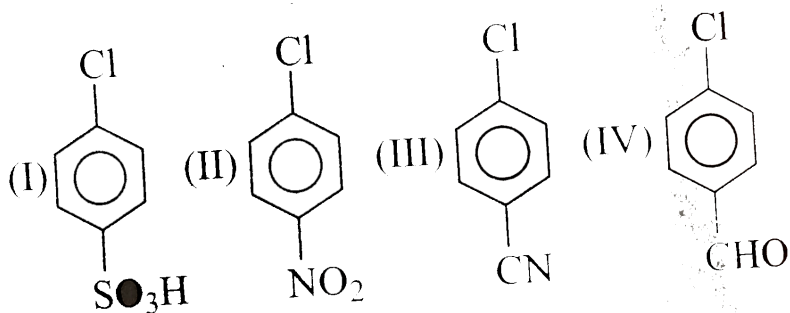
D.



Answer: A

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30. The decreasing order of reactivity towards $ArSN$ reaction of the following with $NaOMe$ is :



A. (I) > (II) > (III) > (IV)

B. (IV) > (III) > (II) > (I)

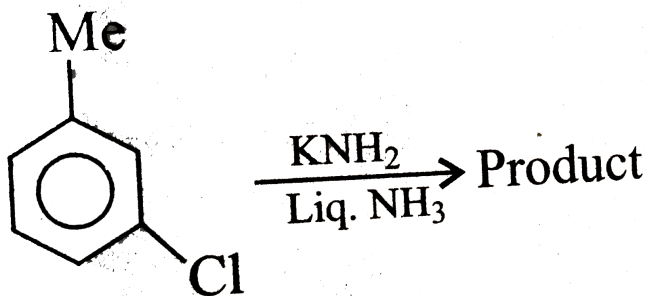
C. (II) > (I) > (III) > (IV)

D. (IV) > (III) > (I) > (II)

Answer: C

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31. Consider the following reaction :



The product is :

- A. o-Toluidine
- B. m-Toluidine
- C. p-Toluidine
- D. All

Answer: D

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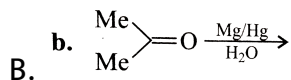
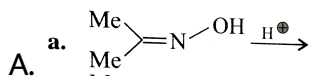
32. Refer to Q.No. 38 and find out which of the following statements is wrong ?

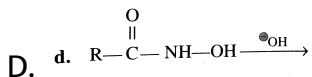
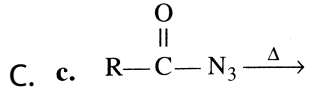
- A. The reaction is *ArSN* (addition-elimination reaction)
- B. The reaction is *ArSN* (elimination-addition reaction) *via* benzyne mechanism.
- C. One product is obtained by direct substitution.
- D. Two products are obtained by cine-substitution.

Answer: A

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33. Which of the following is not a rearrangement reaction ?





Answer: B

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34. Arrange the following in the reactions order of *NA* (nucleophilic addition) reaction.

(I) *MeCOMe*

(II) *PhCOMe*

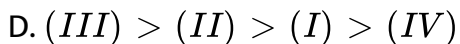
(III) *PhCOPh*

(IV) *PhCH₂COMe*.

A. (I) > (II) > (III) > (IV)

B. (IV) > (III) > (II) > (I)

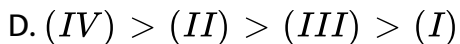
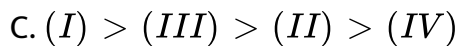
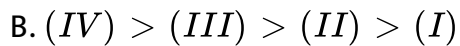
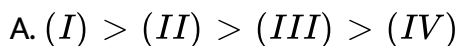
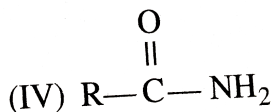
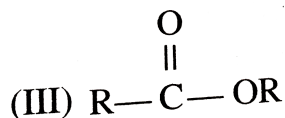
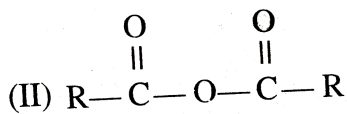
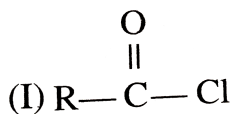
C. (IV) > (I) > (II) > (III)



Answer: C

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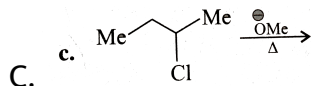
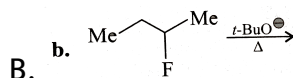
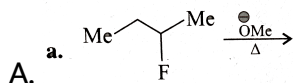
35. Arrange the following in the decreasing order of nucleophilic acyl substitution reaction.



Answer: A

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36. Which of the following reactions will not give Hofmann alkene ?

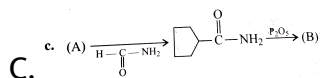
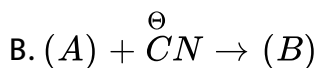
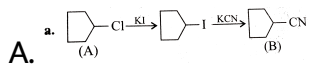


D. 

Answer: C

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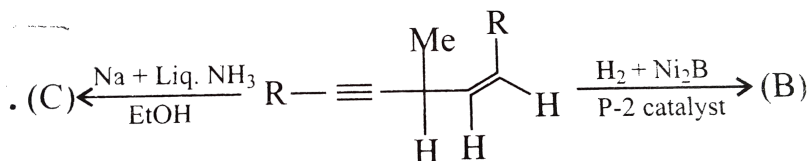
37. Which of the following is the best method for the preparation of compound cyclopentyl cyanide from cyclopentyl chloride ?



D. All

Answer: A

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38.

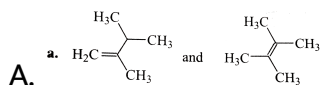
Which statement is correct about the above reaction ?

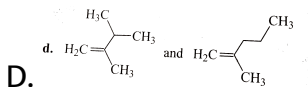
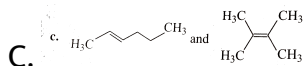
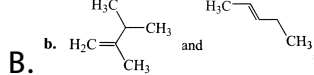
- A. Both products (*B*) and (*C*) are optically active.
- B. Both products (*B*) and (*c*) are optically inactive.
- C. Product (*B*) is optically inactive but product (*c*) is optically active.
- D. Product (*B*) is formed by anti-addition but product (*c*) is formed by syn-addition of H_2 .

Answer: C

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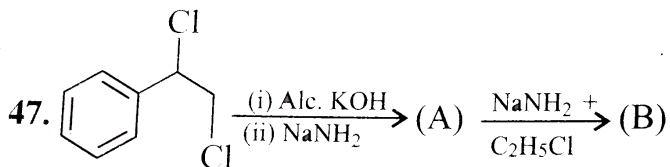
39. An alkyl halide of formula $C_6H_{13}Br$ on treatment with potassium t-butoxide gives two isomeric alkenes dimethyl butane. Isomeric alkene are :





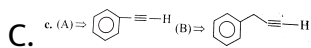
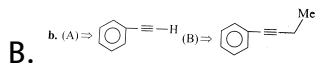
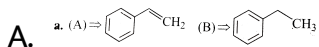
Answer: A

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40.

(A) and (B) are :



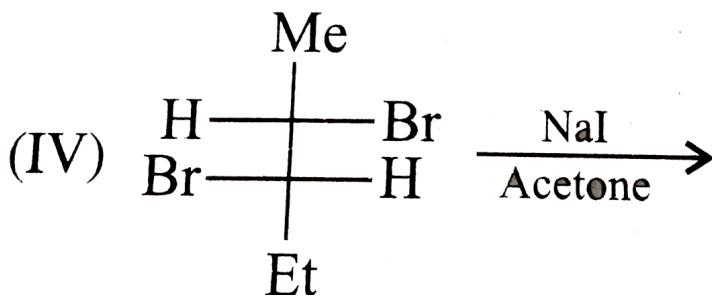
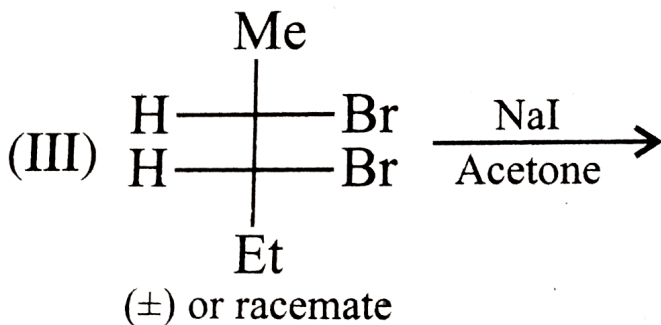
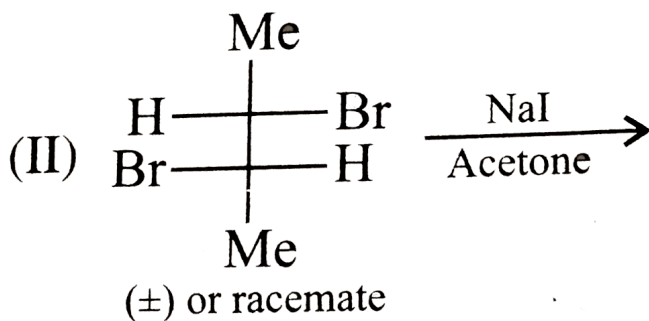
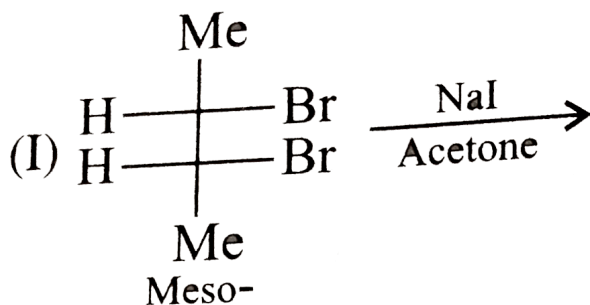
D. None of these

Answer: B



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41. Which of the following reactions would give trans-alkene ?



A. (I)

B. (II)

C. $(I), (III)$

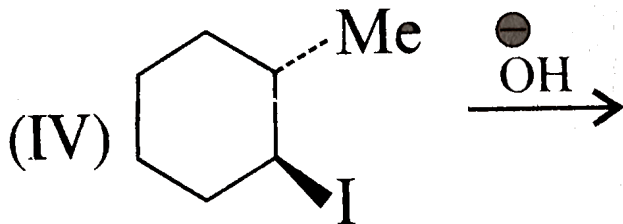
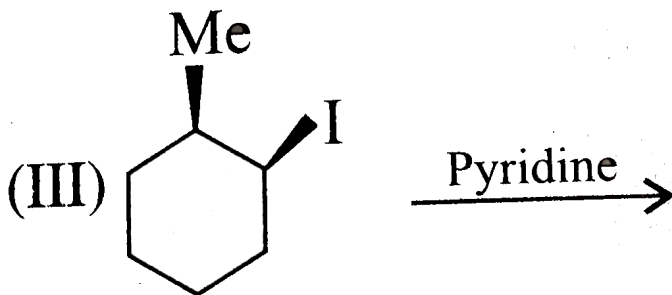
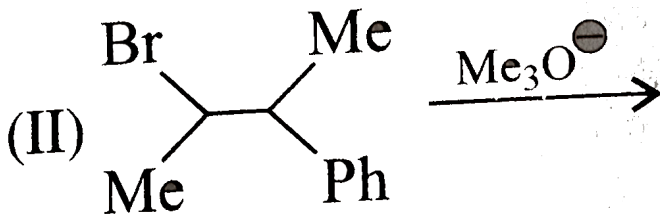
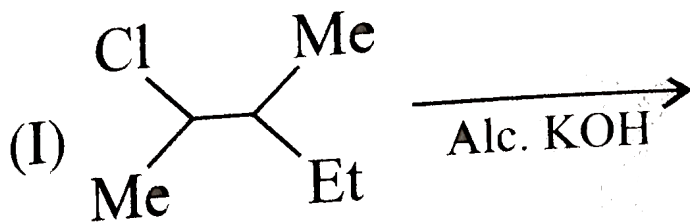
D. $(II), (IV)$

Answer: C



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42. Which of the following reactions is Hofmann elimination ?



A. (I)

B. (I), (III)

C. (II), (III)

D. (II), (IV)

Answer: D

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43. Draw the structure of the following compounds: cyclopropane.

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Assertion Reasoning

1. 1° allylic halides are more reactive than $1^\circ RX$ in SN^1 reaction.

Allylic carbocation intermediate is stabilised by resonance.

- A. If both (A) and (R) are true, but (R) is the correct explanation of (A)
- B. If both (A) and (R) are true, but (R) is not the correct explanation of (A).
- C. If (A) is true but (R) is false.
- D. If (A) is false but (R) is true.

Answer: A

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2. Walden inversion takes place in SN^2 reaction.

Half-life period of SN^2 reaction is inversely proportional to the concentration of the substrate or nucleophile or both.

- A. If both (A) and (R) are true, but (R) is the correct explanation of (A)

B. If both (A) and (R) are true, but (R) is not the correct explanation of (A) .

C. If (A) is true but (R) is false.

D. If (A) is false but (R) is true.

Answer: B

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3. Chlorination of allylic hydrogen is difficult than vinylic hydrogen.

Allyl radical is stabilised by resonance.

A. If both (A) and (R) are true, but (R) is the correct explanation of (A)

B. If both (A) and (R) are true, but (R) is not the correct explanation of (A) .

C. If (A) is true but (R) is false.

D. If (A) is false but (R) is true.

Answer: D

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4. Heavy metal ions Ag^+ or Pb^{2+} decrease SN^1 reactivity.

They aid ionisation of RX .

A. If both (A) and (R) are true, but (R) is the correct explanation of (A)

B. If both (A) and (R) are true, but (R) is not the correct explanation of (A).

C. If (A) is true but (R) is false.

D. If (A) is false but (R) is true.

Answer: D



5. Crown ether acts as phase transfer catalysis and increases SN^2 reactivity.

They strongly complex cation and leave anion (nucleophile) with increased reactivity.

- A. If both (A) and (R) are true, but (R) is the correct explanation of (A)
- B. If both (A) and (R) are true, but (R) is not the correct explanation of (A).
- C. If (A) is true but (R) is false.
- D. If (A) is false but (R) is true.

Answer: A

6. RS^{\ominus} is a stronger nucleophile and a better leaving group than RO^{\ominus} .

RS^{\ominus} is a weaker base than RS^{\ominus} .

A. If both (A) and (R) are true, but (R) is the correct explanation of (A)

B. If both (A) and (R) are true, but (R) is not the correct explanation of (A).

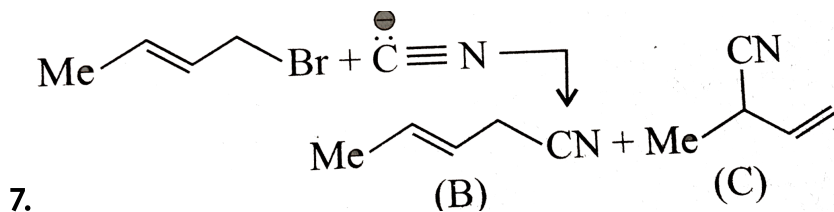
C. If (A) is true but (R) is false.

D. If (A) is false but (R) is true.

Answer: A



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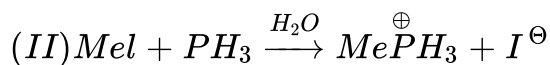
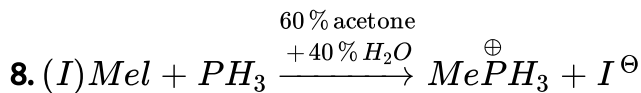


The product (B) results by SN^2 mechanism and product (C) results by SN^2' mechanism.

- A. If both (A) and (R) are true, but (R) is the correct explanation of (A)
- B. If both (A) and (R) are true, but (R) is not the correct explanation of (A).
- C. If (A) is true but (R) is false.
- D. If (A) is false but (R) is true.

Answer: A

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Increase in solvent polarity stabilises the $T.S.$, lowers E_{act} , and increases the rate.

A. If both (A) and (R) are true, but (R) is the correct explanation of (A)

B. If both (A) and (R) are true, but (R) is not the correct explanation of (A).

C. If (A) is true but (R) is false.

D. If (A) is false but (R) is true.

Answer: A



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9. $\text{E}_{\text{lc}}\text{B}^-$ reaction is favoured by stabilisation of carbanion and poor leaving group.

The reaction is kinetically of the second order and unimolecular.

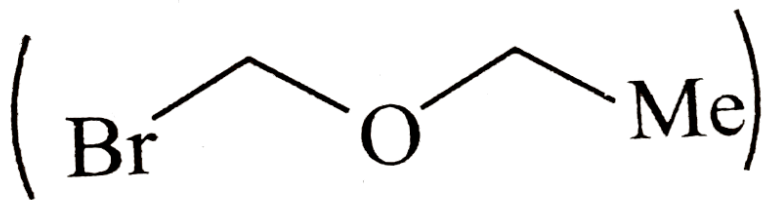
- A. If both (A) and (R) are true, but (R) is the correct explanation of (A)
- B. If both (A) and (R) are true, but (R) is not the correct explanation of (A).
- C. If (A) is true but (R) is false.
- D. If (A) is false but (R) is true.

Answer: B



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10. Rate of ethanolsis of 1° halide



by SN^1

machanism is fast.

Carocation is stabilised by resonance.

- A. If both (*A*) and (*R*) are true, but (*R*) is the correct explanation of (*A*)
- B. If both (*A*) and (*R*) are true, but (*R*) is not the correct explanation of (*A*).
- C. If (*A*) is true but (*R*) is false.
- D. If (*A*) is false but (*R*) is true.

Answer: A

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11. Phenol is more reactive than benzene towards electrophilic substitution reaction.

In case of Phenol, the intermediate carbocation is more resonance stabilised.

A. Statement *I* is true, Statement *II* is true , Statement *II* is the correct explanation of Statement *I*.

B. Statement *I* is true , Statement *II* is true , Statement *II* is not the correct explanation of Statement *I*

C. Statement *I* is true , Statement *II* is false.

D. Statement *I* is false , Statement *II* is true.

Answer: A

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12. Assertion : Addition of bromine to trans-but-2-ene yields meso-2,3-dibromobutane.

Reason : Bromine addition to an alkene is a nucleophilic addition

(a) If both Assertion and Reason are CORRECT and Reason is the CORRECT explanation of the Assertion.

(b) If both Assertion and Reason are CORRECT but Reason is not the CORRECT explanation of the Assertion.

(c) Assertion is CORRECT but Reason is INCORRECT.

(d) Assertion is CORRECT but Reason is INCORRECT.

A. Statement *I* is true, Statement *II* is true , Statement *II* is the correct explanation of Statement *I*.

B. Statement *I* is true , Statement *II* is true , Statement *II* is not the correct explanation of Statement *I*

C. Statement *I* is true , Statement *II* is false.

D. Statement *I* is false , Statement *II* is true.

Answer: B

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Archives

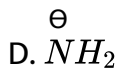
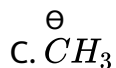
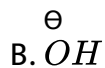
1. The formation of cyanohydrin from a ketone is an example of
nucleophilic substitution
electrophilic substitution
electrophilic addition
nucleophilic addition.

- A. Electrophilic addtion
- B. Nucleophilic addtion
- C. Nucleophilic substitution
- D. Electrophilic substitution

Answer: B

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2. Which of the following has the highest nucleophilicity ?



Answer: C

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3. An S_N2 reaction at an asymmetric carbon of a compound always gives

- A. An enantiomer of the substrate
- B. A product with opposite optical rotation
- C. A mixture of diastereomers
- D. A single stereoisomer.

Answer: B

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4. Identify the correct of reactivity in electrophilic substitution reaction of the following compounds.

(1) Benzene

(2) Toluene

(3) Chlorobenzene,

(4) Nitrobenzene.

A. (1) > (2) > (3) > (4)

B. (4) > (3) > (2) > (1)

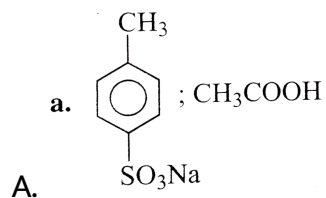
C. (2) > (1) > (3) > (4)

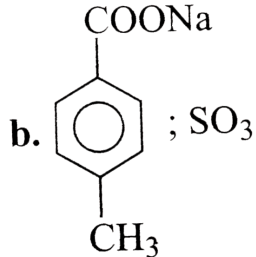
D. (2) > (3) > (1) > (4)

Answer: C

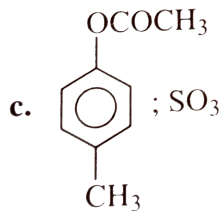
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5. 4-Methyl benzene sulphonic acid reacts with sodium acetate to give :

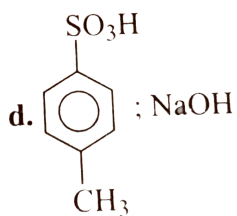




B.



C.



D.

Answer: A

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6. The number of stereoisomers obtained by bromination of trans-2-butene is :

A. 1

B. 2

C. 3

D. 4

Answer: A

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7. The order of leaving group ability is :

A. $(i) > (ii) > (iii) > (iv)$

B. $(iv) > (iii) > (i) > (ii)$

C. $(iii) > (ii) > (i) > (iv)$

D. $(ii) > (iii) > (iv) > (i)$

Answer: B

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8. During debromination of meso-dibromobutane, the major compound formed is

n-butane

but-1-ene

cis-but-2-ene

trans-but-2-ene

A. n-Butane

B. 1-Butene

C. cis-2-Butane

D. trans-2-Butene

Answer: D

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True False

1. Iodide is a better nucleophile than bromide.

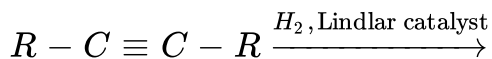
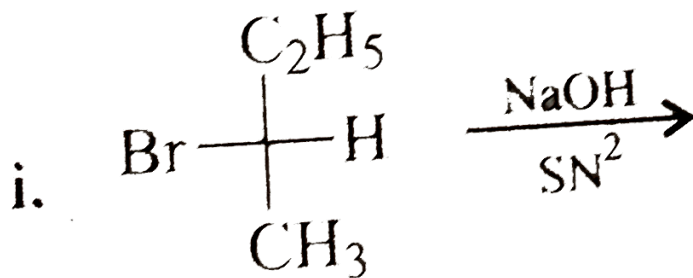
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2. During SN^1 reactions, the leaving group leaves the molecule before the incoming group is attached to the molecule.

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Analytical And Descriptive

1. Draw the stereochemical structures of the products in the following reactions.



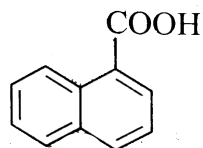
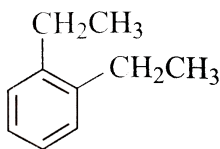
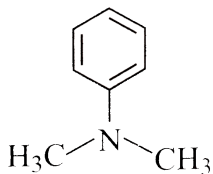
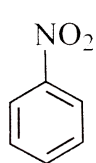
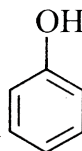
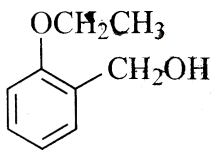
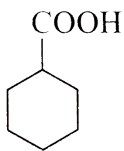
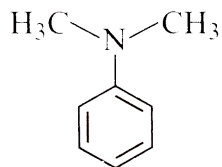
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2. Write down the structure of the stereoisomers formed when cis-2-butene is treated with bromine.

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3. Optically active 2-iodobutane on treatment with NaI in acetone gives a product which does not show optical activity Explain why?

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