HALOGEN DERIVATIVE

1. Match List - I with List - II.

List - I (Compound)		List - II (Use)	
(A)	Carbon tetrachloride	(I)	Paint remover
(B)	Methylene chloride	(II)	Refrigerators and air conditioners
(C)	DDT	(III)	Fire extinguisher
(D)	Freons	(IV)	Non Biodegradable insecticide

Choose the correct answer from the options given below :

(1) (A)-(I), (B), (II), (C)-(III), (D)-(IV)

(2) (A)-(III), (B)-(I), (C)-(IV), (D)-(II)

(3) (A)-(IV), (B)-(III), (C)-(II), (D)-(I)

(4) (A)-(II), (B)-(III), (C)-(I), (D)-(IV)

2. Total number of isomeric compounds (including stereoisomers) formed by monochlorination of 2-methylbutane is _____.

3. Given below are two statements: one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : Haloalkanes react with KCN to form alkyl cyanides as a main product while with AgCN form isocyanide as the main product.

Reason (R) : KCN and AgCN both are highly ionic compounds.

In the light of the above statement, choose the most appropriate answer from the options given below:

(1) (A) is correct but (R) is not correct

(2) Both (A) and (R) are correct but (R) is not the correct explanation of (A)

(3) (A) is not correct but (R) is correct

(4) Both (A) and (R) are correct and (R) is the correct explanation of (A)

4. The product (C) in the below mentioned reaction is:

$CH_3-CH_2-CH_2-Br \xrightarrow[\Delta]{KOH_{(alc)}} A \xrightarrow{HBr} B \xrightarrow[KOH_{(aq)}]{\Delta} C$

(1) Propan-1-ol

(2) Propene

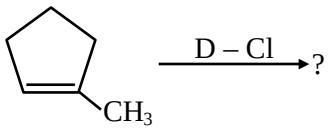
(3) Propyne

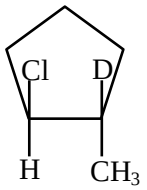
(4) Propan-2-ol

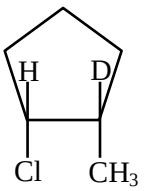
5. $CH_3CH_2Br + NaOH \begin{cases} \xrightarrow{C_2H_5OH} \text{Product A} \\ \xrightarrow[H_2O]{} \text{Product B} \end{cases}$

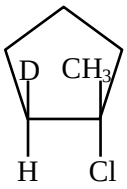
The total number of hydrogen atoms in product A and product B is_____.

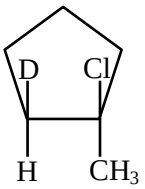
6. Major product of the following reaction is –



(1) 

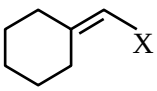
(2) 

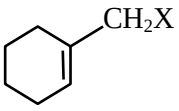
(3) 

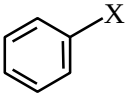
(4) 

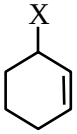
7. Number of isomeric products formed by mono-chlorination of 2-methylbutane in presence of sunlight is _____.

8. Example of vinylic halide is

(1) 

(2) 

(3) 

(4) 

9. Given below are two statement one is labeled as **Assertion (A)** and the other is labeled as **Reason (R).**

Assertion (A): $CH_2 = CH - CH_2 - Cl$ is an example of allyl halide

Reason (R): Allyl halides are the compounds in which the halogen atom is attached to sp^2 hybridised carbon atom.

In the light of the two above statements, choose the **most appropriate** answer from the options given below:

(1) **(A)** is true but **(R)** is false

(2) Both **(A)** and **(R)** are true but **(R)** is **not** the correct explanation of **(A)**

(3) **(A)** is false but **(R)** is true

(4) Both **(A)** and **(R)** are true and **(R)** is the correct explanation of **(A)**

10. Compound A formed in the following reaction reacts with B gives the product C. Find out A and B.

$$CH_3 - C \equiv CH + Na \rightarrow A \xrightarrow{B} \underset{(C)}{CH_3 - C \equiv C - CH_2 - CH(CH_3)} + NaBr$$

(1) A = $CH_3 - C \equiv \bar{C}Na^+$, B = $CH_3 - CH_2 - CH_2 - Br$

(2) A = $CH_3 - CH = CH_2$, B = $CH_3 - CH_2 - CH_2 - Br$

(3) A = $CH_3 - CH_2 - CH_3$, B = $CH_3 - C \equiv CH$

(4) A = $CH_3 - C \equiv \bar{C}Na^+$, B = $CH_3 - CH_2 - CH_3$

11. Given below are two statements:

Statement – I: High concentration of strong nucleophilic reagent with secondary alkyl halides which do not have bulky substituents will follow S_N2 mechanism.

Statement – II: A secondary alkyl halide when treated with a large excess of ethanol follows S_N1 mechanism.

In the the light of the above statements, choose the most appropriate from the questions given below:

(1) Statement I is true but Statement II is false.

(3) Statement I is false but Statement II is true.

(3) Both statement I and Statement II are false.

(4) Both statement I and Statement II are true.

12. 2-chlorobutane + $Cl_2 \rightarrow C_4H_8Cl_2$ (isomers)

Total number of optically active isomers shown by $C_4H_8Cl_2$, obtained in the above reaction is_____.

13. Alkyl halide is converted into alkyl isocyanide by reaction with

(1) NaCN (2) NH_4CN

(3) KCN (4) AgCN

14. The correct statement regarding nucleophilic substitution reaction in a chiral alkyl halide is ;

(1) Retention occurs in S_N1 reaction and inversion occurs in S_N2 reaction.

(2) Racemisation occurs in S_N1 reaction and retention occurs in S_N2 reaction.

(3) Racemisation occurs in both S_N1 and S_N2 reactions.

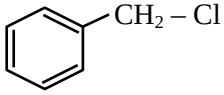
(4) Racemisation occurs in S_N1 reaction and inversion occurs in S_N2 reaction.

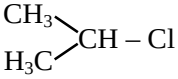
15. 3-Methylhex-2-ene on reaction with HBr in presence of peroxide forms an addition product (A). The number of possible stereoisomers for 'A' is _____.

16. Which among the following halide/s will not show S_N1 reaction:

(A) $H_2C = CH - CH_2Cl$

(B) $CH_3 - CH = CH - Cl$

(C) 

(D) 

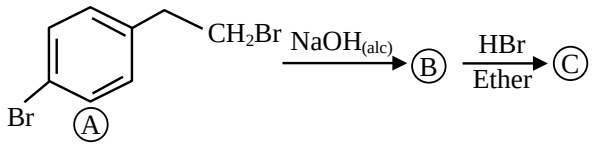
Choose the **most appropriate** answer from the options given below:

(1) (A), (B) and (D) only

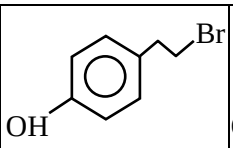
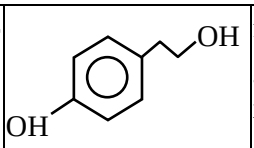
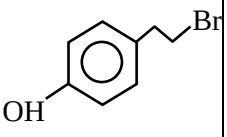
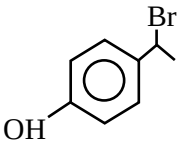
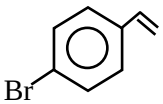
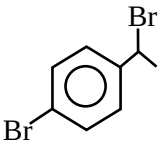
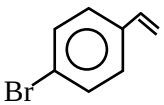
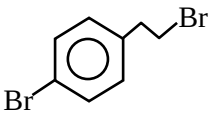
(2) (A) and (B) only

(3) (B) and (C) only

(4) (B) only

17. 

Identify (B) and (C) and how are (A) and (C) related ?

	(B)	(C)	
(1)			functional group isomers
(2)			Derivative
(3)			position isomers
(4)			chain isomers

18. Identify the correct set of reagents or reaction conditions 'X' and 'Y' in the following set of transformation.

$CH_3 - CH_2 - CH_2 - Br \xrightarrow{\text{'X'}} \text{Product} \xrightarrow{\text{'Y'}} CH_3 - \underset{\underset{Br}{|}}{CH} - CH_3$

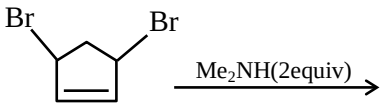
(1) X = conc.alc. NaOH, 80°C, Y = $Br_2/CHCl_3$

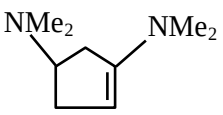
(2) X = dil.aq. NaOH, 20°C, Y = HBr/acetic acid

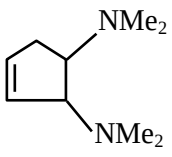
(3) X = conc.alc. NaOH, 80°C, Y = HBr/acetic acid

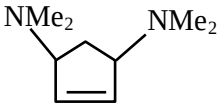
(4) X = dil.aq. NaOH, 20°C, Y = $Br_2/CHCl_3$

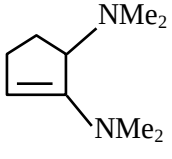
19. Find out the major product formed from the following reaction. [Me: $-CH_3$]



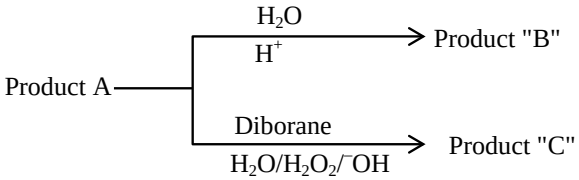
(1) 

(2) 

(3) 

(4) 

20. $CH_3 - CH_2 - CH_2 - Br + NaOH \xrightarrow{C_2H_5OH}$ Product 'A'



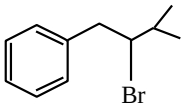
Consider the above reactions, identify product B and product C.

(1) B = C = 2-Propanol

(2) B = 2-Propanol C = 1-Propanol

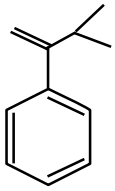
(3) B = 1-Propanol C = 2-Propanol

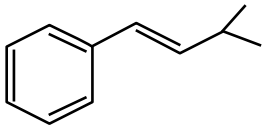
(4) B = C = 1-Propanol

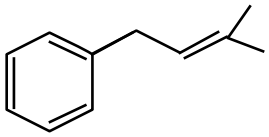
21. 

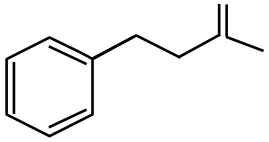
major product "P"

Product P is

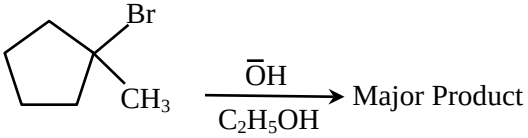
(1) 

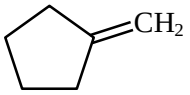
(2) 

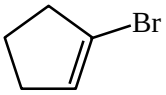
(3) 

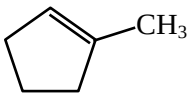
(4) 

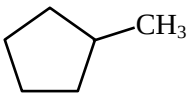
22. Identify the major product in the following reaction.



(1) 

(2) 

(3) 

(4) 

23. Match **List I** with **List II** :

List-I (Compound)		List-II (Uses)	
A.	Iodoform	I.	Fire extinguisher
B.	Carbon tetrachloride	II.	Insecticide
C.	CFC	III.	Antiseptic
D.	DDT	IV.	Refrigerants

Choose the **correct** answer from the options given below :

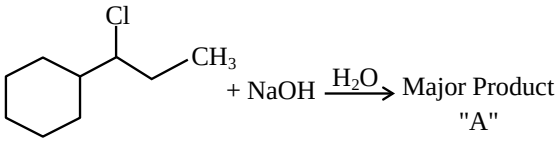
(1) A-I, B-II, C-III, D-IV

(2) A-III, B-II, C-IV, D-I

(3) A-III, B-I, C-IV, D-II

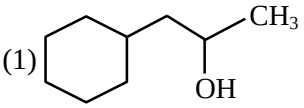
(4) A-II, B-IV, C-I, D-III

24.



Consider the above chemical reaction. Product "A" is:

(1)



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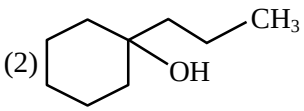

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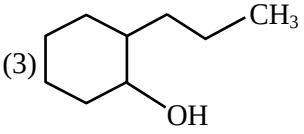

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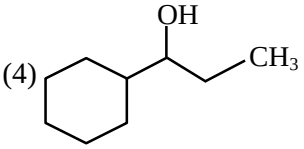
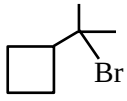


25. Which among the following compounds will undergo fastest S_N2 reaction.

(1)



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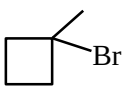

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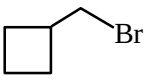
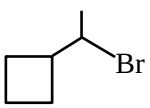


(4)



26. Given below are two statements :

Statement (I) : S_N2 reactions are 'stereospecific', indicating that they result in the formation only one stereo-isomers as the product.

Statement (II) : S_N1 reactions generally result in formation of product as racemic mixtures. In the light of the above statements, choose the **correct** answer from the options given below :

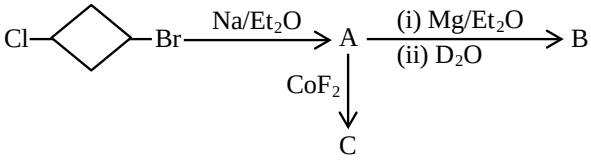
(1) **Statement I** is true but **Statement II** is false

(2) **Statement I** is false but **Statement II** is true

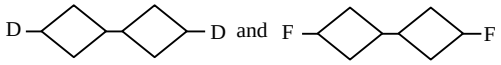
(3) Both **Statement I** and **Statement II** is true

(4) Both **Statement I** and **Statement II** is false

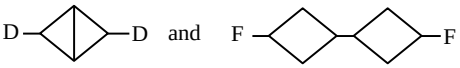
27. In the following sequence of reaction, the major products B and C respectively are :



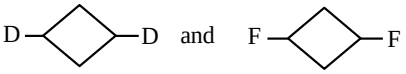
(1)



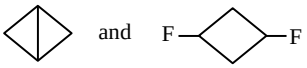
(2)



(3)



(4)



28. Given below are two statements : one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)** :

Assertion (A) : S_N2 reaction of $C_6H_5CH_2Br$ occurs more readily than the S_N2 reaction of CH_3CH_2Br.

Reason (R) : The partially bonded unhybridized p-orbital that develops in the trigonal bipyramidal transition state is stabilized by conjugation with the phenyl ring.

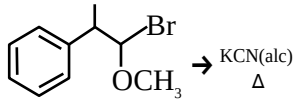
In the light of the above statements, choose the **most appropriate** answer from the options given below :

(1) **(A)** is not correct but **(R)** is correct

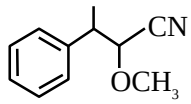
(2) Both **(A)** and **(R)** are correct but **(R)** is not the correct explanation of **(A)**

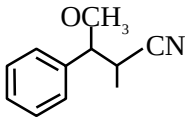
(3) Both **(A)** and **(R)** are correct and **(R)** is the correct explanation of **(A)**

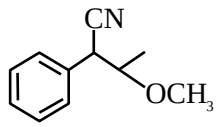
(4) **(A)** is correct but **(R)** is not correct

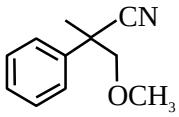
29.  Major Product 'P'

In the above reaction product 'P' is

(1) 

(2) 

(3) 

(4) 

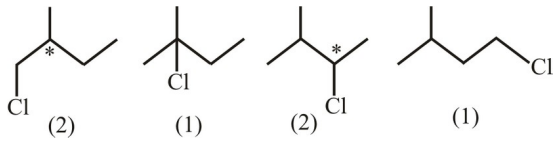
SOLUTIONS

1. Ans. (2)

Sol. CCl_4 used in fire extinguisher. CH_2Cl_2 used as paint remover. Freons used in refrigerator and AC.

DDT used as non Biodegradable insecticide.

2. Ans. (6)

Sol. 

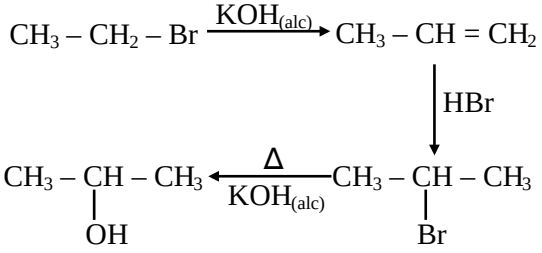
3. Ans. (1)

Sol. (i) $\overset{\oplus}{K}\overset{\ominus}{C}N + R\!-\!X \rightarrow$ R–CN
(Ionic) (Major product)

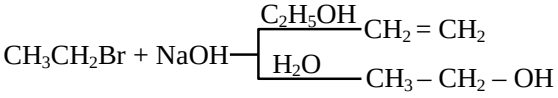
(ii) $AgC\ddot{N} + R\!-\!X \rightarrow$ R–NC
(Covalent) (Major product)

AgCN is mainly covalent in nature and nitrogen is available for attack, so alkyl isocyanide is formed as main product.

4. Ans. (4)

Sol. 

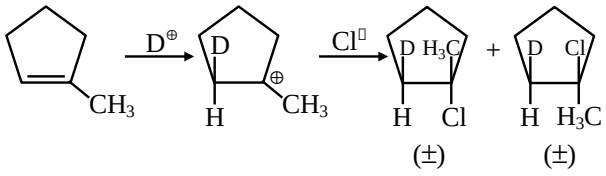
5. Ans. (10)

Sol. 

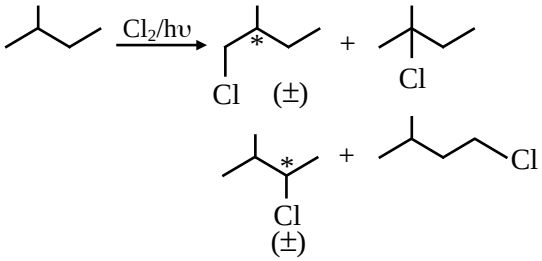
Total number of hydrogen atom in A and B is 10

6. Ans. NTA (3)

Allen (3 or 4)

Sol. 

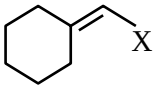
7. Ans. (6)

Sol. 

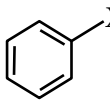
∴ Number of isomeric products = 6

8. Ans. (1)

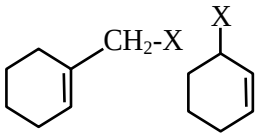
Sol. Vinyl carbon is sp^2 hybridized aliphatic carbon



is vinyl halide

While 

is aryl halide

and 

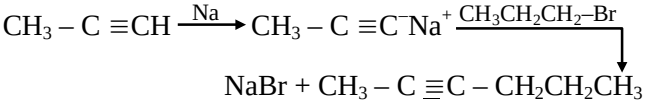
are allyl halide

9. Ans. (1)

Sol. $CH_2 = CH \overset{\uparrow}{C}H_2 - Cl$

It is allyl carbon and sp^3 hybridized

10. Ans. (1)

Sol. 

11. Ans. (4)

Sol. **Statement – I:** Rate of $S_N2 \propto [R\text{–}X][Nu^-]$

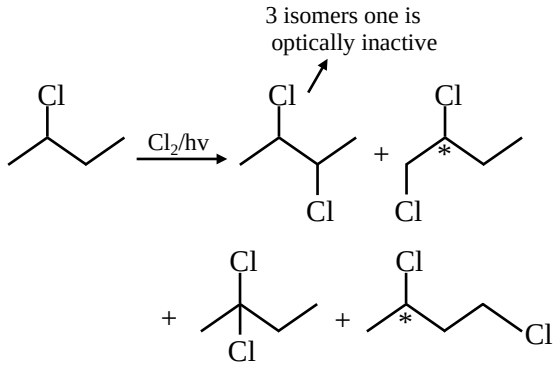
S_N2 reaction is favoured by high concentration of nucleophile (Nu^-) & less crowding in the substrate molecule.

Statement – II: Solvolysis follows S_N1 path.

Both are correct Statements.

12. Ans. NTA (3)
Allen (6)

Sol.



13. Ans. (4)

Sol. Covalent character of AgCN.

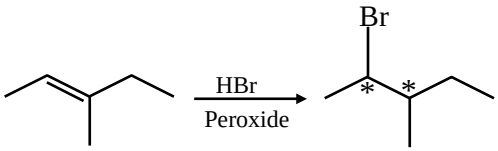
14. Ans. (4)

Sol. S_N1 – Racemisation

S_N2 – Inversion

15. Ans. (4)

Sol.



2chiral centres

No. of stereoisomers = 4

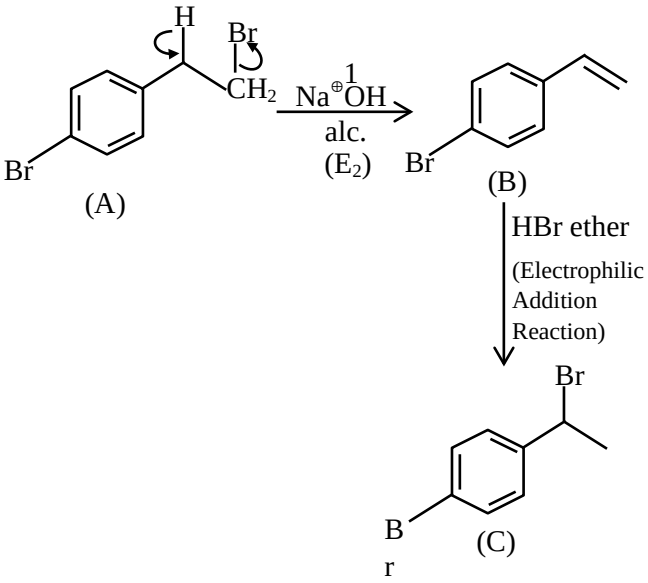
16. Ans. (4)

Sol. Since $CH_3-\overset{+}{C}H=CH$ is very unstable,

$CH_3-CH=CH-Cl$ cannot give $S_N1$reaction.

17. Ans. (3)

Sol.



A and C are position isomer.

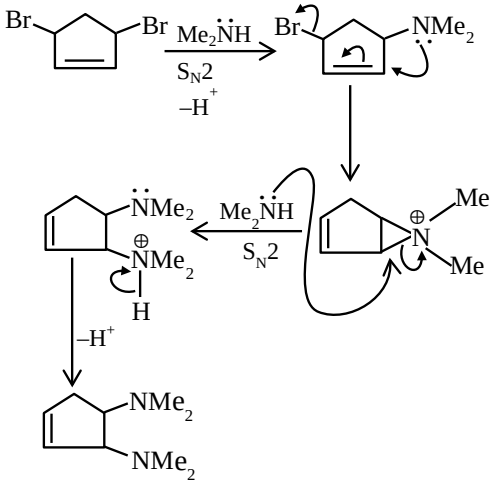
18. Ans. (3)

Sol. $CH_3-CH_2-CH_2-Br \xrightarrow[80\,℃]{X=\text{conc.alc.NaOH}}$

$CH_3-CH=CH_2 \xrightarrow{Y=HBr/\text{Acetic acid}} CH_3-CHBr-CH_3$

19. Ans. (2)

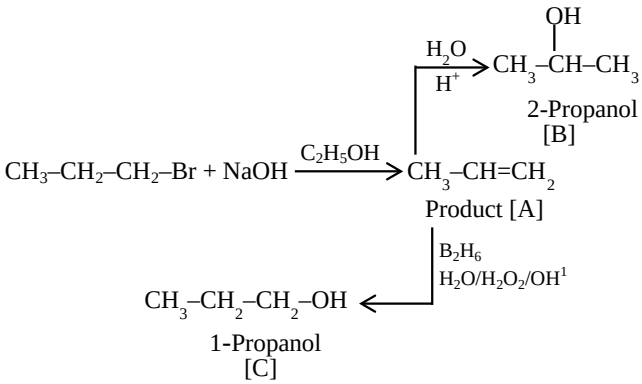
Sol.



The above mechanism valid for both cis and trans isomers. So the products are same for both cis and trans isomers.

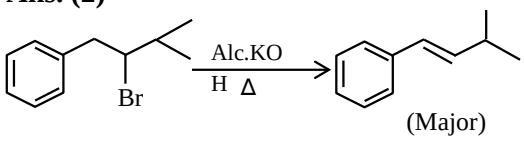
20. Ans. (2)

Sol.



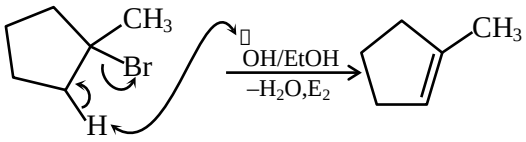
21. Ans. (2)

Sol.



22. Ans. (3)

Sol.



23. Ans. (3)

Sol. Iodoform – Antiseptic

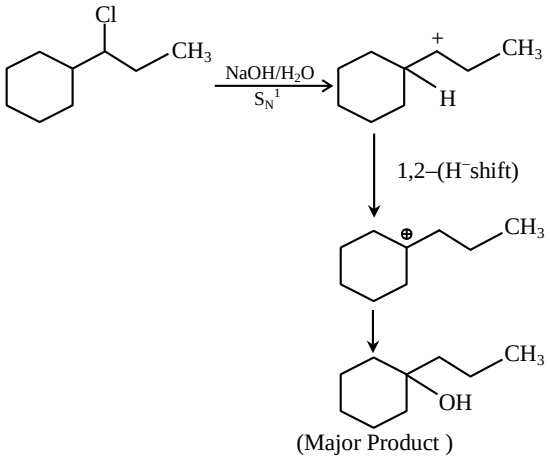
CCl_4 – Fire extinguisher

CFC – Refrigerants

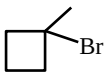
DDT – Insecticide

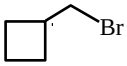
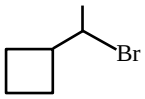
24. Ans. (2)

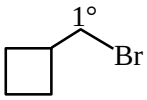
Sol.



25. Ans. (3)

Sol. 1  2 

3  4 

fastest SN^2 reaction give 

Rate of SN^2 is Me – x > 1° – x > 2° – x > 3° – x

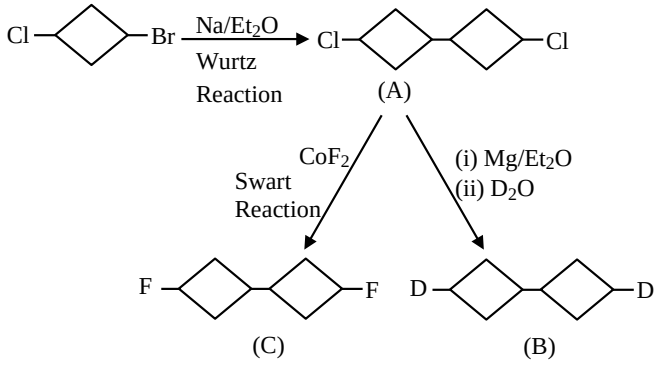
26. Ans. (3)

Sol. SN^2 → Inversion

SN^1 → Racemisation

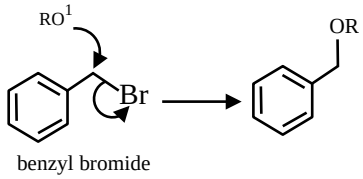
27. Ans. (1)

Sol.



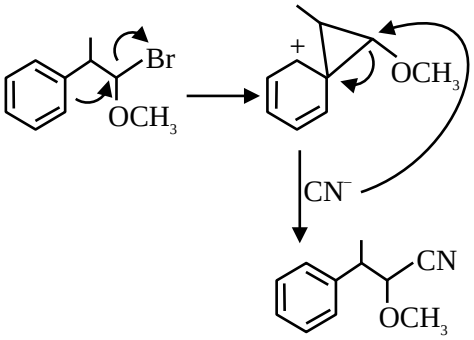
28. Ans. (3)

Sol. The benzyl group acts in much the same way using the π-system of the benzene ring for conjugation with the p-orbital in the transition state.



29. Ans. (1)

Sol.



Due to NGP effect of phenyl ring Nucleophilic substitution of Br will occurs.