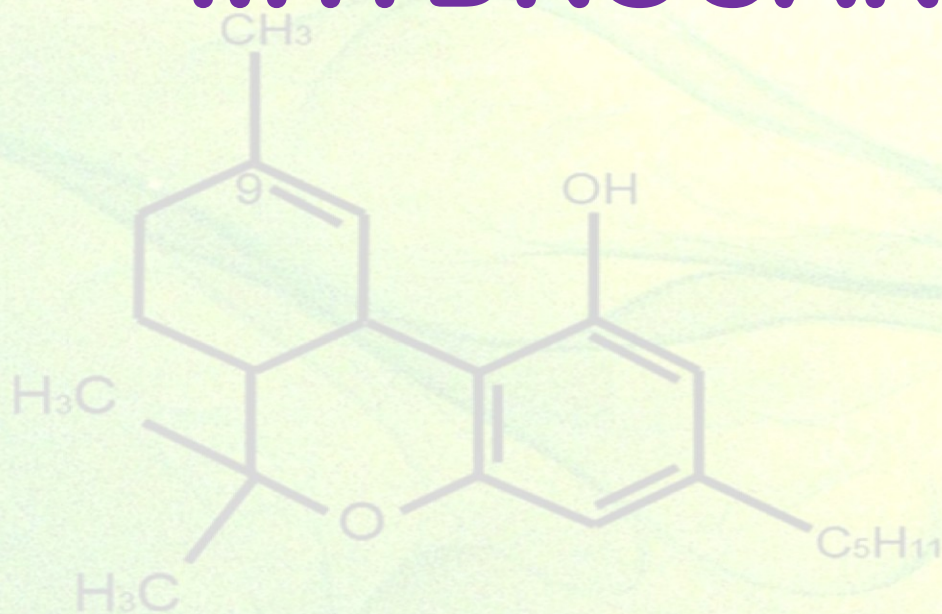


***VIKASANA-CET-2013***

**HYDROCARBONS – II  
HALOALKANES  
AMINES**

H<sub>3</sub>C

# I. HYDROCARBONS – II



1] The cycloalkane which easily undergoes ring opening reaction when heated with  $H_2$  and Ni is

1] cyclohexane

2] cyclopentane

3] cyclobutane

4] cyclopropane

ring opening reaction is a method of determining order of stability.

1] cyclohexane = resistant to ring opening

2] cyclopentane =  $300^{\circ}\text{C}$

3] cyclobutane =  $200^{\circ}\text{C}$

4] cyclopropane =  $80^{\circ}\text{C}$

**Ans: 4] cyclopropane**

2] The cycloalkane which is most stable according to Baeyer's angle strain theory is

1] cyclohexane

2] cyclopentane

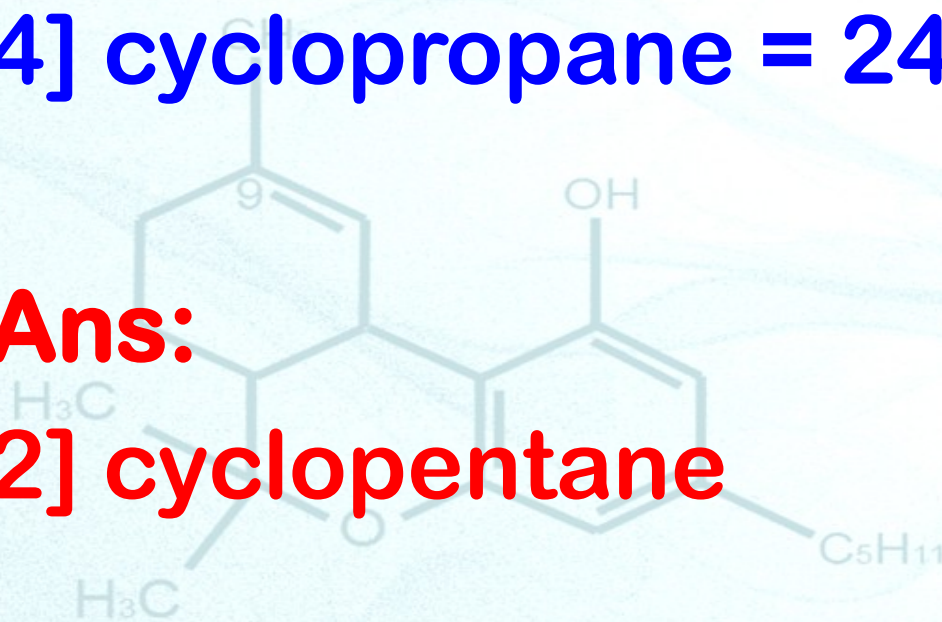
3] cyclobutane

4] cyclopropane

- 1] cyclohexane =  $-5^{\circ} 12'$
- 2] cyclopentane =  $0^{\circ} 44'$
- 3] cyclobutane =  $9^{\circ} 44'$
- 4] cyclopropane =  $24^{\circ} 44'$

**Ans:**

**2] cyclopentane**



3] 1,4-dibromobutane is treated with sodium metal in dry ether. The product obtained is

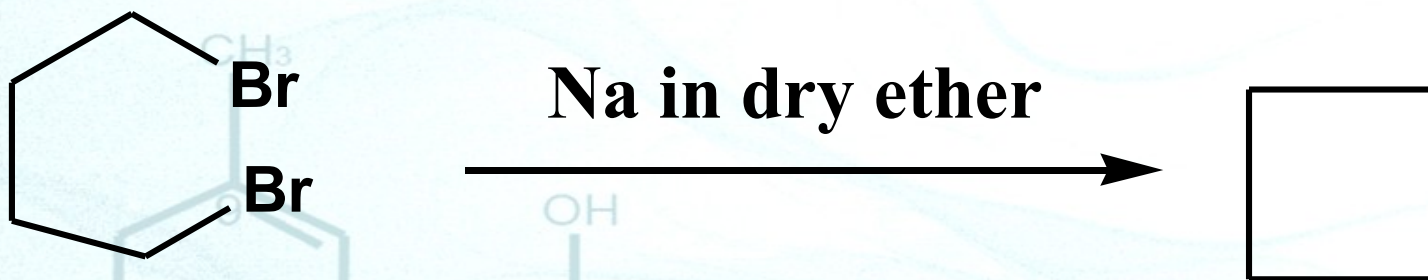
1] butane

2] 1-butene

3] cyclobutane

4] 1,3-butadiene

Intra-molecular Wurtz reaction, also called Freund reaction.



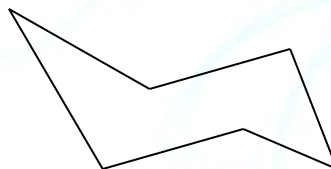
**Ans: 3] cyclobutane**

**Zinc may be used instead of sodium**



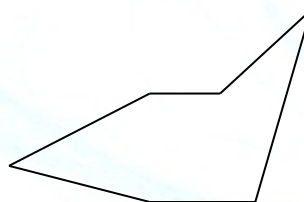
4] The most stable conformation of cyclohexane is

1]



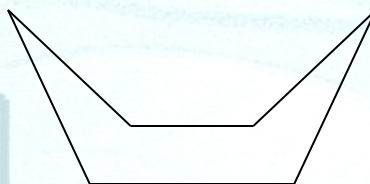
chair

2]



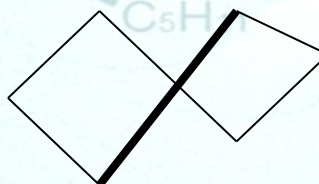
half-chair

3]

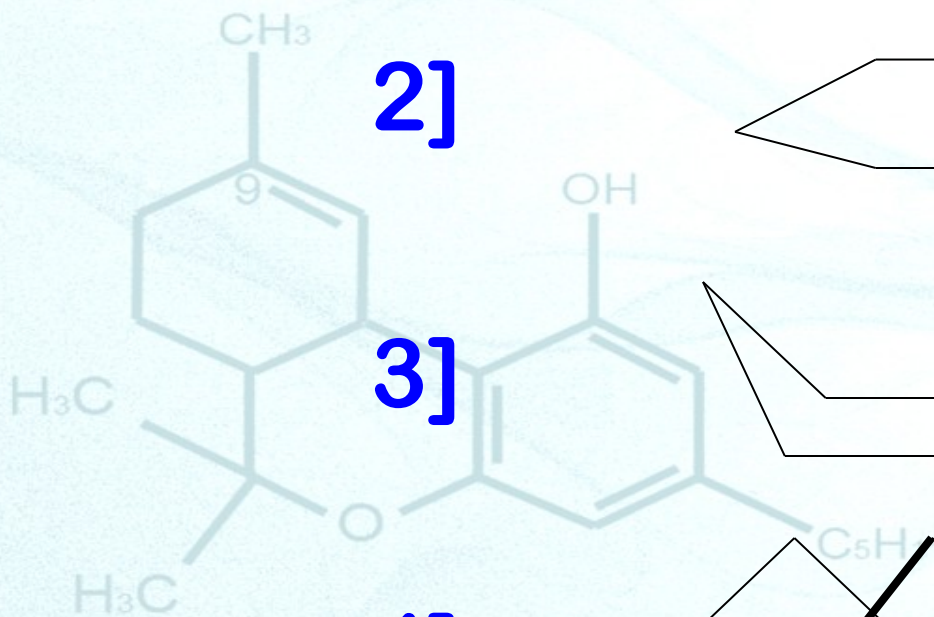


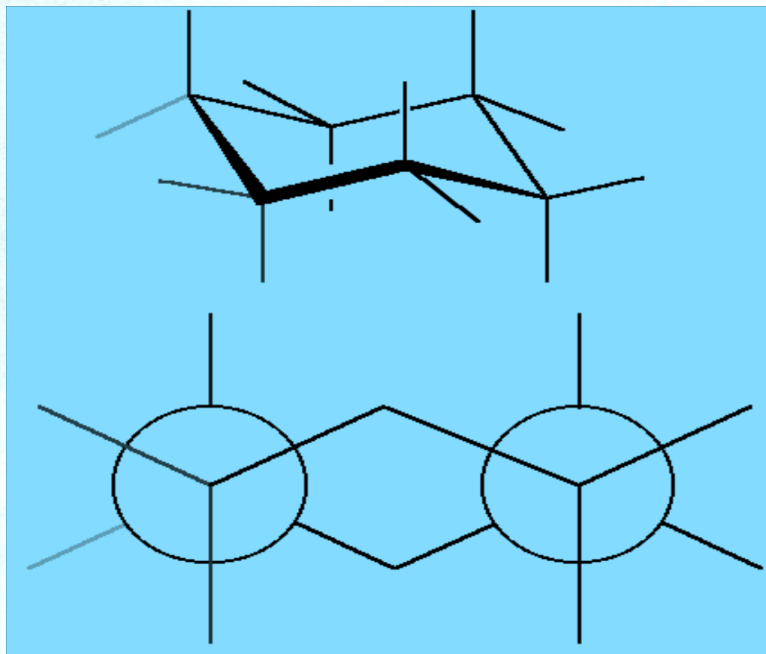
boat

4]



twist-boat

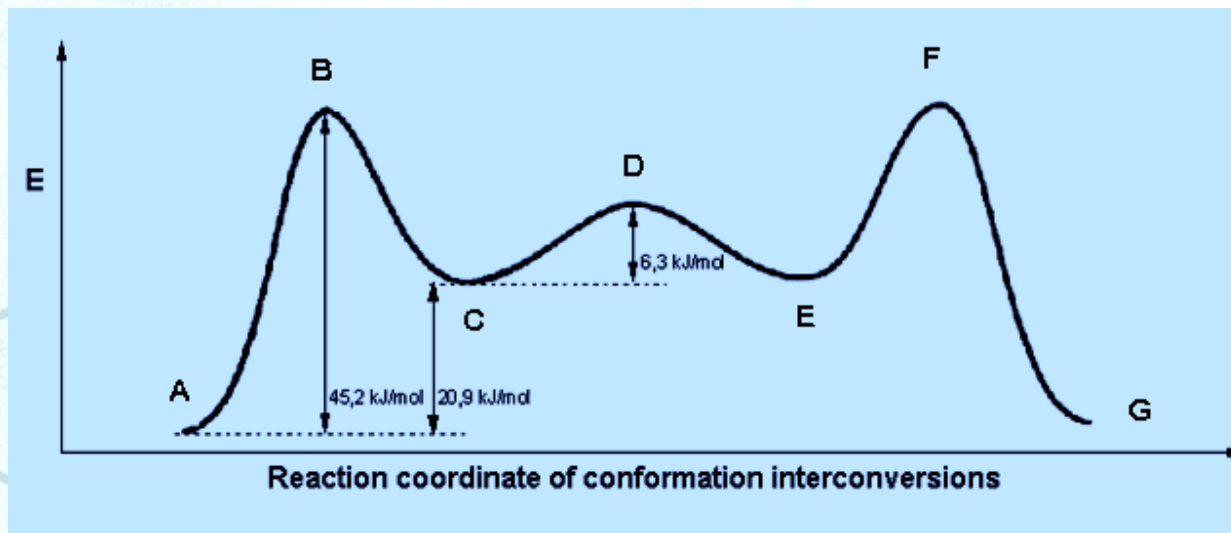




Due to least interaction between C-H and C-C bonds, chair form is most stable

**Ans: 1] chair form**

5] In the graph given below ,what do the positions C and E represent w.r.t conformers of cyclohexane?

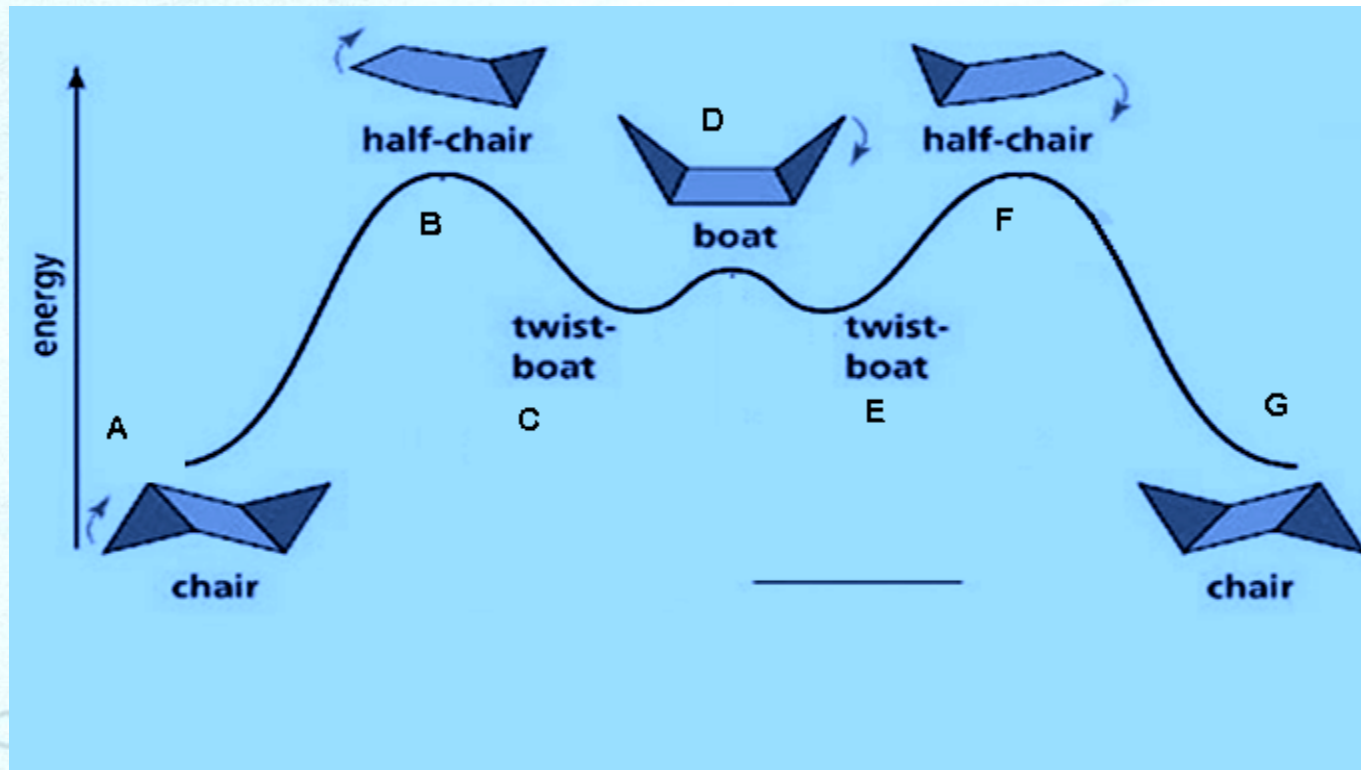


1] half-chair

2] boat

3] twist-boat

4] chair



**Ans: 3] twist-boat**

6] The hybridisation of carbon atoms and the bond angles in benzene are

1]  $sp$  and  $180^\circ$

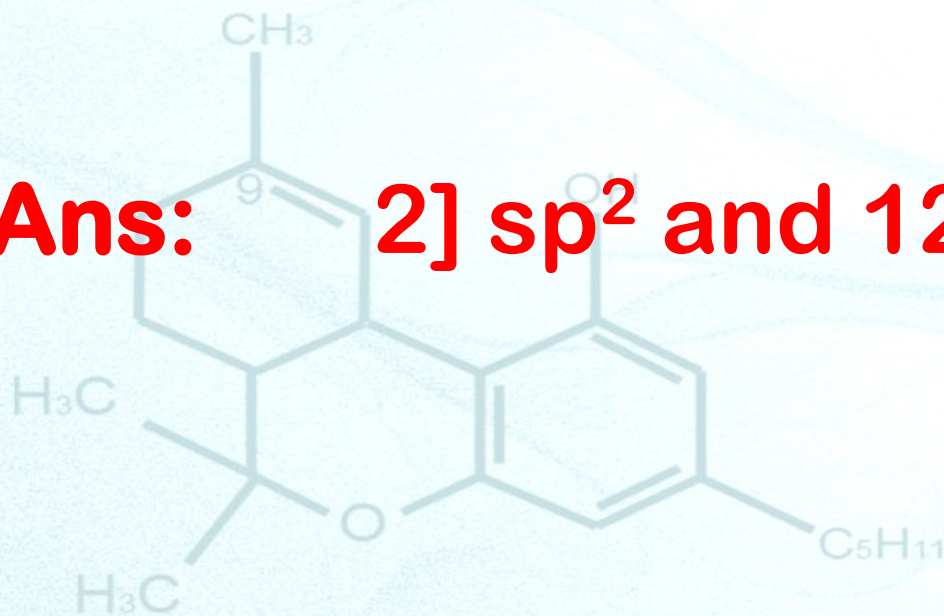
2]  $sp^2$  and  $120^\circ$

3]  $sp^3$  and  $109.5^\circ$

4]  $sp^3$  and  $120^\circ$

The question is based on VBT structure of benzene

Ans: 2]  $sp^2$  and  $120^\circ$



7] Which of the following is a wrong combination?

1] Chlorination of methane » free-radical substitution

2] nitration of benzene » nucleophilic substitution

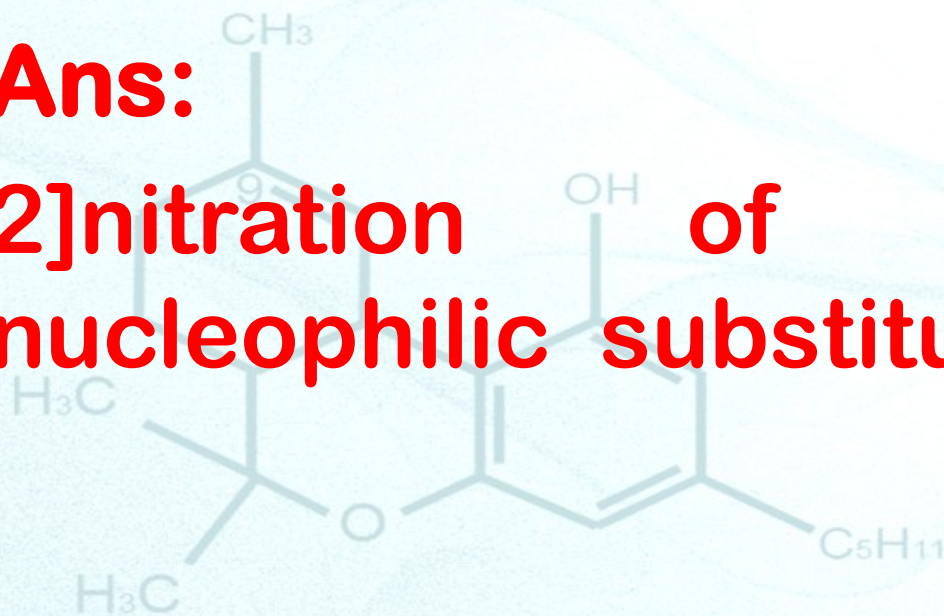
3] Kolbe's electrolysis » free-radical mechanism

4] Cannizaro's reaction »  $\text{H}^-$  (hydride) transfer

Aromatic reactions are electrophilic substitution reactions

**Ans:**

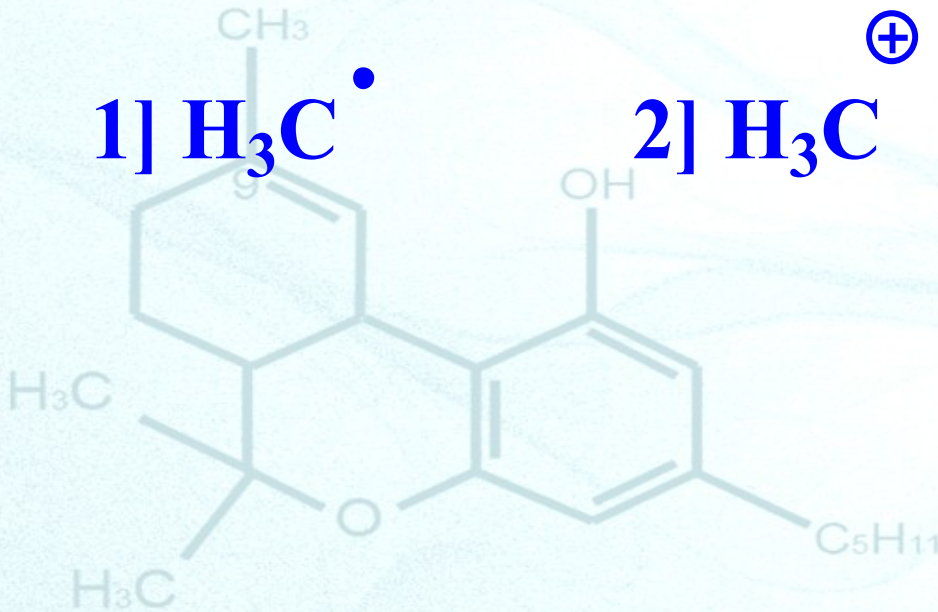
2]nitration of benzene »  
nucleophilic substitution





8] Which of the following is involved in Friedel-Crafts methylation of benzene?

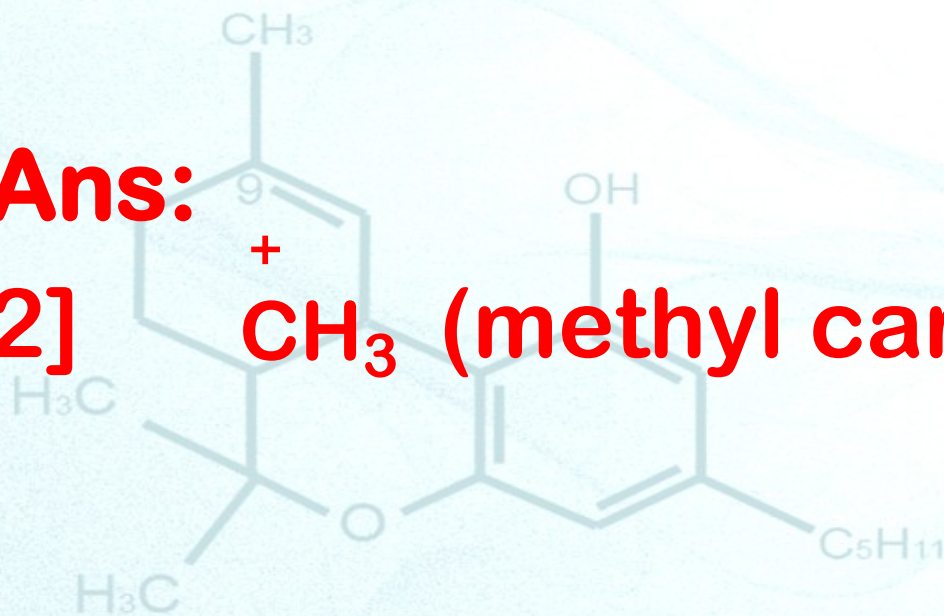
- 1)  $\text{H}_3\text{C}^\bullet$       2)  $\text{H}_3\text{C}^\oplus$       3)  $\text{H}_3\text{C}^\ominus$       4)  $\text{CH}_4$



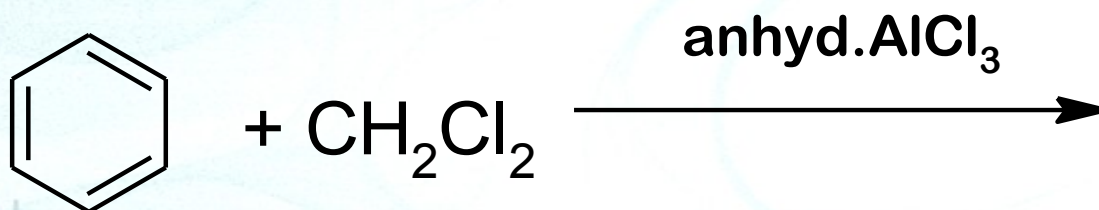
Friedel-Crafts methylation is an aromatic substitution reaction, it requires an electrophile

**Ans:**

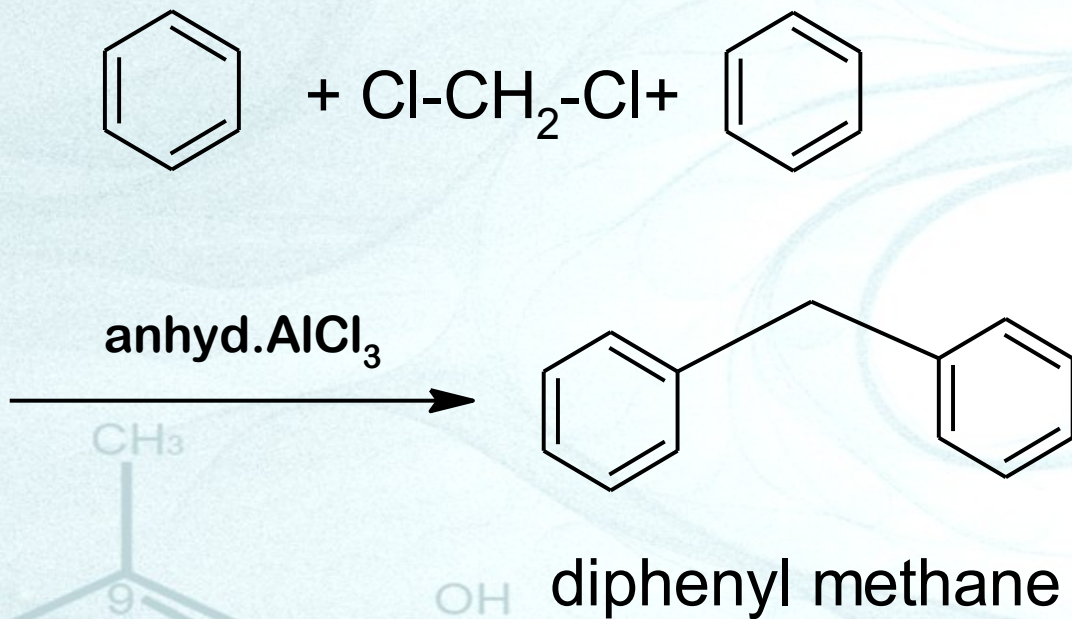
**2]  $\text{CH}_3$  (methyl carbocation)**



9] The product of the following reaction is



- 1] toluene
- 2] xylene
- 3] diphenyl methane
- 4] chlorobenzene



**Ans:- 3] diphenyl methane**

10] During nitration of benzene using nitrating mixture, nitric acid acts as

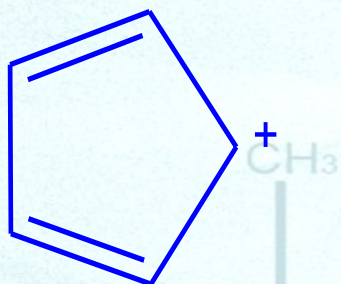
- 1] Lewis acid
- 2] dehydrating agent
- 3] Bronsted base
- 4] catalyst

Electrophile in this reaction is Nitronium ion which is formed when nitric acid is protonated. Hence nitric acid accepts proton. Proton acceptor is called bronsted base.

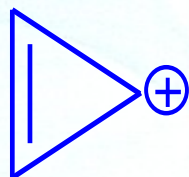
**Ans:**

**3] bronsted base**

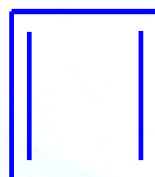
11] which of the following is aromatic?



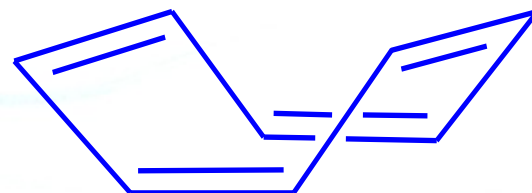
cyclopenta  
dienyl cation



cyclopropenyl  
cation



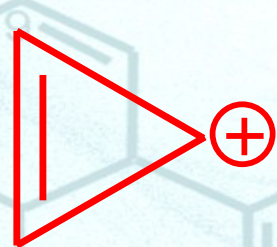
cyclo  
butadiene



cycloocta  
tetraene

Huckel's rule:- A planar ring with  $4n+2$  number of delocalised  $\pi$  electrons is aromatic ( $n=0,1,2$  etc). Hence 2 or 6 or 10 delocalised  $\pi$  electrons is must.

Ans:-

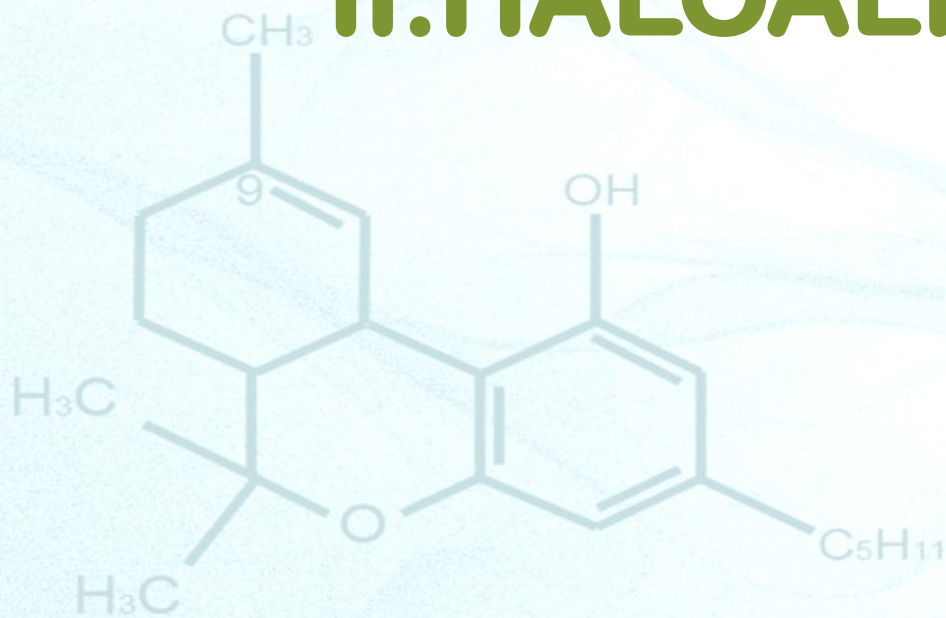


2]

$n=0$ , in  $4n+2$  rule  
two  $\pi$  electrons  
delocalised

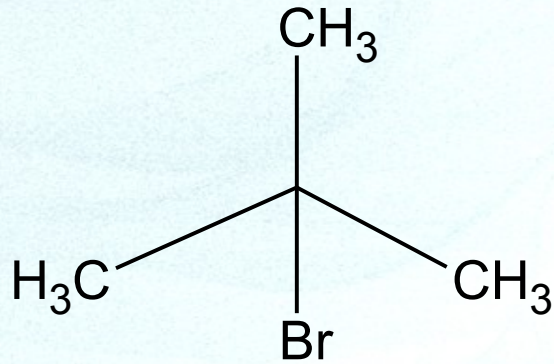


## II. HALOALKANES

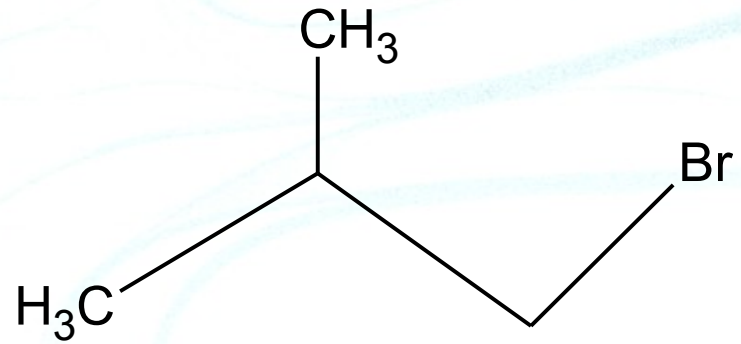


12] t-butyl bromide & isobutyl bromide are related to each other as-

- 1] position isomers
- 2] chain isomers
- 3] functional isomers
- 4] enantiomers



2-bromo-2-methyl propane, 1-bromo-2-methyl propane  
(t-butyl bromide)



(iso-butyl bromide)

**Ans:**  
**1] position isomers**

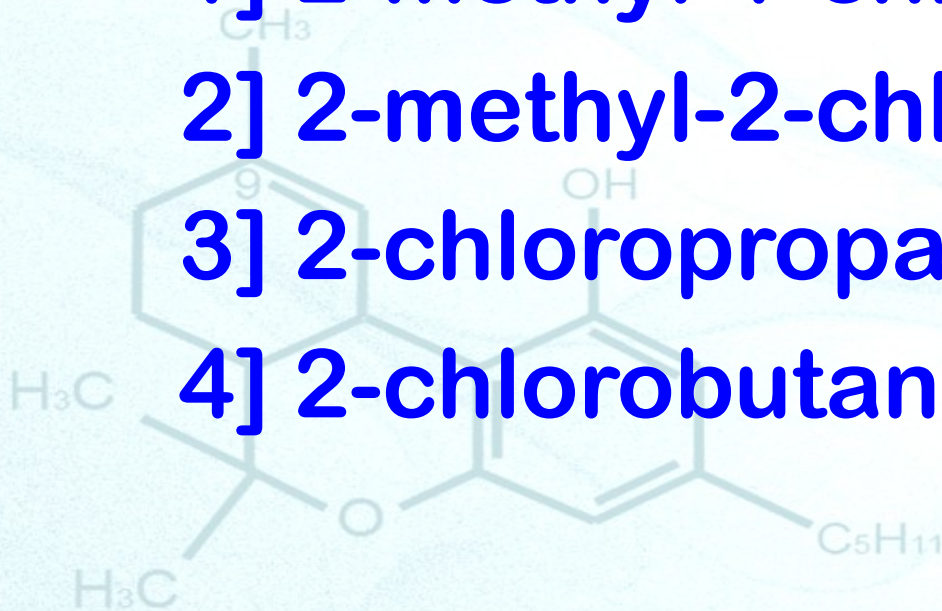
13] The IUPAC name of sec-butyl chloride is

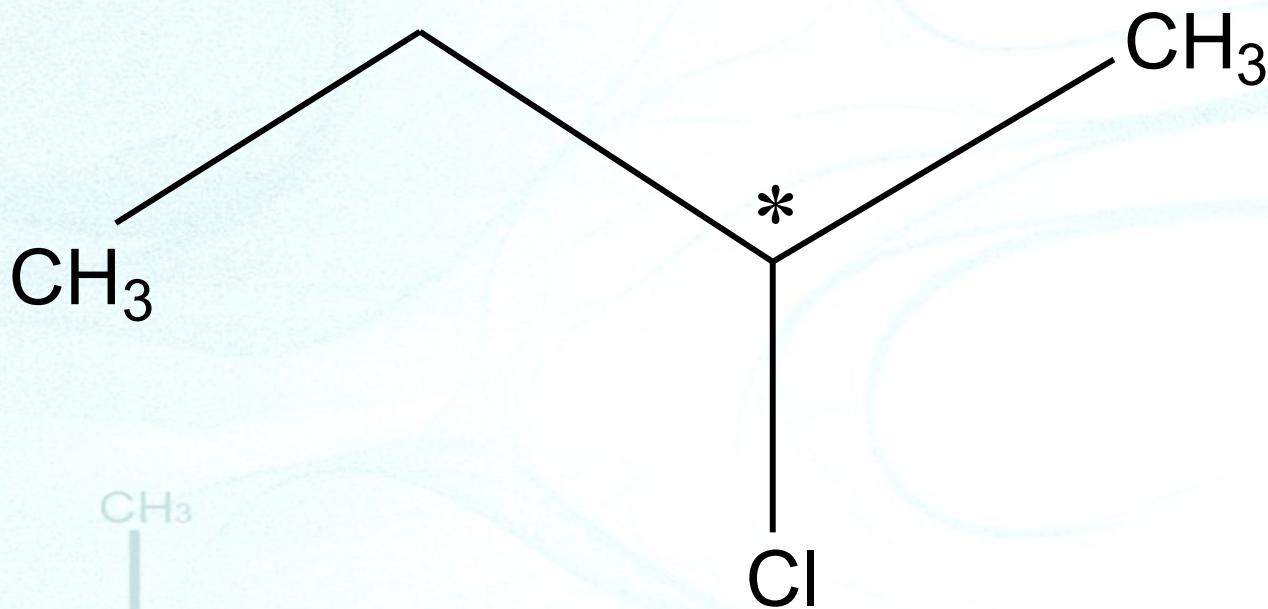
1] 2-methyl-1-chloropropane

2] 2-methyl-2-chloropropane

3] 2-chloropropane

4] 2-chlorobutane



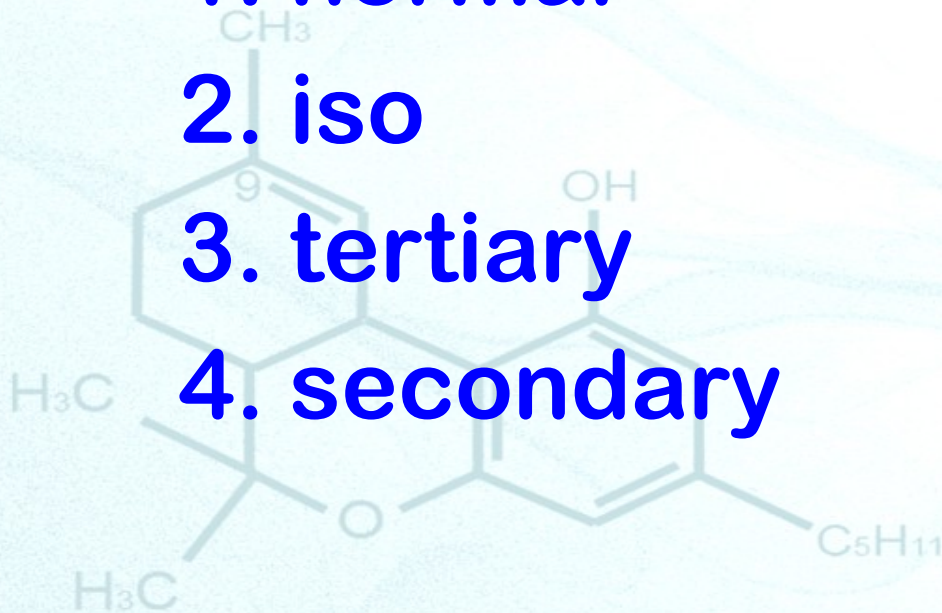


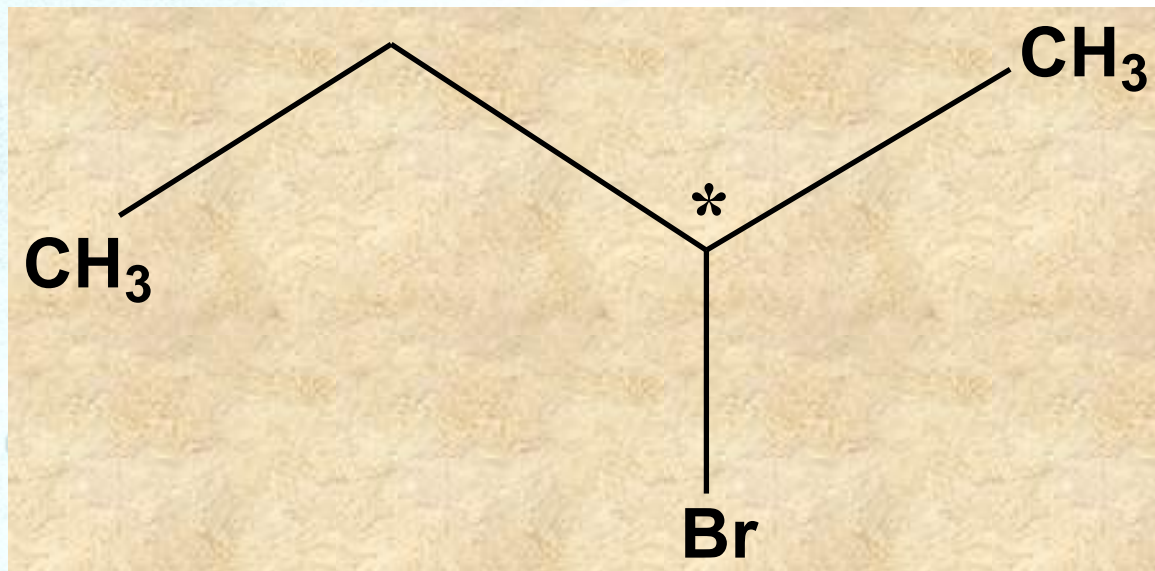
**Ans:**

**4] 2-chlorobutane**

14] Which butyl bromide is optically active?

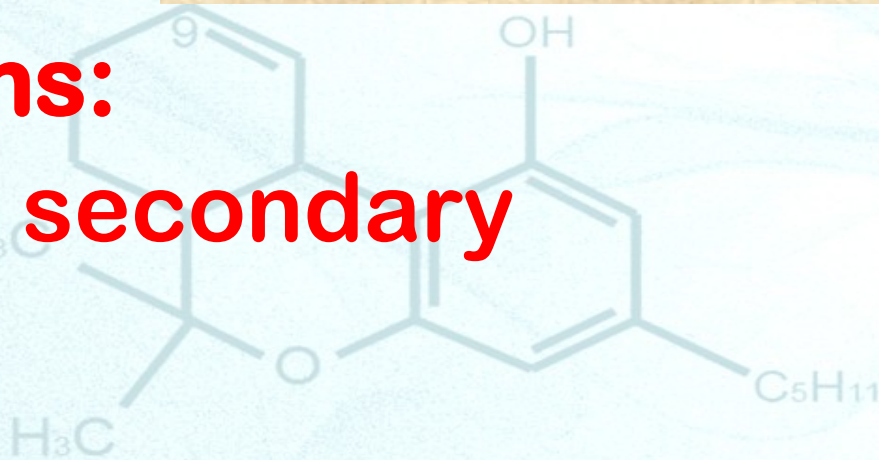
1. normal
2. iso
3. tertiary
4. secondary





**Ans:**

**4] secondary**



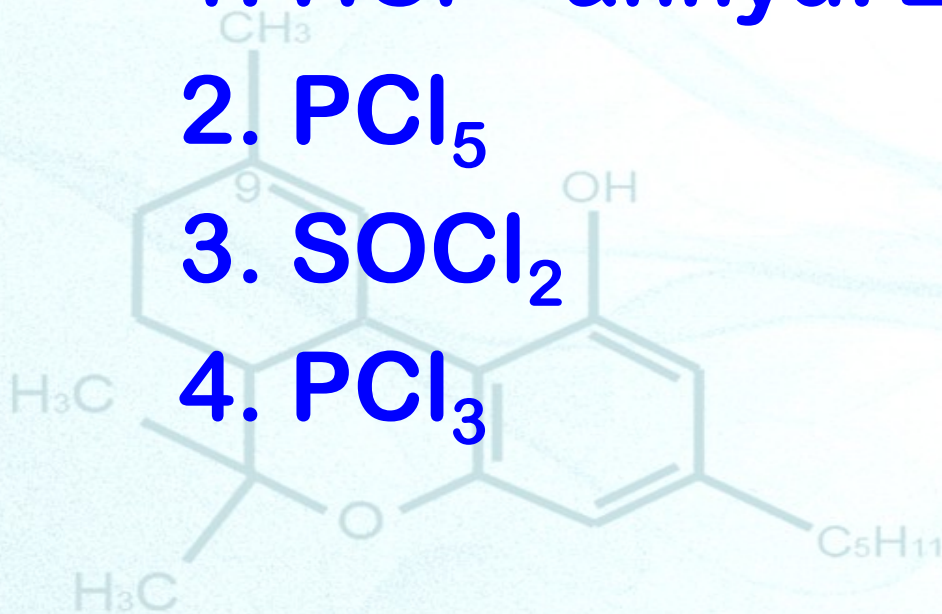
15] The best reagent to convert an alcohol into a chloroalkane is-

1.  $\text{HCl} + \text{anhyd. ZnCl}_2$

2.  $\text{PCl}_5$

3.  $\text{SOCl}_2$

4.  $\text{PCl}_3$





The byproducts must be easily separable and there must not be formation of re-arrangement products

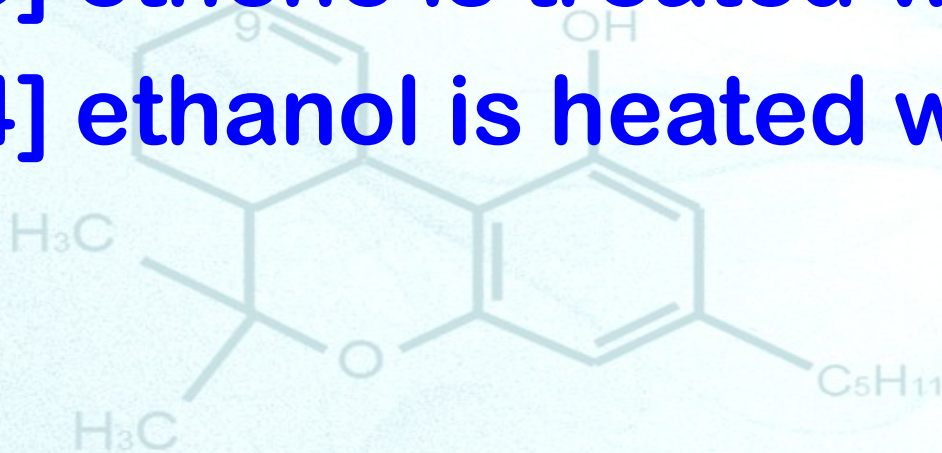
$1^\circ$  alcohol  $\rightarrow$   $1^\circ$  R-Cl,  $2^\circ$  alcohol  $\rightarrow$   $2^\circ$  R-Cl

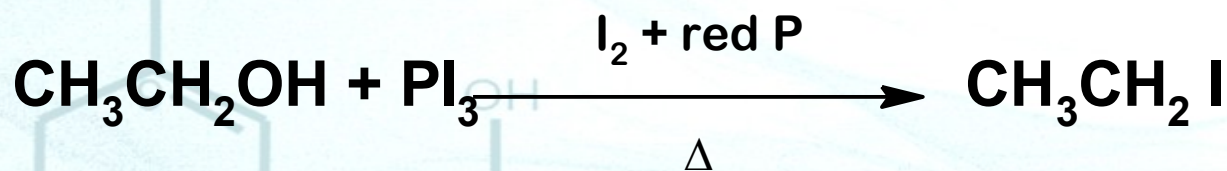
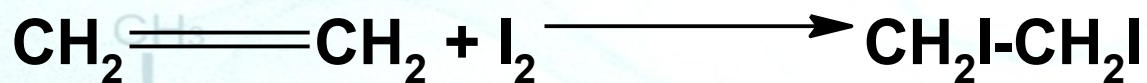
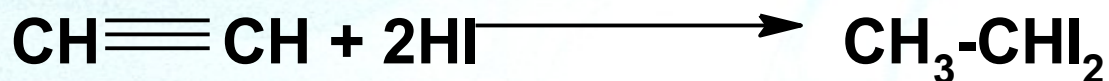
$3^\circ$  alcohol  $\rightarrow$   $3^\circ$  R-Cl

Ans: 3]  $\text{SOCl}_2$

16] ethyl iodide is obtained if –

- 1] ethanol is heated with HI & red P
- 2] ethyne is treated with HI
- 3] ethene is treated with iodine
- 4] ethanol is heated with  $I_2$  & red P.

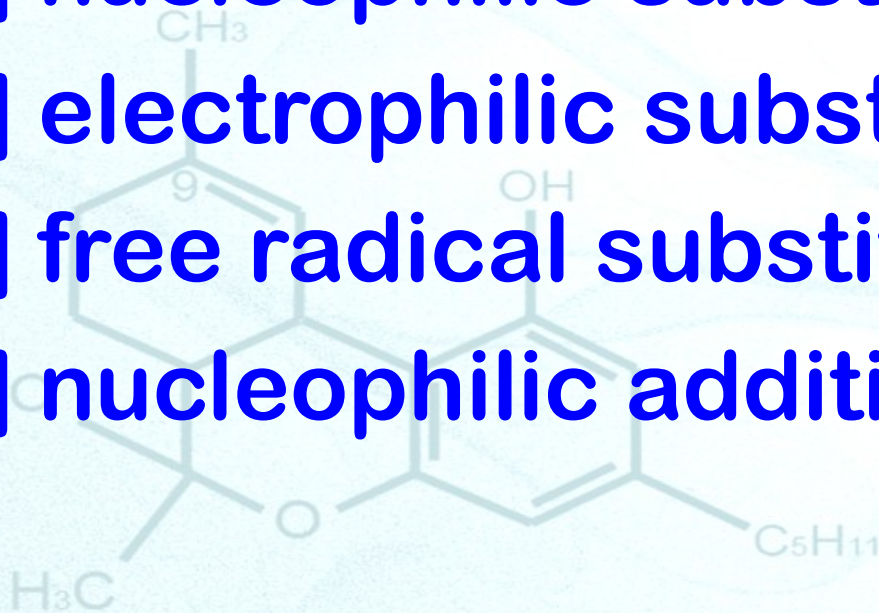


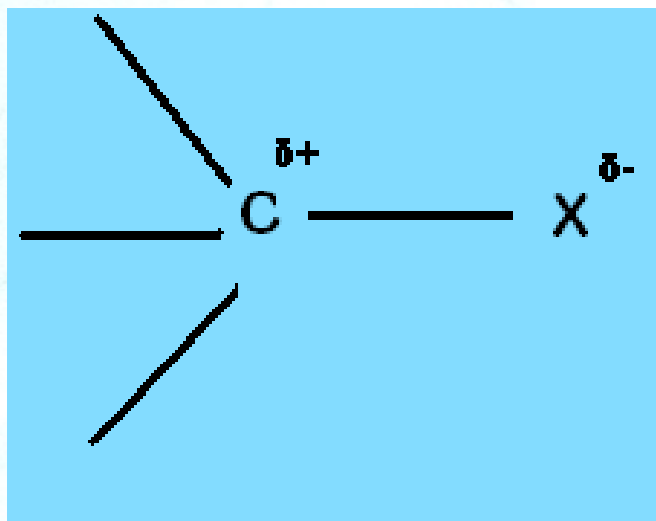


**Ans: 4] ethanol is heated with I<sub>2</sub> & red P.**

17] A characteristic reaction of haloalkane is

- 1] nucleophilic substitution
- 2] electrophilic substitution
- 3] free radical substitution
- 4] nucleophilic addition



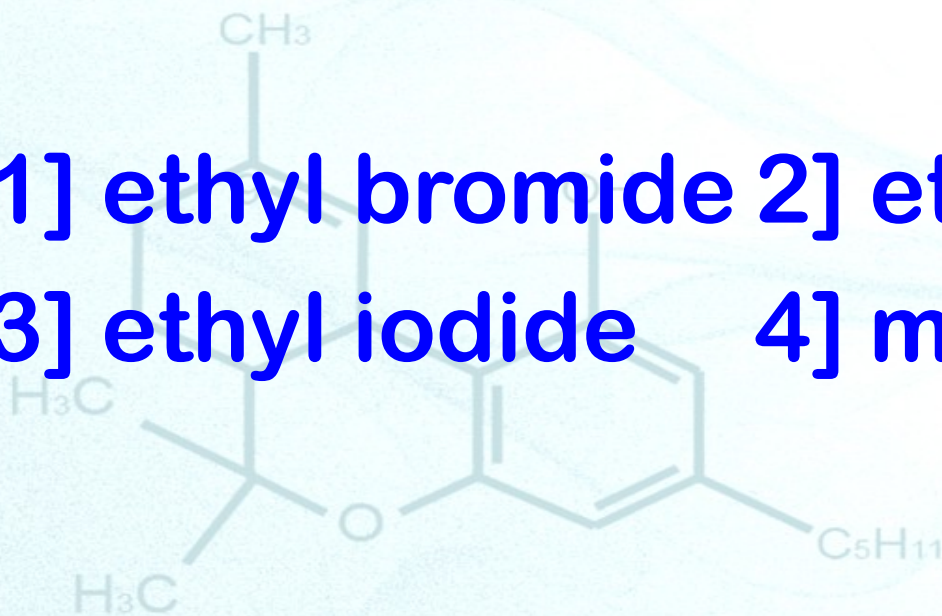


The C-X bond is polar and carbon is electron deficient. It is attacked by nucleophiles to substitute the halogen

**Ans:1] nucleophilic substitution**

18] when heated with alc.  $\text{AgNO}_3$  an alkyl halide that gives yellow precipitate which is insoluble in  $\text{NH}_4\text{OH}$ , is

- 1] ethyl bromide    2] ethyl chloride  
3] ethyl iodide    4] methyl bromide

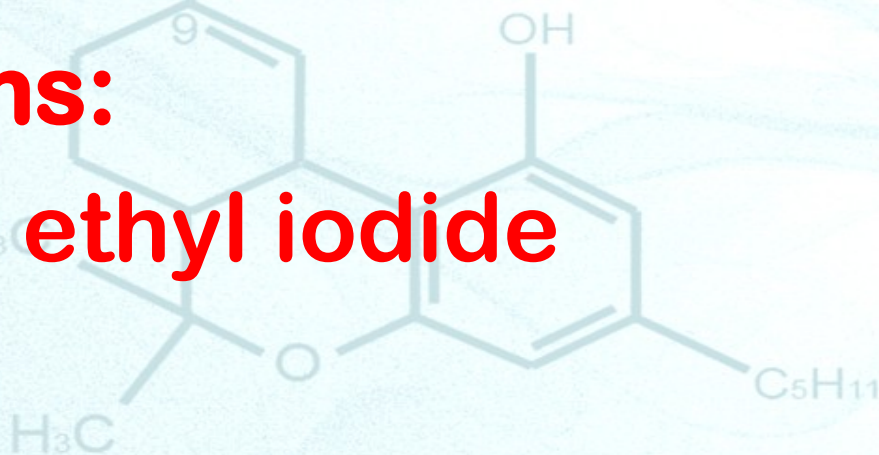




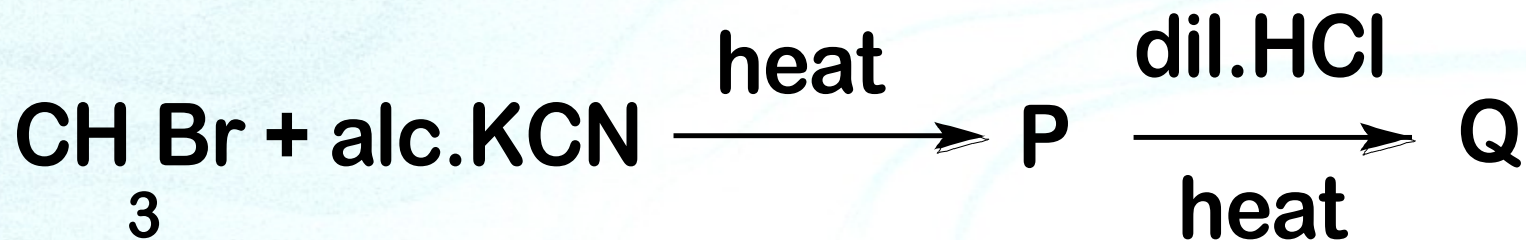
If X is iodine then yellow precipitate of AgI, which is insoluble in  $\text{NH}_4\text{OH}$  is formed.

**Ans:**

**3] ethyl iodide**



19]

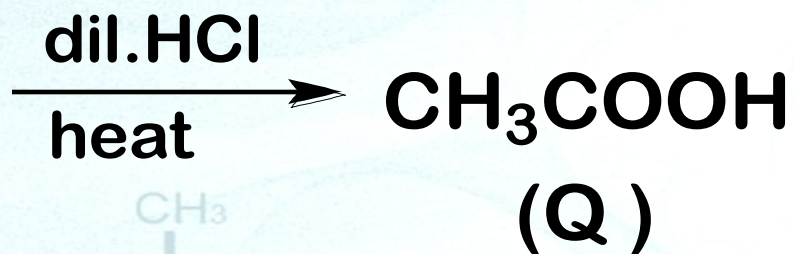
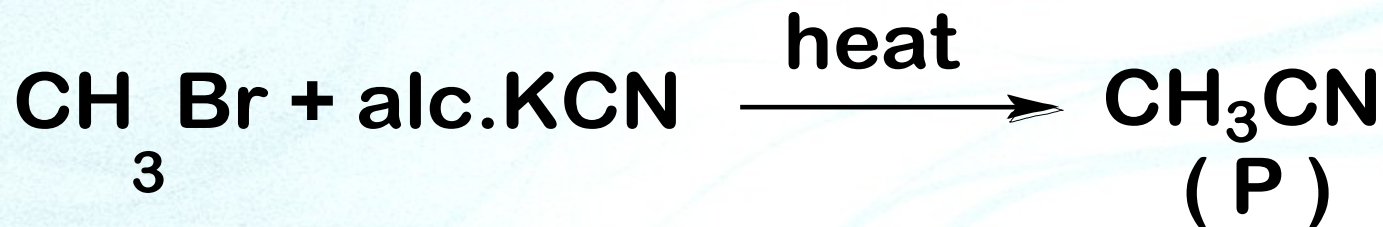


The aqueous solution sodium salt of 'Q' on electrolysis gives

1. ethane  
3. butane

2. propane  
4. methane.



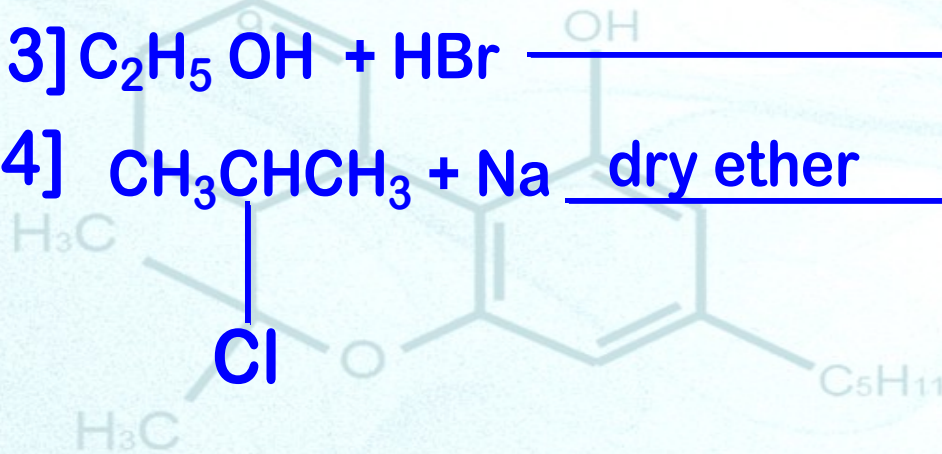
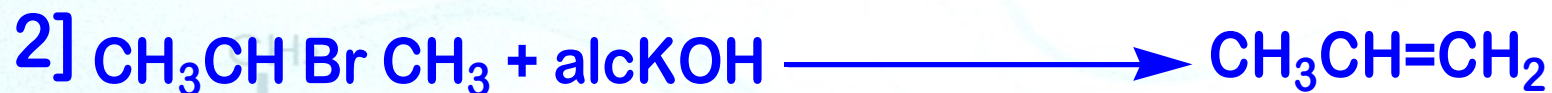


Sodium ethanoate gives ethane during Kolbe's electrolysis.

**Ans:**

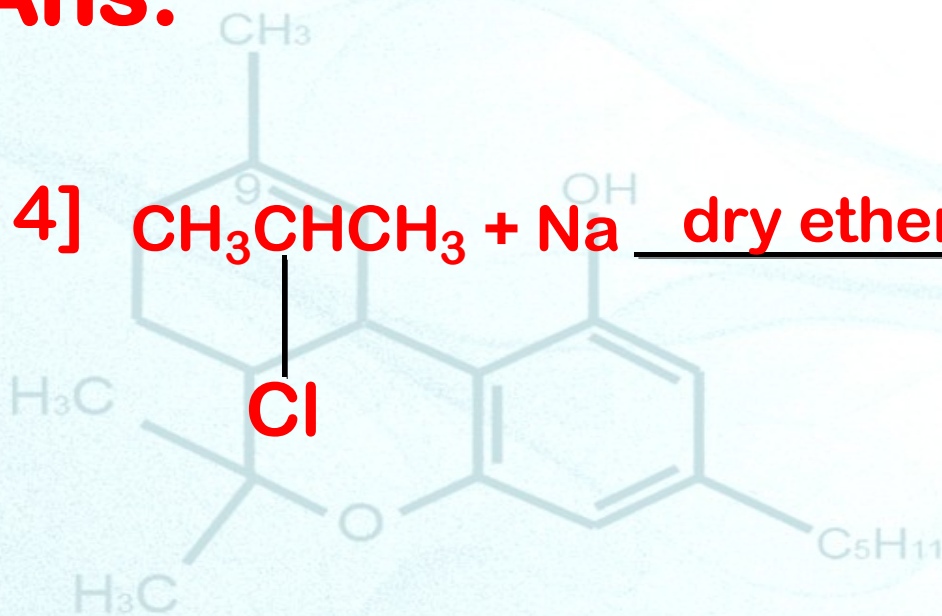
**1] ethane**

20] which of the following is not correct



Wurtz reaction does not give alkane with same number of carbon atoms.

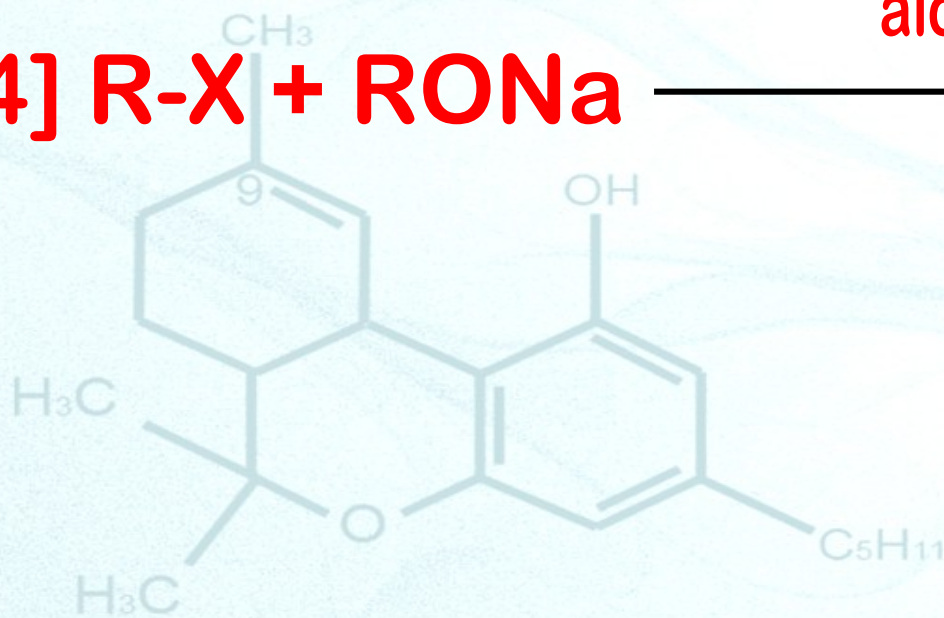
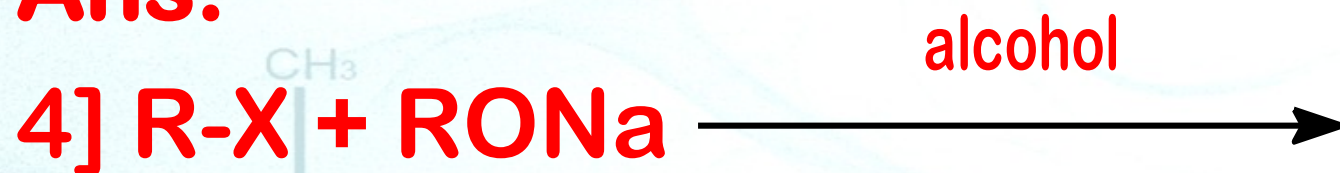
Ans:



21] Which of these represents Williamson's ether synthesis?



**Ans:**



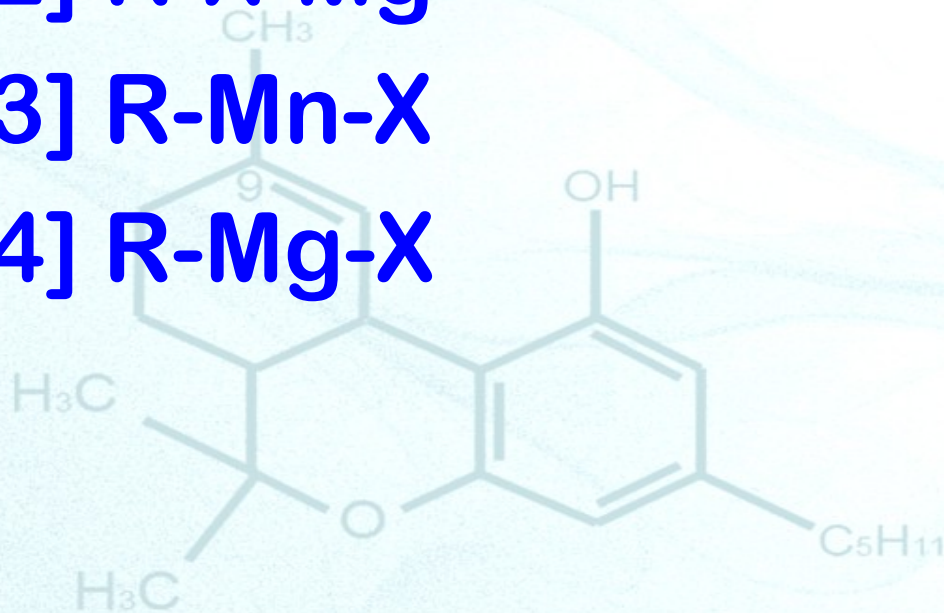
22] Grignard reagent is

1] Mg-R-X

2] R-X-Mg

3] R-Mn-X

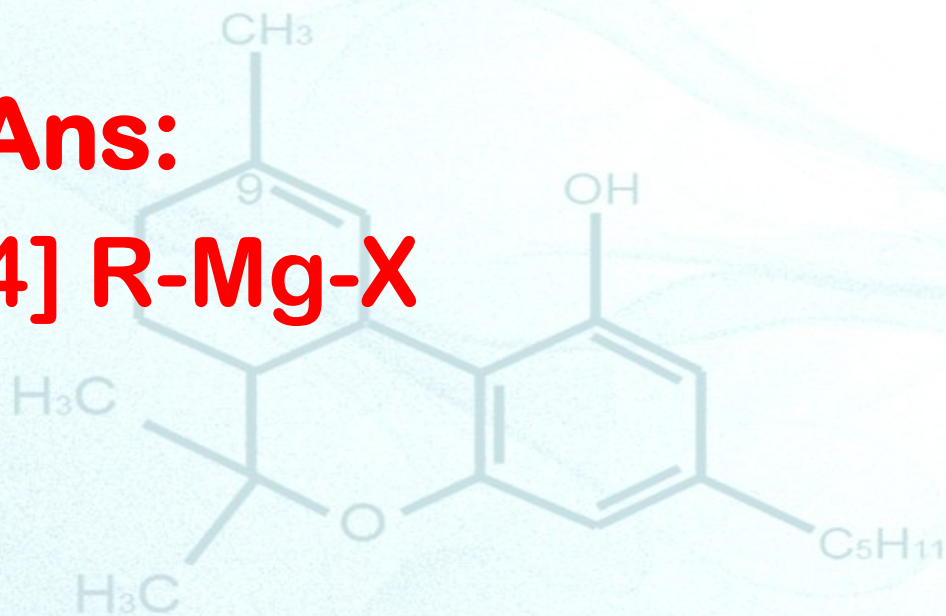
4] R-Mg-X



Organo magnesium halide is Grignard reagent.

**Ans:**

**4] R-Mg-X**



23] Statement A:  $S_N1$  involves carbocation.

Statement B: if halogen is attached to chiral carbon then a racemic mixture is obtained.

1] A is correct & B is wrong

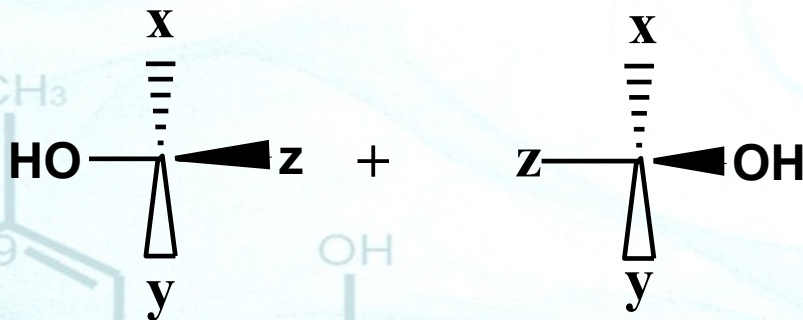
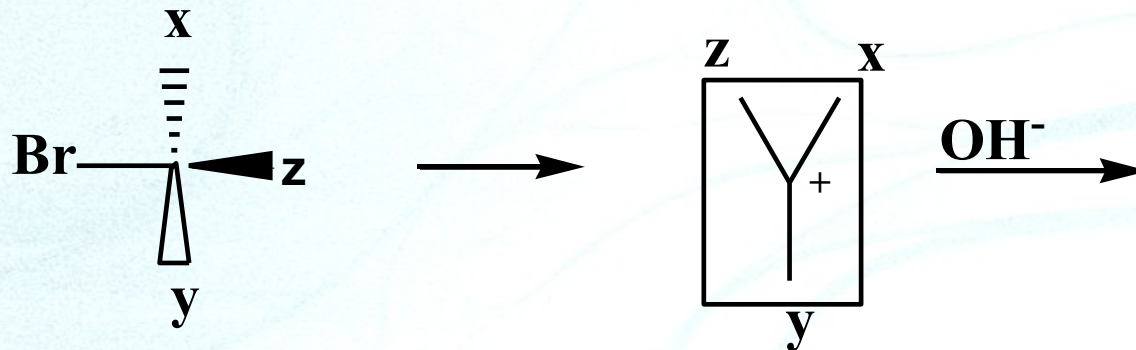
2] A is wrong & B is correct.

3] both are correct & B is the correct reason for A

4] both are correct & B is not the reason for A



**S<sub>N</sub>1**



**Ans:**

**3] both are correct & B is the correct reason for A**

24] The final product in the following reaction is

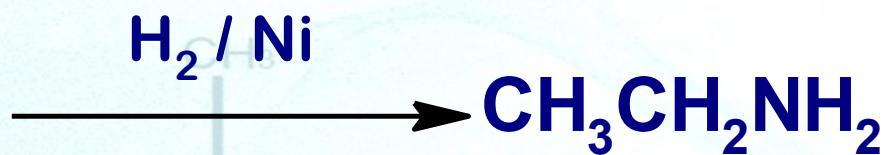


1] chloroethane

2] ethyl amine

3] ethyl cyanide

4] ethanoic acid



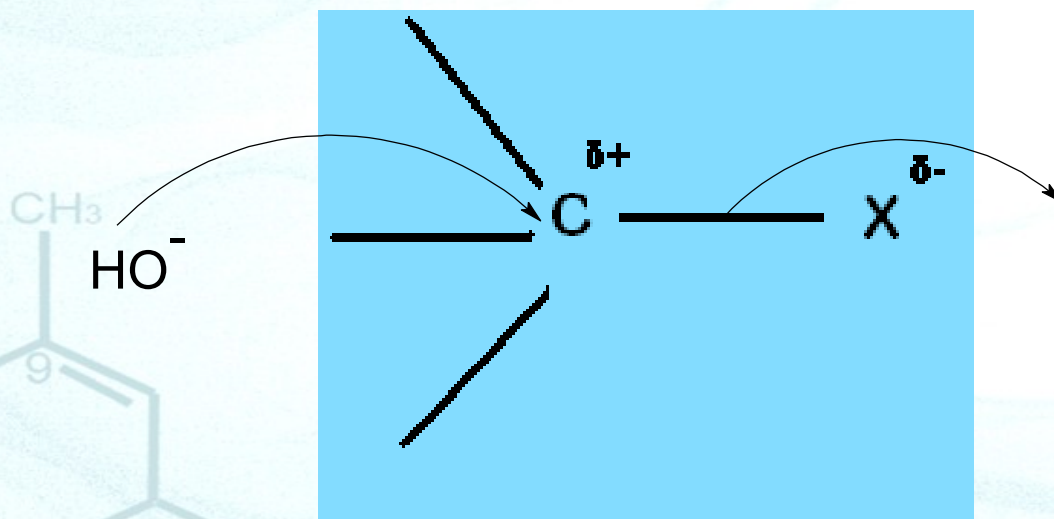
**Ans:**

**2] ethyl amine**

25] Which of the following is NOT true with respect to  $S_N1$  reaction?

- 1] it is favored by polar solvents
- 2] it involves concerted process.
- 3]  $3^\circ$  alkyl halides usually give this reaction
- 4] change in concentration of nucleophile has no effect on rate of reaction

concerted process takes place in  $S_N2$  reaction



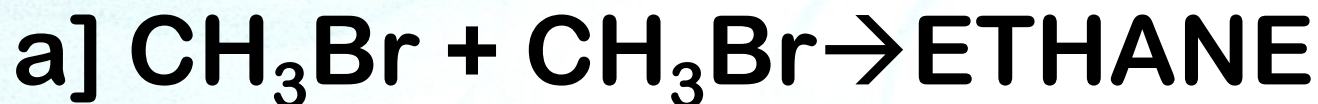
**Ans:**

**2] it involves concerted process**

26] Which one of the following is NOT formed when a mixture of bromomethane and bromobenzene is heated with sodium metal in dry ether?

- 1] ethane
- 2] biphenyl
- 3] propane
- 4] toluene

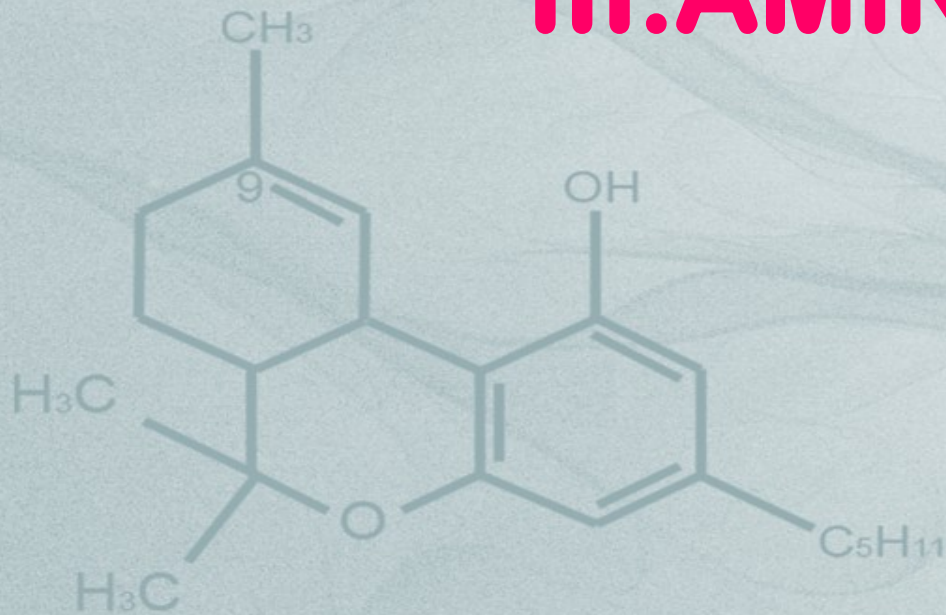
explanation: possible reactions are-



**Ans:**

**3] propane**

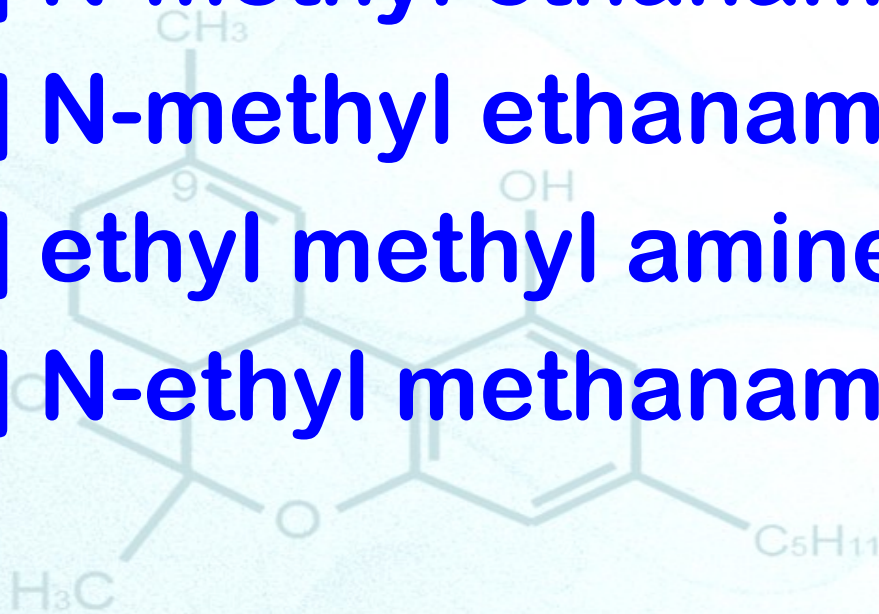
# III. AMINES





27]  $\text{CH}_3\text{CH}_2\text{-NH-CH}_3$  in IUPAC system is

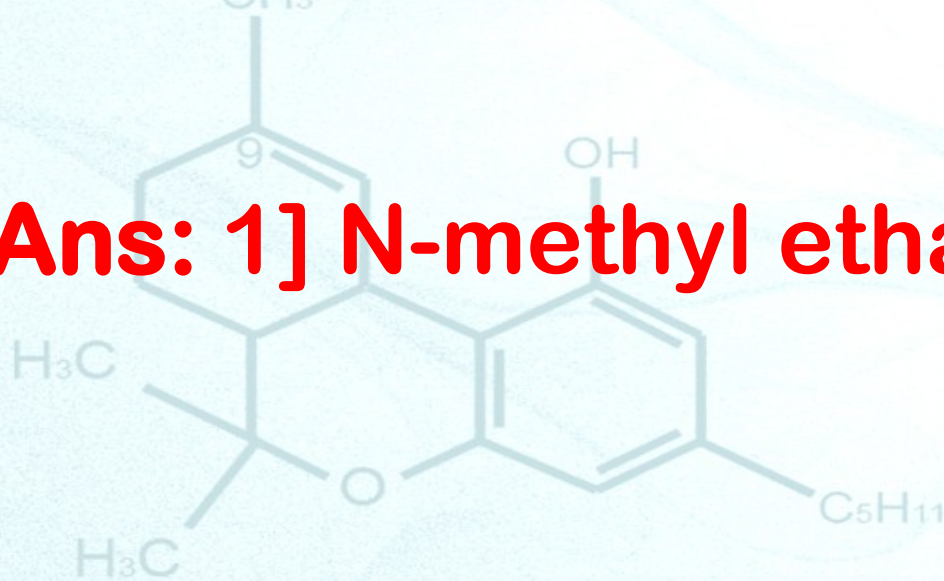
- 1] N-methyl ethanamine
- 2] N-methyl ethanamide
- 3] ethyl methyl amine
- 4] N-ethyl methanamine



2° and 3° amines are named as N-alkyl derivatives of 1° amines.

$\text{CH}_3\text{CH}_2\text{-NH-CH}_3$  is named as derivative of ethanamine

**Ans: 1] N-methyl ethanamine**



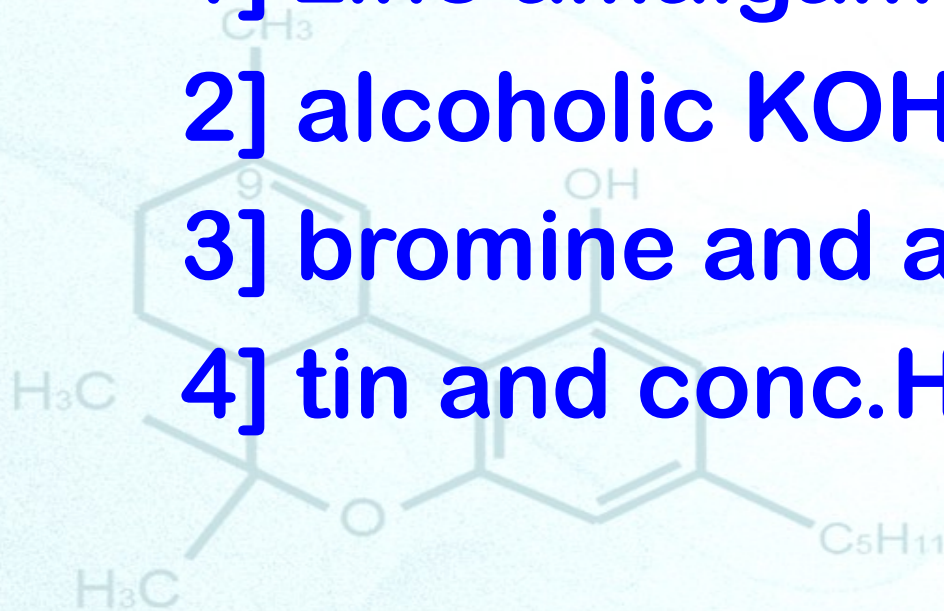
28] nitrobenzene is reduced to aniline when heated with

1] zinc amalgam and conc.HCl

2] alcoholic KOH

3] bromine and aq.KOH

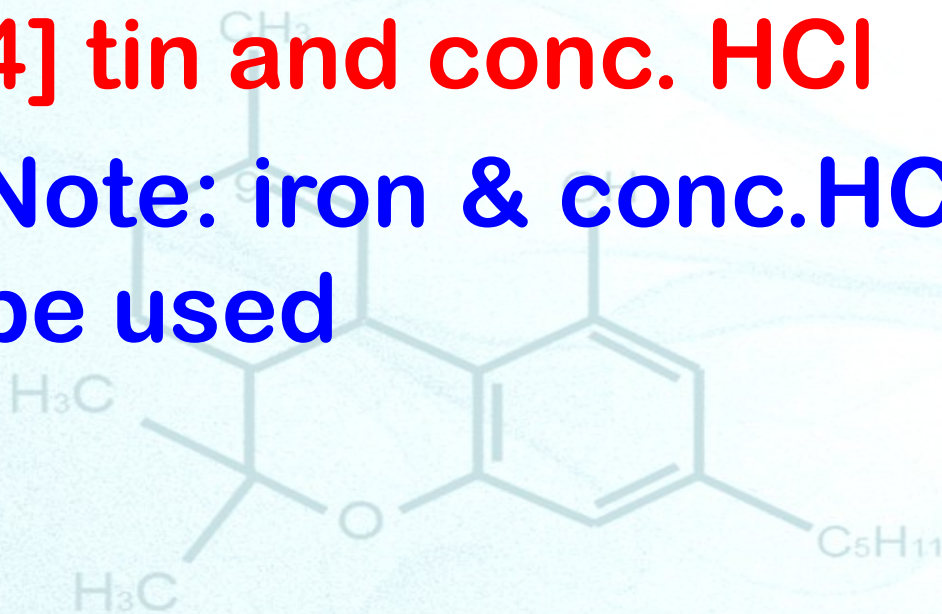
4] tin and conc.HCl



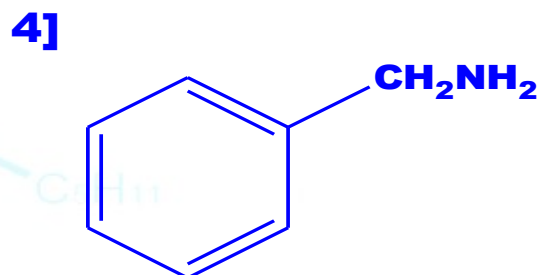
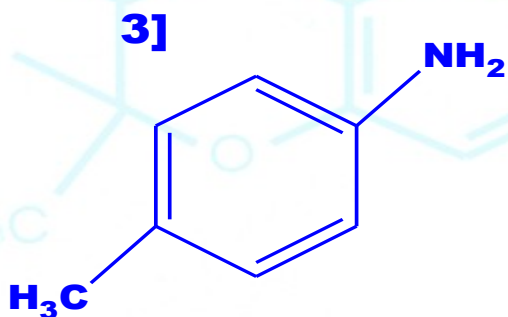
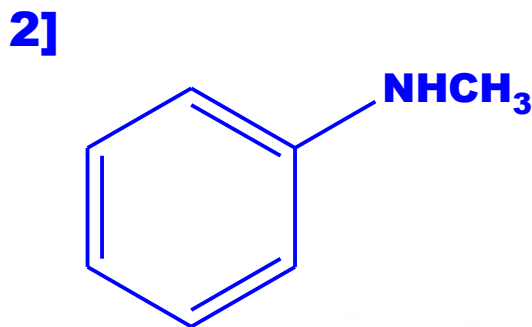
**Ans:**

**4] tin and conc. HCl**

**Note: iron & conc.HCl or  $\text{LiAlH}_4$  may be used**



29] Which of the following gives a red coloured dye on treatment with  $\text{NaNO}_2$  in dil.  $\text{HCl}$ , followed by addition of an alkaline solution of  $\beta$ -naphthol?



**Explanation:** The question is based on diazotization which is given by aromatic primary amines.

1] is 3° amine and 2] is 2° amine.

4] behaves like methanamine. Hence

3] gives the reaction

**Ans: 3 (toluidine)**

30] Match the bases with their  $pK_b$  values

base

$pK_b$

a] dimethyl amine

i) 4.75

b] methyl amine

ii) 9.38

c] aniline

iii) 3.38

d] ammonia

iv) 3.27

1] a-ii, b-i, c-iii, d-iv    2] a-iv, b-iii, c-ii, d-i.

3] a-i, b-iv, c-ii, d-iii    4] a-iv, b-ii, c-i, d-iii

Explanation: Due to resonance aromatic amines are weaker than ammonia. Alkyl amines are stronger than ammonia due to +I effect.

- |                   |           |
|-------------------|-----------|
| a) dimethyl amine | i) 4.75   |
| b) methyl amine   | ii) 9.38  |
| c) aniline        | iii) 3.38 |
| d) ammonia        | iv) 3.27  |

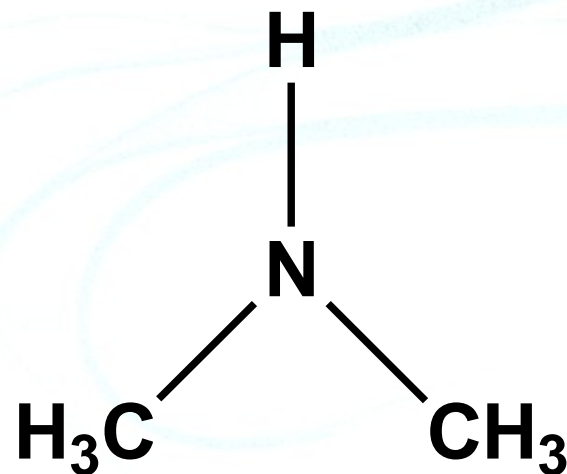
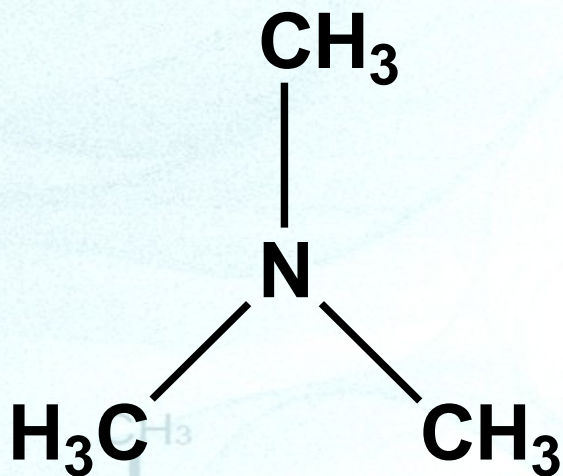
**Ans:**

**2] a-iv, b-iii, c-ii, d- i**



31] trimethyl amine is weaker base than dimethyl amine ( $pK_b$  are 4.22 and 3.27). This is explained by

- 1] steric hindrance in trimethyl amine
- 2] more +I effect in dimethyl amine
- 3] difference in hybridization of nitrogen
- 4] difference in number of lone-pairs on nitrogen



**Ans:**

**1] steric hindrance in trimethyl amine**

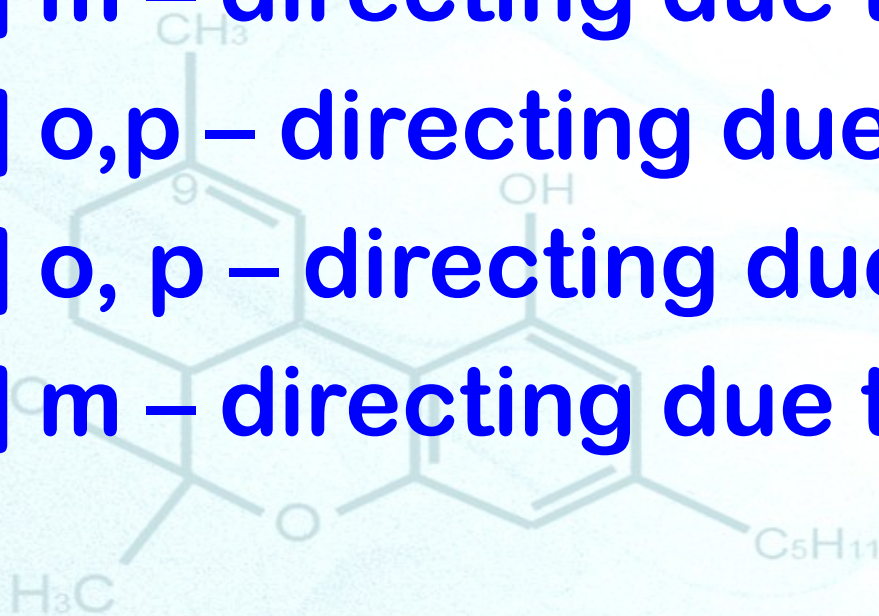
32]  $\text{-NH}_2$  group in aniline is

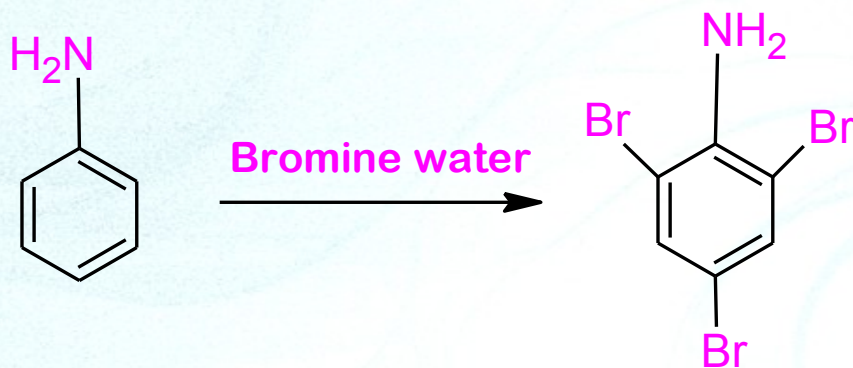
1] m – directing due to – I effect

2] o,p – directing due to + M effect

3] o, p – directing due to – M effect

4] m – directing due to + M effect





2,4,6-tribromoaniline

Due to resonance the lone-pair on nitrogen is delocalised over benzene ring(+M effect)

Ans: 2] o,p – directing due to + M effect

33] The ring activating nature of  $-NH_2$  in aniline is increased by converting aniline into –

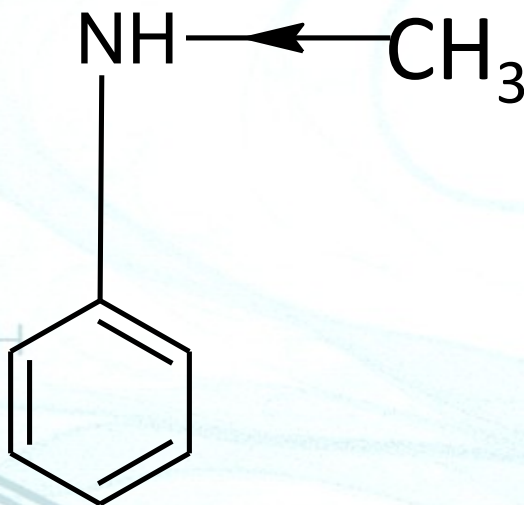
1] acetanilide ( $C_6H_5-NHCOCH_3$ )

2] anilium ion ( $C_6H_5-\overset{+}{N}H_3$ )

3] BDC  $C_6H_5-\overset{+}{N}_2 \overset{-}{Cl}$

4] N-methyl aniline ( $C_6H_5 - NH - CH_3$ )

a methyl group attached to nitrogen eases delocalisation of lone-pair of amino group (by its +I effect towards nitrogen)



**Ans: 4]  $C_6H_5-NH-CH_3$**

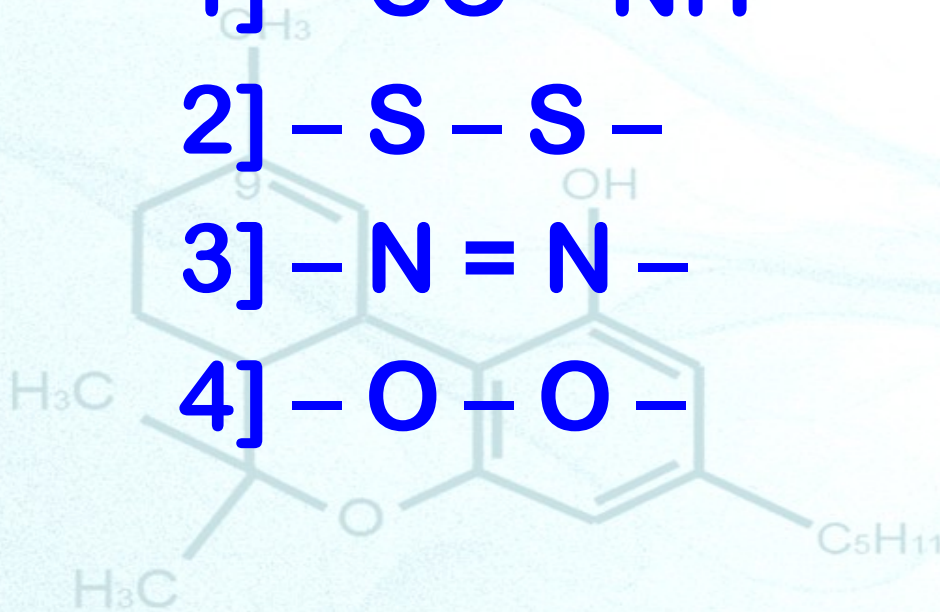
34] Azo dyes contain –

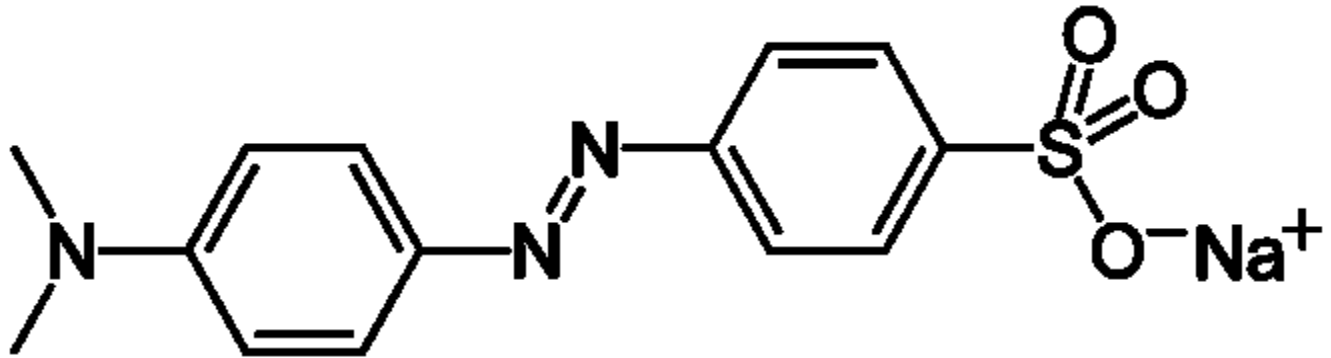
1] – CO – NH –

2] – S – S –

3] – N = N –

4] – O – O –

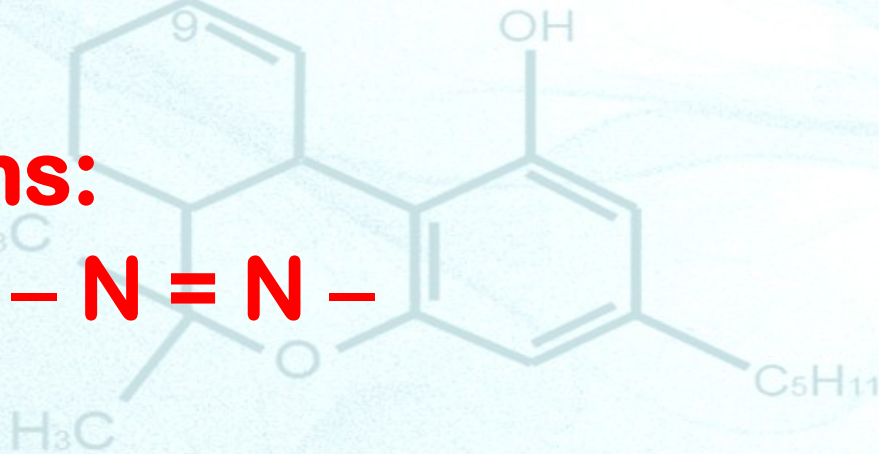




## Methyl orange( azo dye)

**Ans:**

**3] - N = N -**





35] The conversion of m – nitrophenol into resorcinol involves-

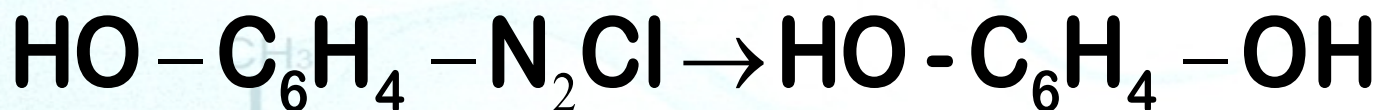
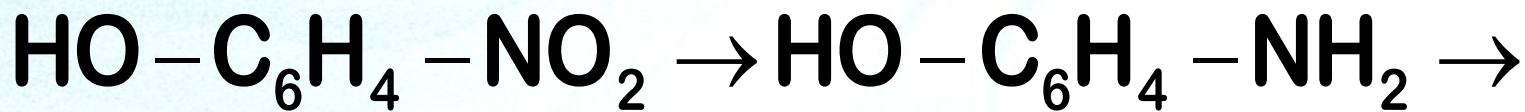
1] diazotization, reduction and hydrolysis

2] hydrolysis, diazotization and reduction

3] reduction, diazotization and hydrolysis

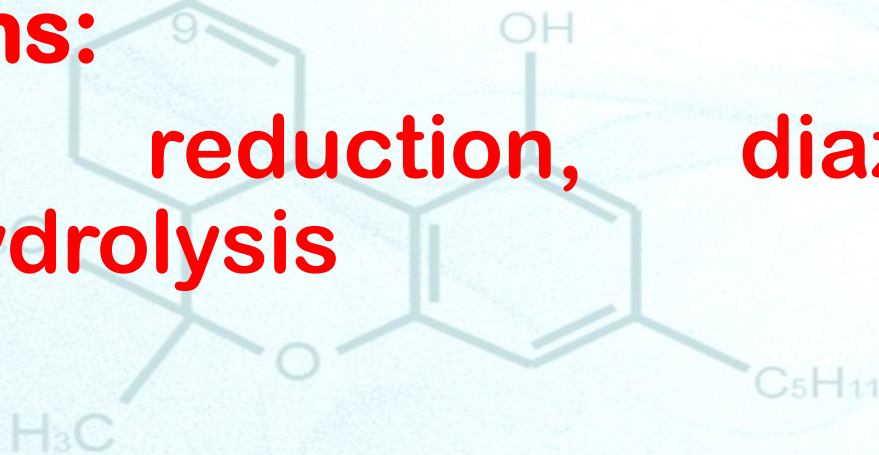
4] hydrolysis, reduction and diazotization.

Explanation:



Ans:

3] reduction, diazotization and hydrolysis



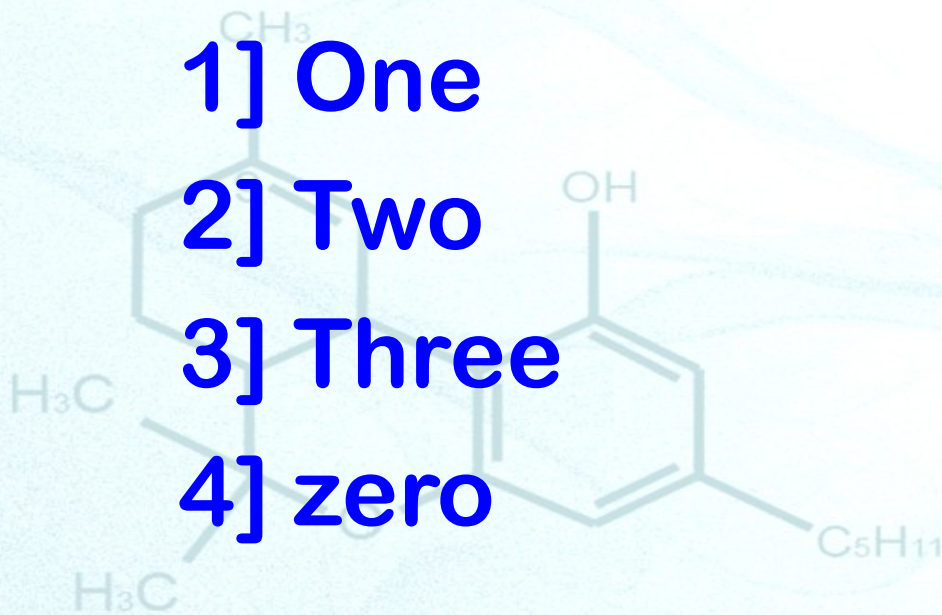
36] the number of moles of  $\text{CH}_3\text{I}$  consumed by a  $2^\circ$  amine during exhaustive methylation is-

1] One

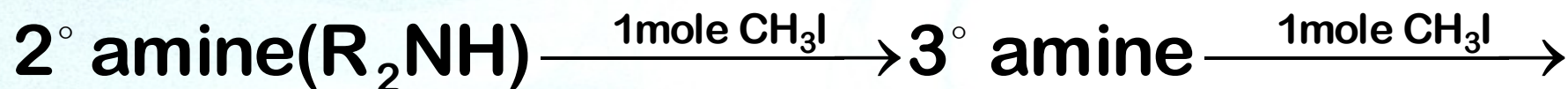
2] Two

3] Three

4] zero



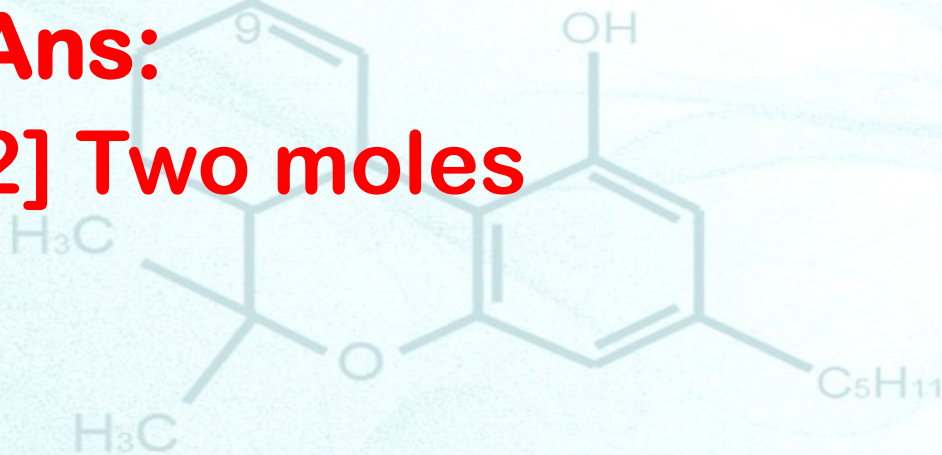
## Explanation:



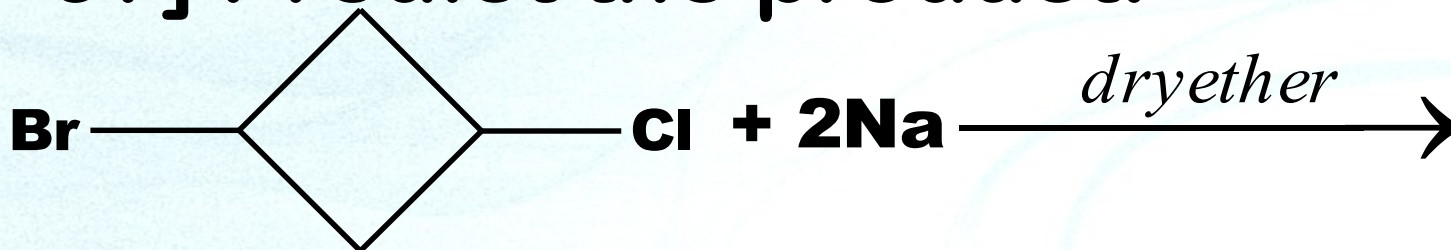
Quaternary ammonium salt.

**Ans:**

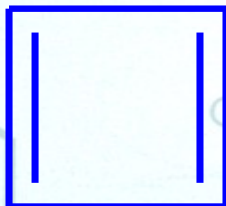
**2] Two moles**



**37] Predict the product:**



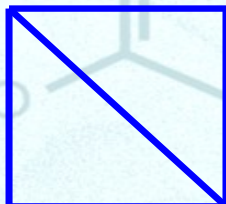
1]



2]



3]



4]



A method of preparing strained ring is Freund (intramolecular Wurtz) reaction.

**Ans:**

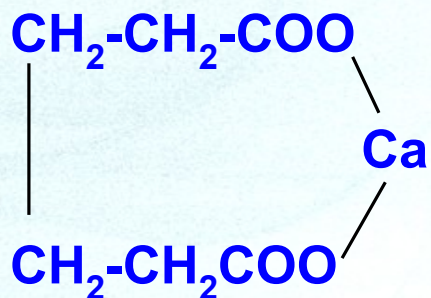
**3]**



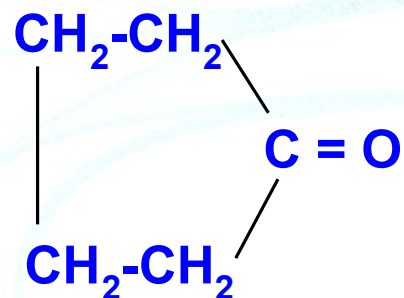
**(Bicyclo(1,1,0) butane)**

38] Which of the following gives cyclopentane on dry distillation followed by Clemmensen reduction?

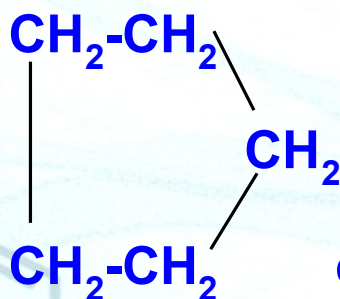
- 1] calcium acetate
- 2] calcium propanoate + calcium acetate
- 3] calcium acetate + calcium formate
- 4] calcium adipate



calcium adipate



cyclopentanone



cyclopentane

**Ans: 4] calcium adipate**



39] The cycloalkane which has highest heat of combustion per mole of  $\text{CH}_2$  is-

1] cyclopropane

2] cyclobutane

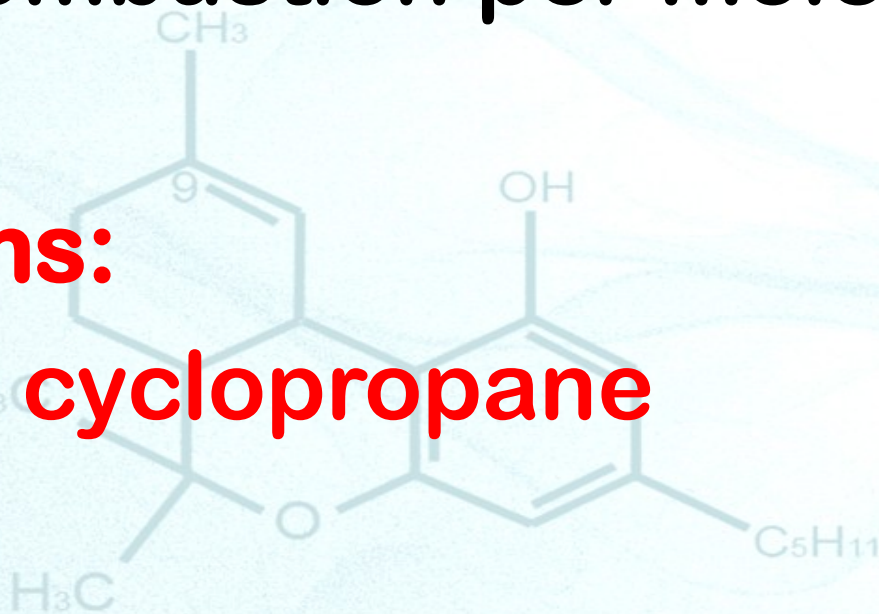
3] cyclopentane

4] cyclohexane

**Explanation: Most unstable cycloalkane has highest heat of combustion per mole of  $\text{CH}_2$**

**Ans:**

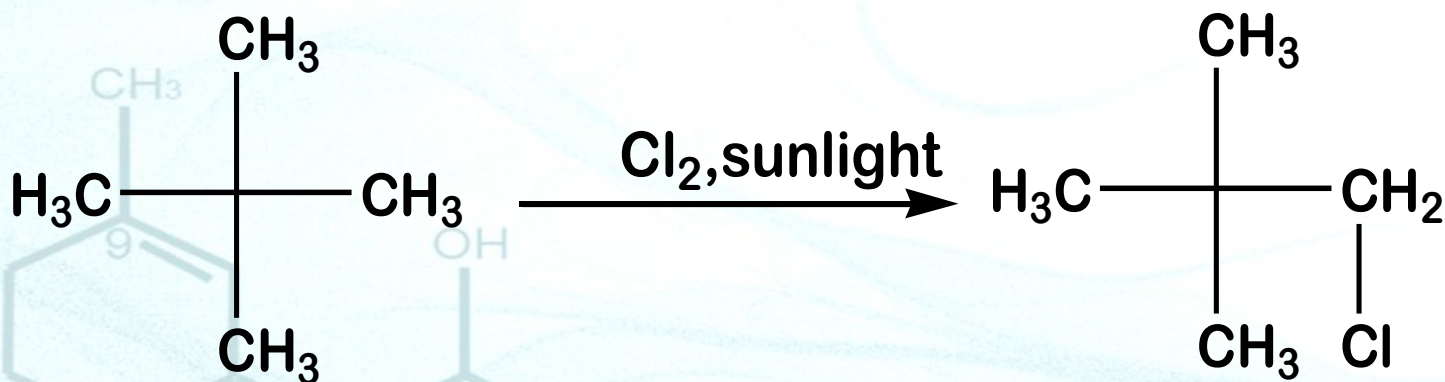
**1] cyclopropane**



40] An alkane that gives only one type of monochloroalkane on mixing with  $\text{Cl}_2$  in presence of sunlight is –

- 1] neopentane(2,2-dimethyl propane)
- 2] propane
- 3] pentane
- 4] isopentane

Explanation: Only one type of monochloro derivative is formed if all hydrogen atoms are identical.

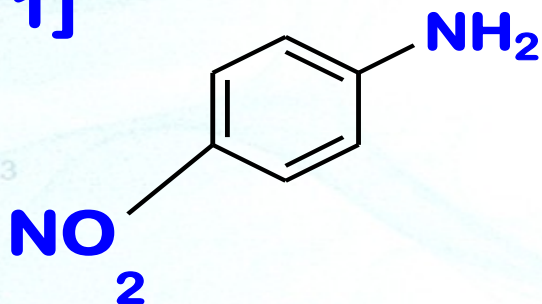


**Ans:**

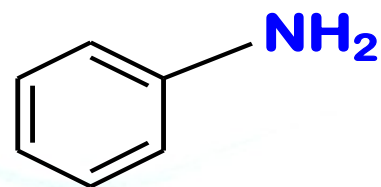
**1] Neopentane**

41] Which of the following is strongest base ?

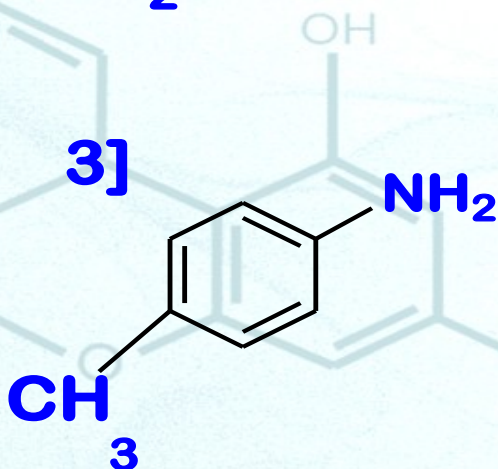
1]



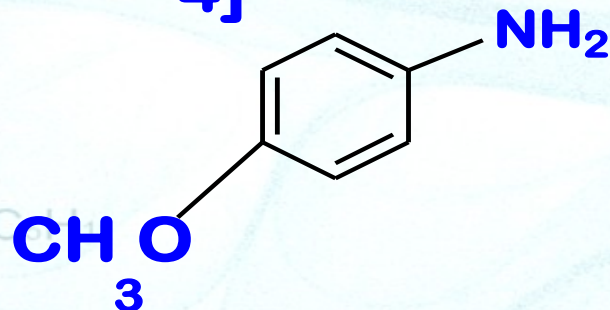
2]



3]

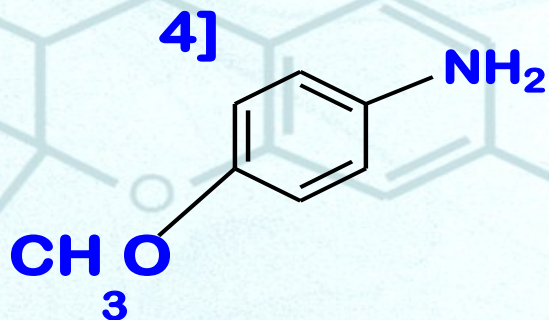


4]



A functional group which opposes delocalisation of lone-pair of amino group increases basic nature. Both 3 and 4 are stronger than aniline & 4 is strongest due to +M effect of methoxy(-OCH<sub>3</sub>) group.

**Ans:**



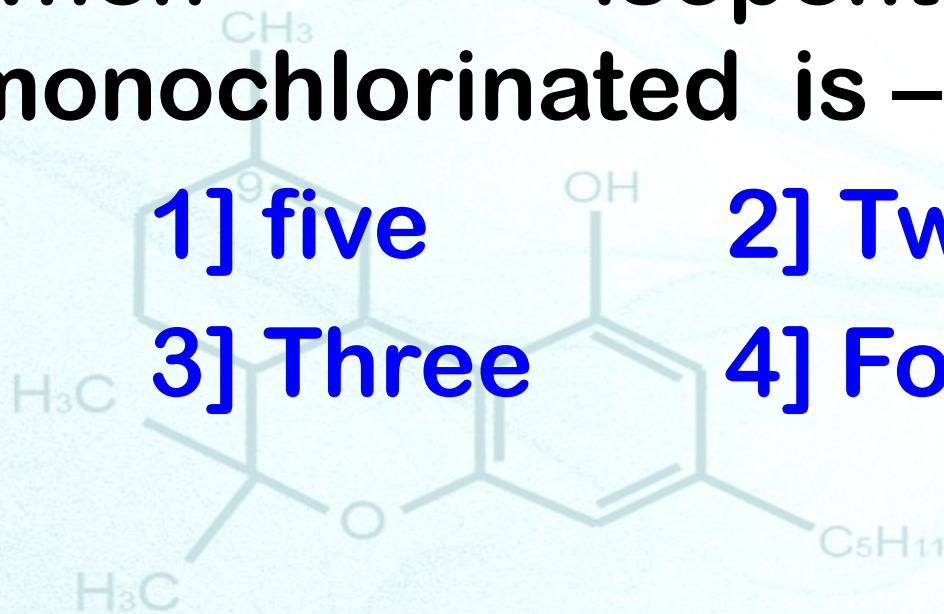
42] Total number of isomers (including stereoisomers) formed when isopentane gets monochlorinated is –

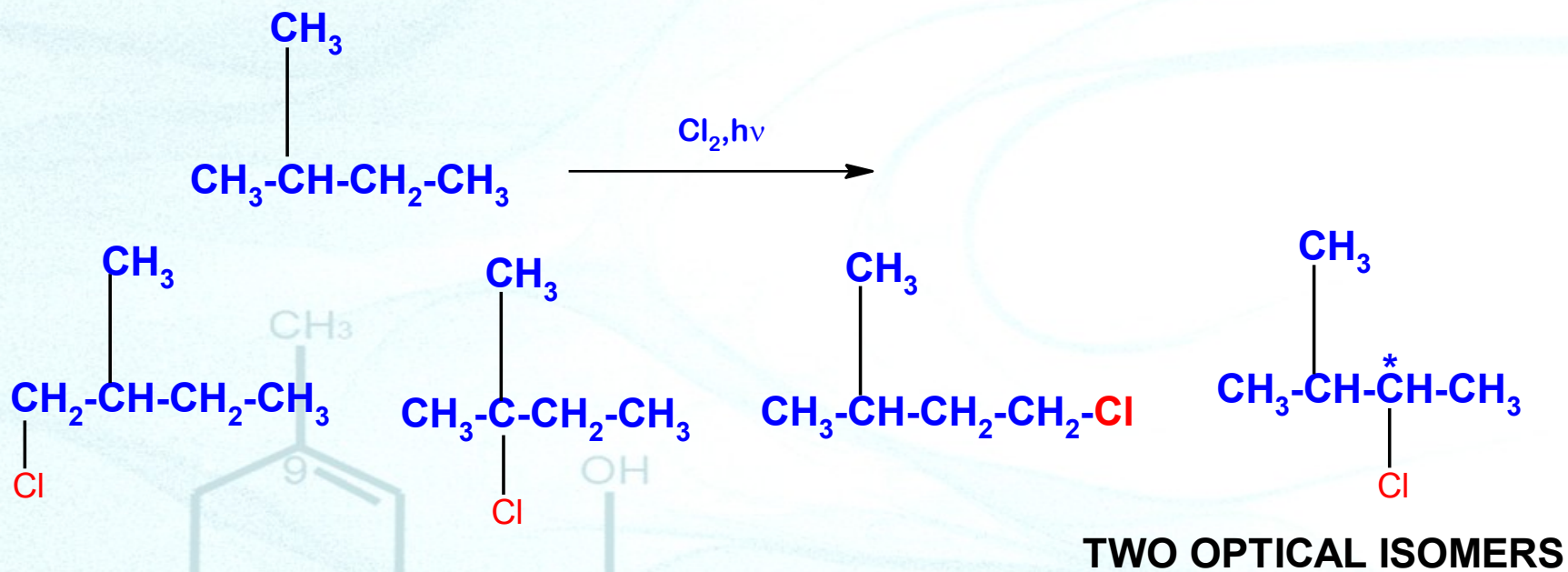
1] five

2] Two

3] Three

4] Four

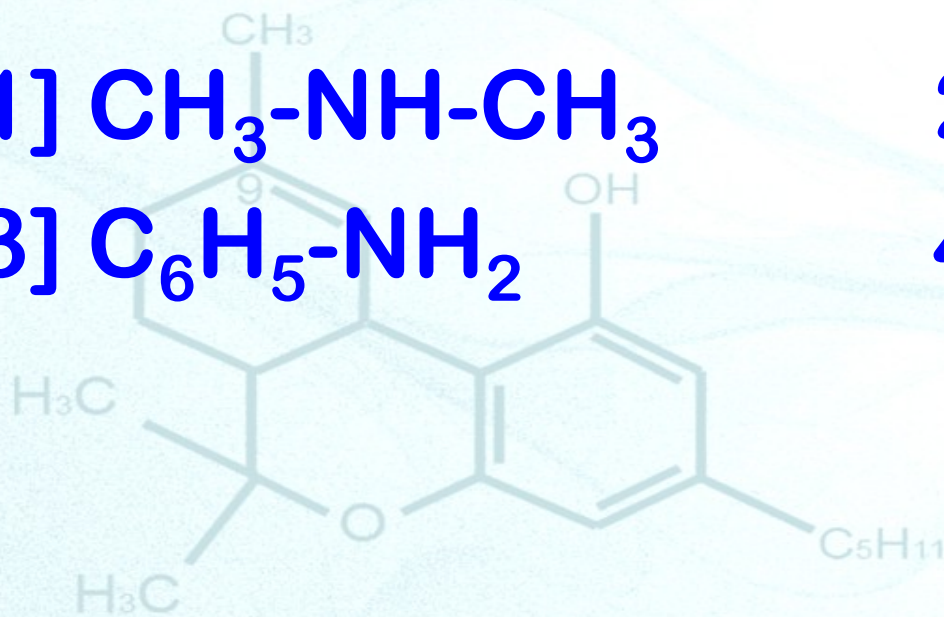
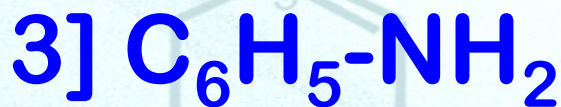




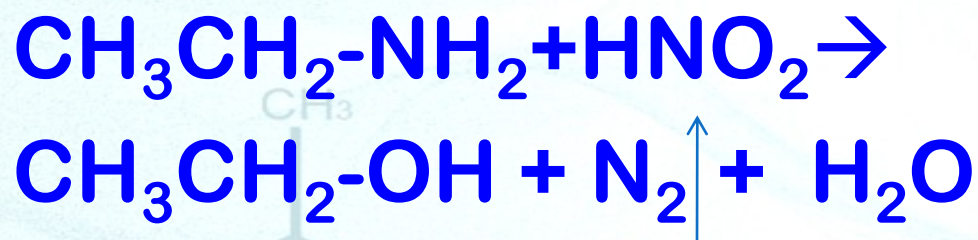
**Ans: 1] five**



43] When treated with nitrous acid the amine that smells like spirit after liberating a colorless gas is



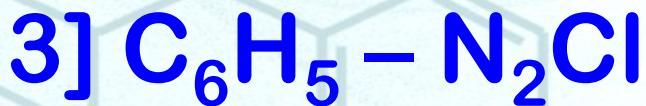
Explanation: Aliphatic 1° amines give alcohol & liberate nitrogen gas when treated with nitrous acid.



**Ans:**



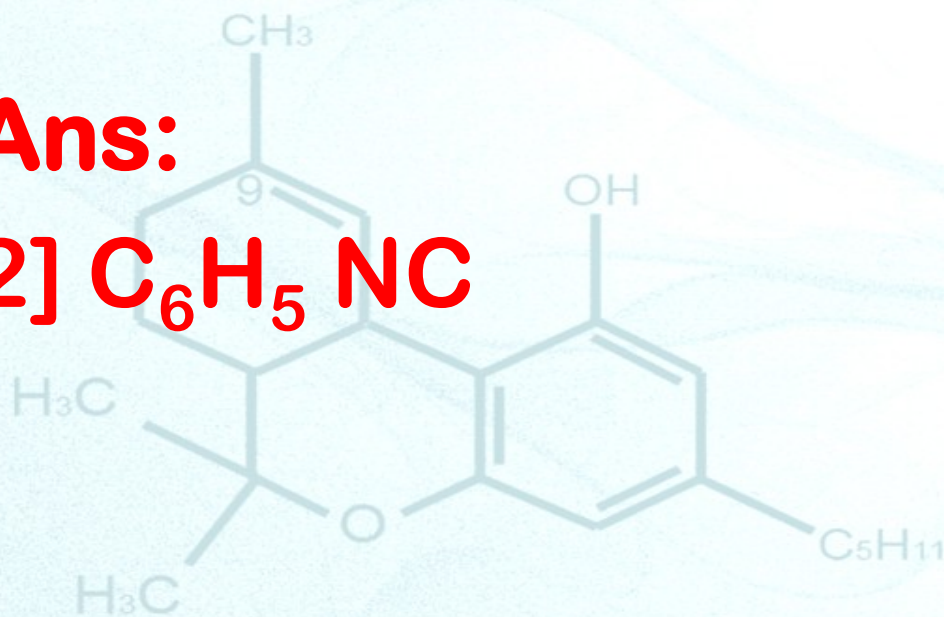
44] The reaction of chloroform with alcoholic KOH and benzenamine gives



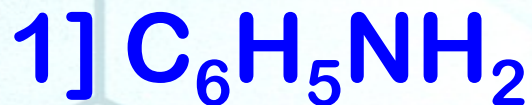
The reaction given is carbylamine test.

**Ans:**

**2]  $C_6H_5NC$**

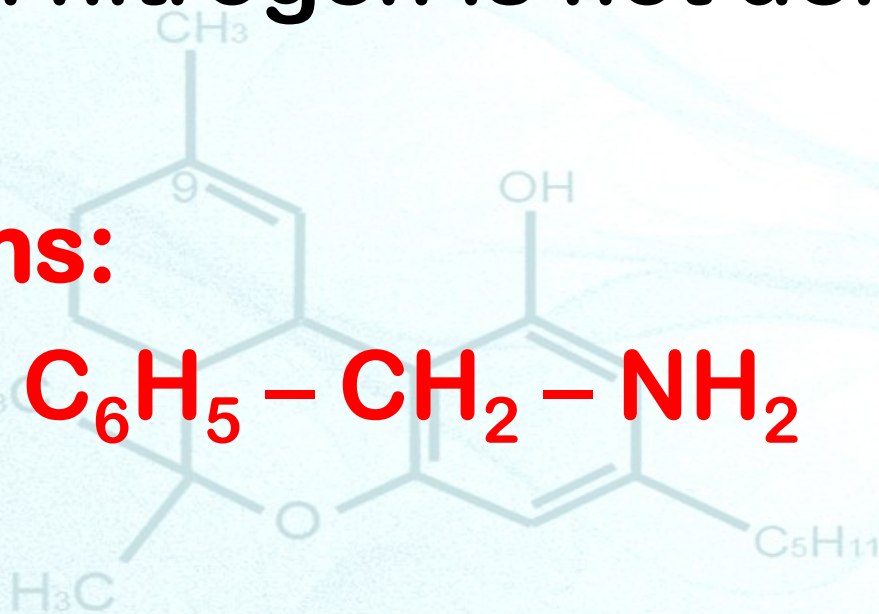


45] Which of the following is strongest base?



Alkyl amines are stronger bases than aromatic amines. The lone-pair on nitrogen is not delocalised.

**Ans:**

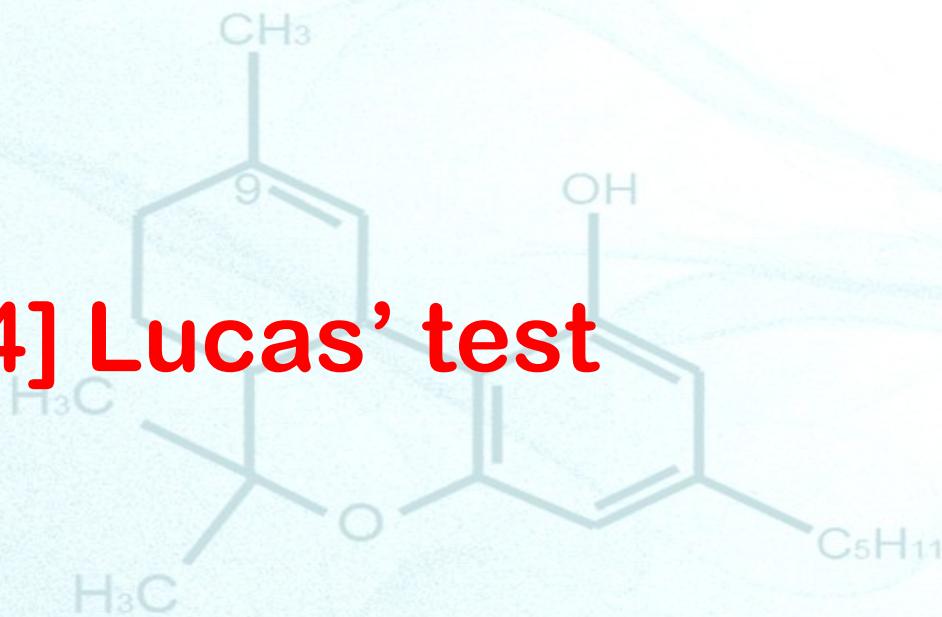


46] Which of the following is NOT meant for either the preparation or identification of amines?

- 1] Methylation
- 2] nitrous acid test
- 3] Hofmann bromamide reaction
- 4] Lucas' test

**Lucas' test** is used to distinguish  $1^\circ$ ,  $2^\circ$  and  $3^\circ$  alcohols.

**4] Lucas' test**





47] (A) + Br<sub>2</sub> + 4KOH → CH<sub>3</sub>NH<sub>2</sub> + (B) + 2KBr + 2H<sub>2</sub>O. The compounds A and B are –

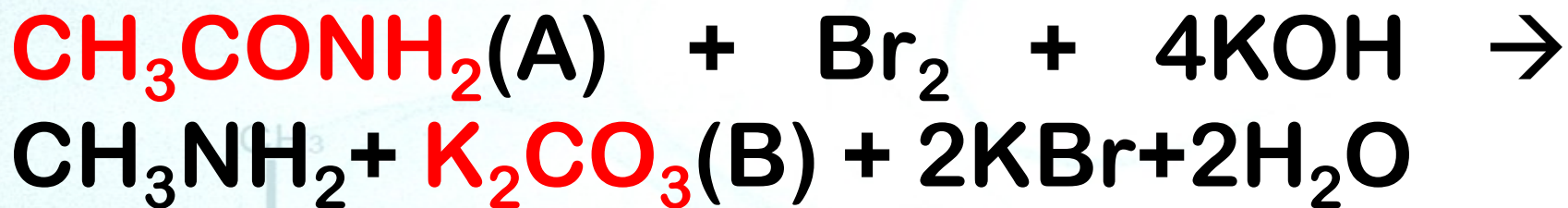
1] CH<sub>3</sub>NC and 3KBr

2] CH<sub>3</sub>CONH<sub>2</sub> and 3KBr

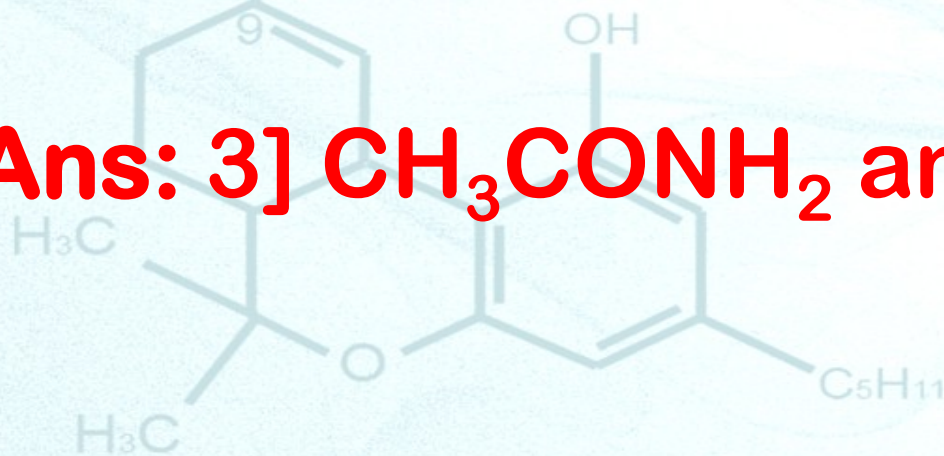
3] CH<sub>3</sub>CONH<sub>2</sub> and K<sub>2</sub>CO<sub>3</sub>

4] CH<sub>3</sub>NC and K<sub>2</sub>CO<sub>3</sub>

Explanation: The reaction is Hofmann bromamide reaction.

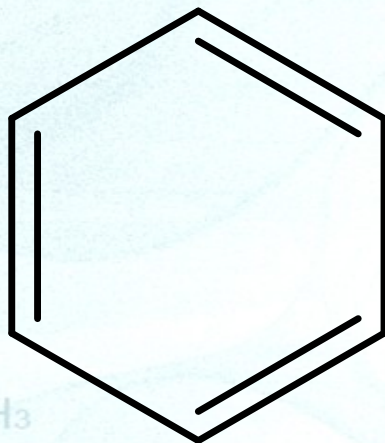


Ans: 3]  $\text{CH}_3\text{CONH}_2$  and  $\text{K}_2\text{CO}_3$

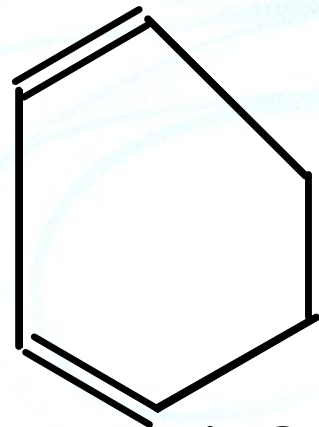


48] The difference between benzene and cyclohexa-1,3,5-triene is

- 1] hybridisation of carbon
- 2] bond-angle
- 3] carbon-carbon bond lengths
- 4] number of  $\pi$ -electrons

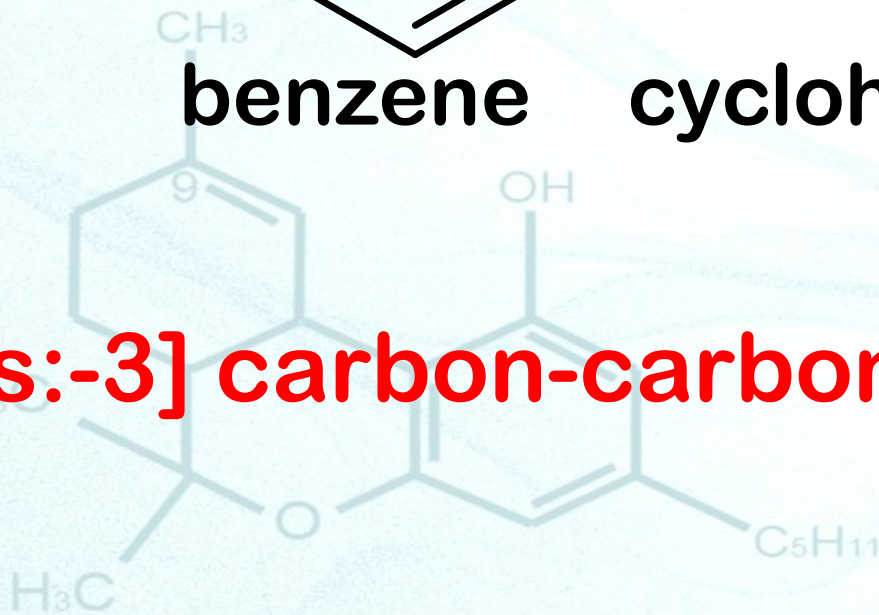


benzene



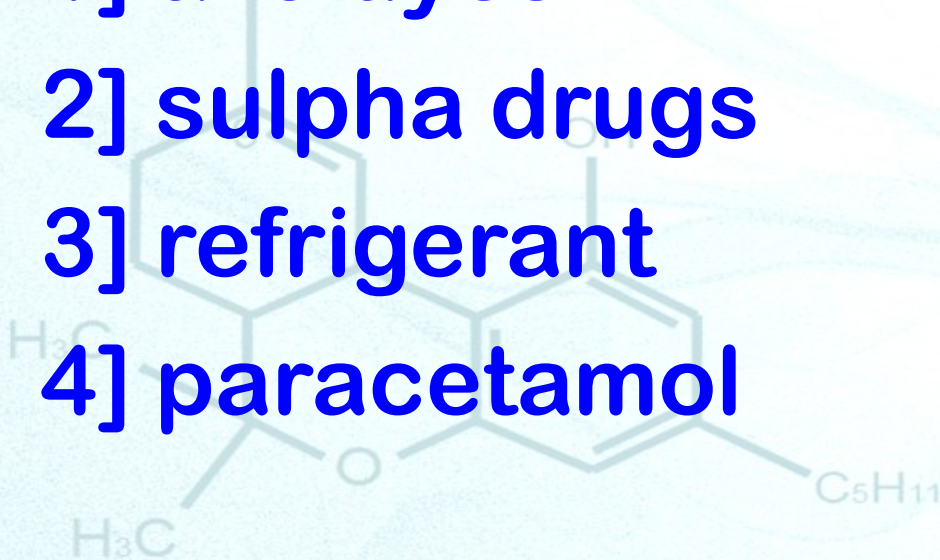
cyclohexa-1,3,5-triene

**Ans:-3] carbon-carbon bond lengths**



49] one of the following is NOT related to the uses of aniline-

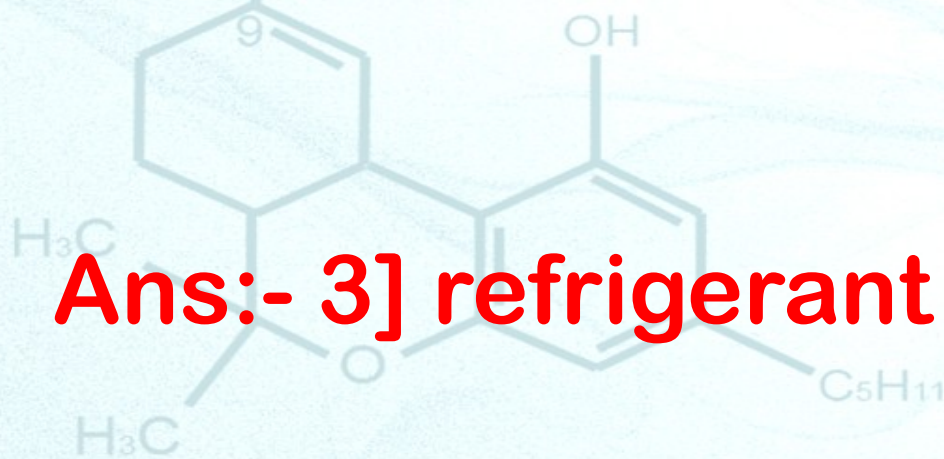
- 1] azo dyes
- 2] sulpha drugs
- 3] refrigerant
- 4] paracetamol



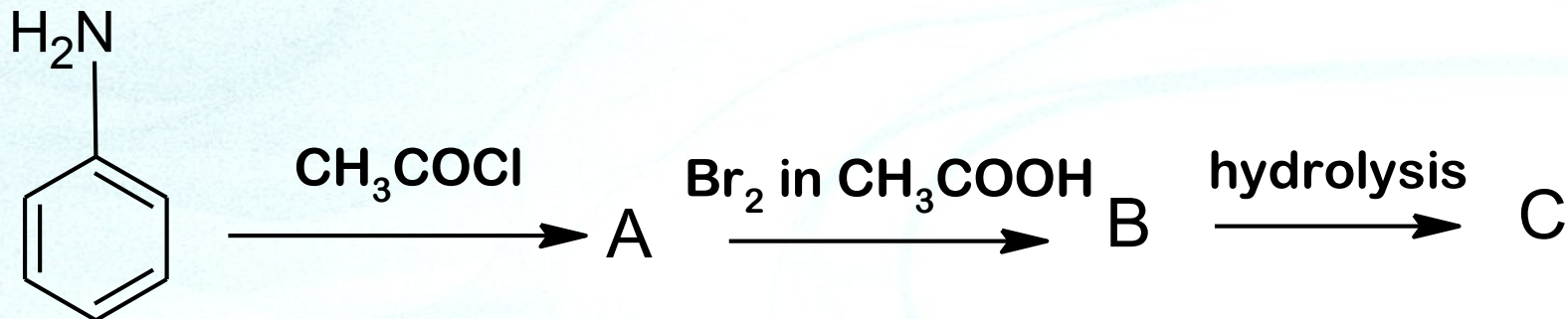
A refrigerant must have a boiling-point less than the target temperature.

Aniline has very high boiling point , it can not be used as refrigerant.

**Ans:- 3] refrigerant**

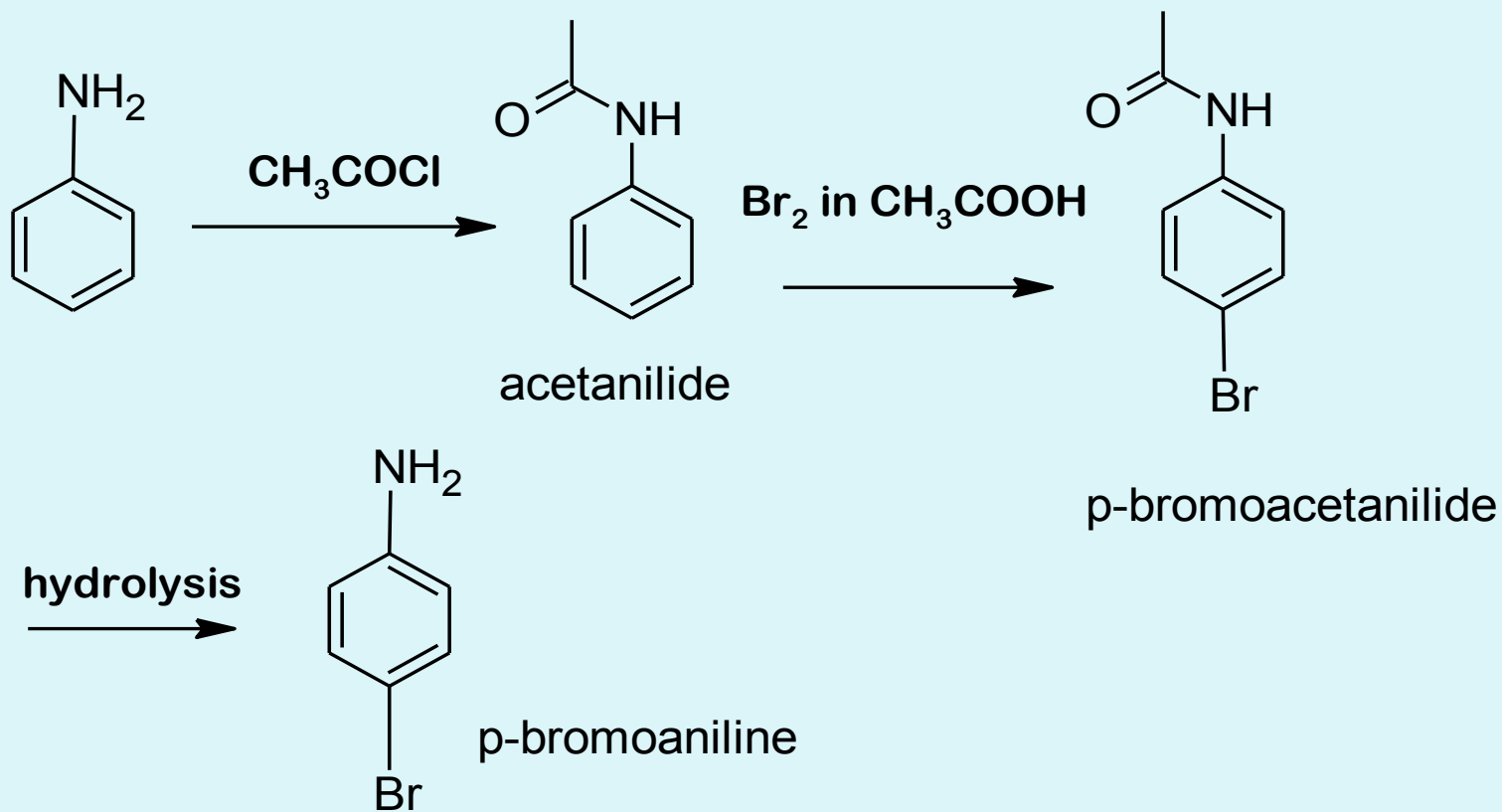


50]



The product 'C' is-

- 1] p-bromoacetanilide
- 2] o-bromoacetanilide
- 3] p-aminophenol
- 4] p-bromoaniline



**Ans: 4] p-bromoaniline**

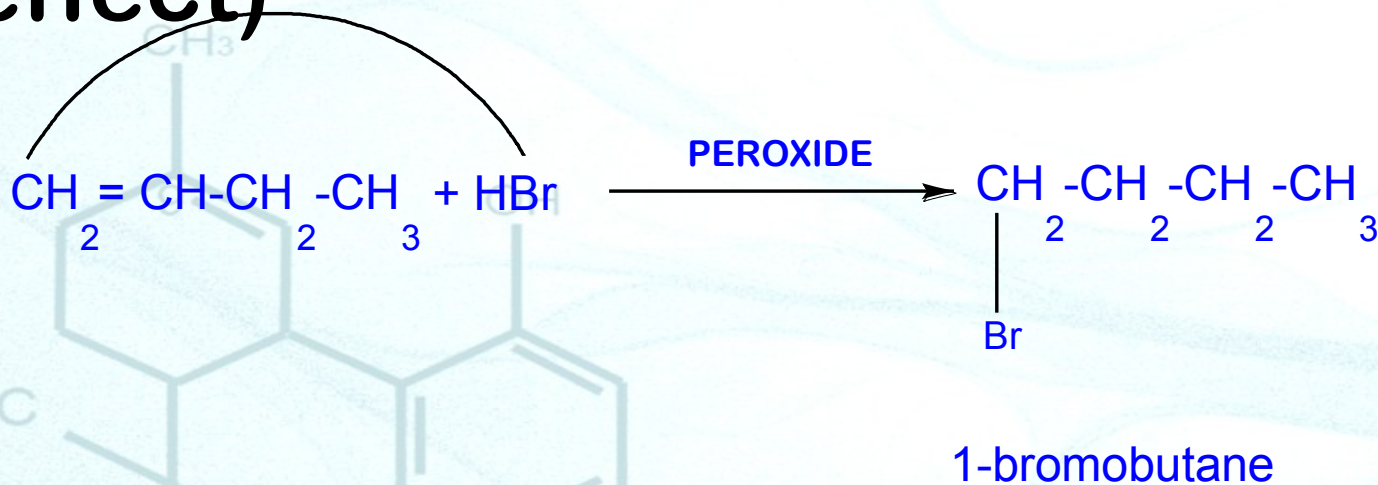


51] Identify the major product 'X' in the following equation



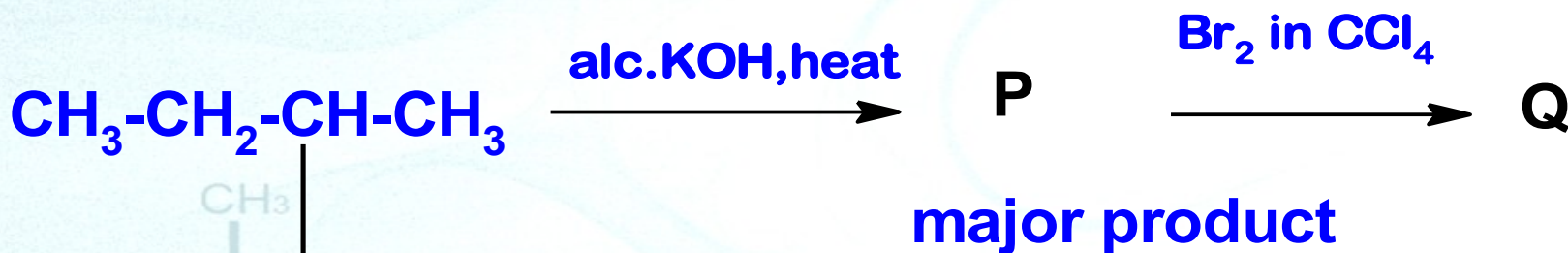
- 1] 2-bromobutane
- 2] 1,2-dibromobutane
- 3] 1-bromobutane
- 4] 1-bromobutene

The reaction proceeds against Markownikov's rule due to the presence of peroxide (Kharasch effect)



**Ans: 3] 1-bromobutane**

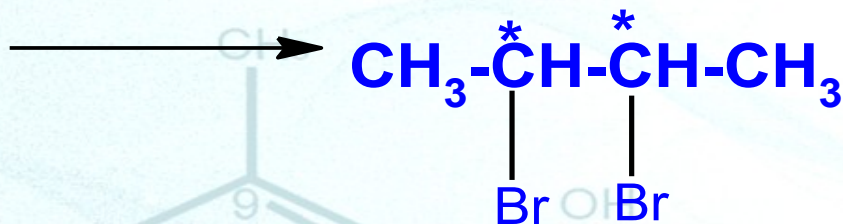
52] The total number of stereo isomers of the final product in the given equation is



- 1] two
- 2] three
- 3] six
- 4] four



$\text{Br}_2$  in  $\text{CCl}_4$



$2^n = 2^2 = 4$  isomers

**Ans:- 4] four**

**ALL THE BEST**

