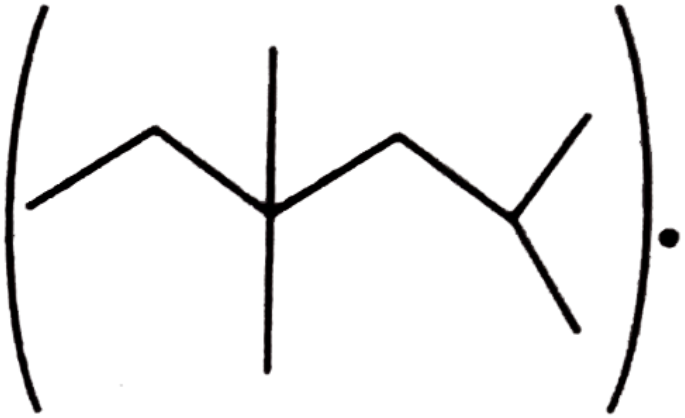
CHEMISTRY

BOOKS - CENGAGE CHEMISTRY (HINGLISH)

ALKANES AND CYCLOALKANES

Illustration

1. (a) Write the IUPAC name of the compound (A) whose bond line structre is



(b) Write the condensed formula of the compound (A).

(c) Define and identify all the primary (1°), secondary (2°), tertiary (3°), and quaternary (4°) carbon atoms.

(d) Identify all the 1°, 2°, and 3° H atoms.

(e) Given the number of H atoms bonded to 1°, 2°, 3°, and 4° C atom in an alkane.

(f) Given the number of C atoms bonded to 1°, 2°, 3°, and 4° C atoms bonded to 1°, 2°, 3°, and 4° C atom in an alkane.

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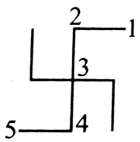
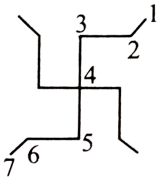
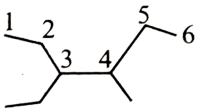
2. Write the IUPAC name and condensed formula of the following compounds whose bond line structures are given as folllows:

a. 

b. 

c. 

(a) **a.** IUPAC name: 3,3-Diethyl pentane

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3. What is wrong with the following names ? Drawn the structures they represent and given their (a) correct IUPAC name, (b) write the corresponding corresponding bond line structures.

I. 1,1-Dimethyl pentane

II. 2-Methyl-2-propyl hexane

III. 3-Dimethyl pentane

IV. 4,4-Dimethyl-3-ethyl pentane

V. 3-Isopropyl pentane

VI. 3-Chloro-4-methyl pentane

VII. 4-(2-Methyl ethyl) heptane

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4. Given the IUPAC name and bond structures of the following condensed formulae:

(a) Pr_2CHCMe_3

$Me_3CCH_2CM_3$

(c) Cme_4

(d) $MeC(Br)_2CHMe_2$

(e) $Et_2CHCH(Me)Et$

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5. Write the IUPAC nam, bond line structure, and condensed formula for the following alkanes with the greatest number of (Me) groups.

C_7H_{16}

(b) C_8H_{18}

(c) $C_{10}H_{22}$

$C_{11}H_{24}$

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6. Write the IUPAC name (s) and structure (s) of the simplest alkane (s) with lowest molecular mass (or the least number of C atoms) which contains 1°, 2°, 3° and 4° carbon atoms.

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7. (a) Write all the isomeric biyclic spiranes of a compound with formula C_7H_{12}

(b) Write all the isomeric biyclic structures of the compound with formula C_7H_{12}.

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8. Which conformer of ethylence chlorohydrin and ethylene glycol is more stable?

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9. Which conformer of propene, ethanal (acetaldehyde), and propanaldehyde is more stable?

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10. (a) Draw sawhorse projection formulae for the two eclipsed conformations of butane.

(b) What is the dihedral angle between adjaccent methyl groups? (c) Which conformer has greater torsional strain?

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11. i. 0.21 gm of but-3-yn-2-ol is treated with excess of C_2H_5 MgBr at standard condition. The volume of gas evolved is:

(a) 134.4 ml, (b) 146.4 ml

(c) 67.2 ml, (d) 73.2 ml

ii. 0.46 gm of a compound with molecular mass of 92 gm gave 336 ml of a gas at STP when treated with excess of CH_3MgI. The number of moles in the compound is:

(a) 0.1, (b) 2

(c) 3, (d) 4

iii. The treatement of CH_3OH with CH_3Mgl releases $1.04ml$ of a gas at STP. The mass of CH_3OH added is:

(a) 1.49 mg,

(b) 2.98 mg

(c) 3.71 mg, (d) 4047 mg

iv. The addition of 4.12 mg of an unknown alcohol, ROH, to CH_3Mgl releases 1.56 ml of a gas at STP. The molar mass of alcohol is:

(a) 32 gm mol^{-1} , (b) 46 gm mol^{-1}

(c) $59 gm mol^{-1}$, (d) 74 gm mol^{-1}

v. Teh sample of 1.79 mg of a compound of molar mass 90 gm mol^{-1} when treated with CH_3Mgl releases 1.34 mol of a gas at STP. The number of moles of active hydrogen in the molecule is:

(a) 1 , (b) 2

(c) 3 , (d) 4

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12. i. $A + 2Na \xrightarrow{\text{Dryehter}} Me_2CH - CJMe_2$

ii. $A + 2Na \xrightarrow{\text{Dryether}} Me_3C - Cme_3$

iii. One mole of CH_3Br are reacted with 2 mole of sodium metal in dry ether. The productus thus obtained are:

a. Ethane + 2NaBr

b. Ethane + Propane + 2 NaBr

c. Ethane + Propane + Butane + 2 NaBr

d. Ethane + Propane + Butane + Ethene + 2 NaBr

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13. i. The volume of gases evolved at STP by passing $0.1A$ of current for 965 sec through an aqeous solution of potassium acetate is:

a. 22.4 ml , b. 11.2 ml

c. 89.6 ml , d. 44.8 ml

ii. The mass of gases eveolved in the above problem is:

a. 0.06 gm , b. 0.6 gm

c. 6.0 gm , d. 60 gm

iii. The volume of gases evolved at STP by passing $0.2A$ of current for 965 sec through an aqueous soultion of disodium fumerate is:

a. 22.4 ml , b. 11.2 ml

c. 89.6 ml , d. 44.8 ml

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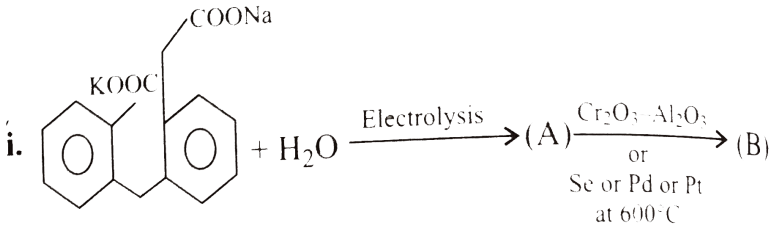
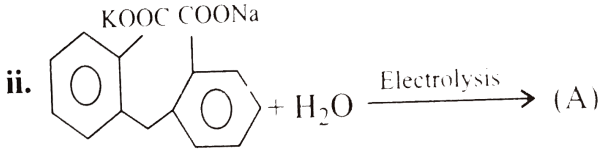
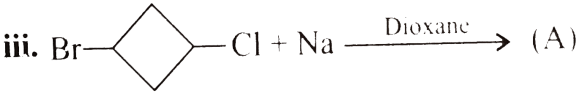
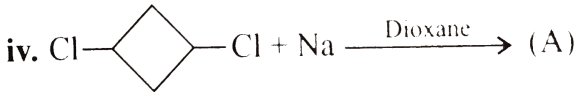
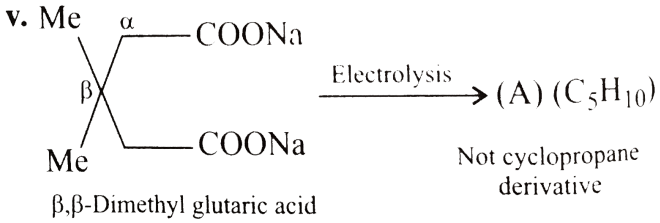
14. Complete the following recations:

i. 

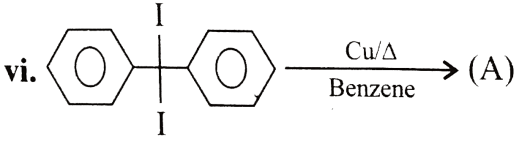
ii. 

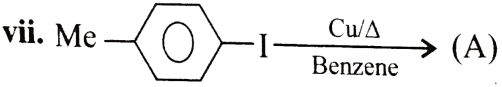
iii. 

iv. 

v. 

β,β-Dimethyl glutaric acid

vi. 

vii. 

i.

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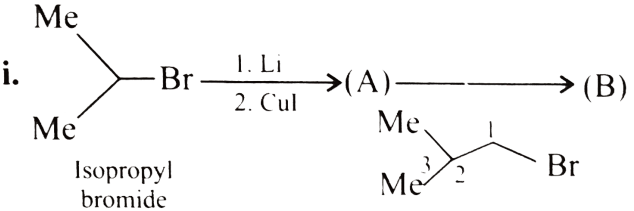
15. i.



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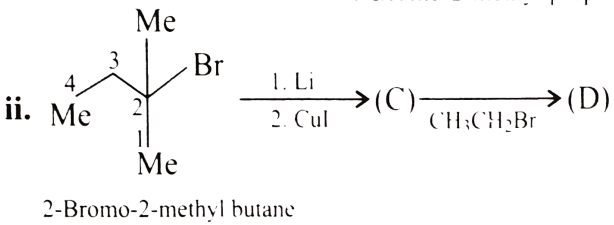

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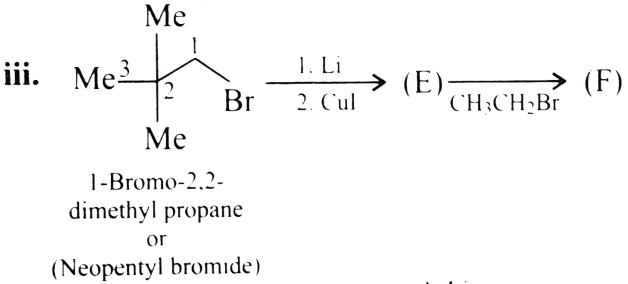

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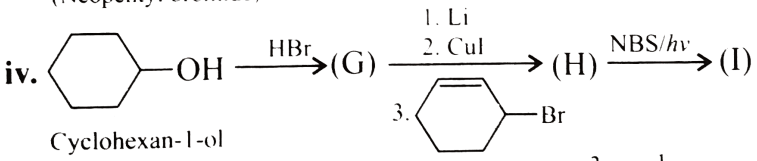

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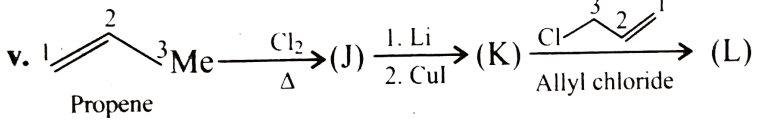

ii.

iii.

iv.

iv. 

v. 

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16. An alkane, C_7H_{16} , is produced by the reaction of di -(3-pentyl) lithium cuprate with ethyl bromide. What is the structure of the alkane ?

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17. I. Arrange the compounds of (a) in the order of decreasing boiling points and (b) in the order of decreasing solubility in water.

(A) (1) Ethanol, (2) Propane, (3) Pentanol

(B) (1) Butane, (2) 1,2,3-Pentane triol, (3) Butyl alcohol

(C) (1) Pentane, (2) Pentanol, (3) Hexanol

II. Arrange the following in the decreasing order of their boiling points.

(A) (1) C_3H_8, (2) C_2H_5OH, (3) $(CH_3)_2O$, (4) $HOH_2C - - - - CH_2OH$

(B) (1) 3-pentanol, (2) n-Pentane, (3) 2,2-Dimethyl propanol, (4) n-Pentanol

III. Arrange the following alcohols (a) in the decreasing order of their boilling points and (b) in the decreasing order of their solubility in water.

(1) n-Butyl alcohol

(2) sec-Butyl alcohol and

(3) tert-Butyl alcohol

IV. Arrange the following compounds in the order of their increasing boiling points.

(1) CH_3COC1 , (2) $(CH_3CO)_2O$, (3) CH_3CONH_2 , (4) CH_3COOH

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18. A sample of diesel has the same characteristics as a 60 ml mixture of cetane and α -methyl napthalene mixed in $2:1$ ratio (v/v). What is the centane number of the diesel sample?

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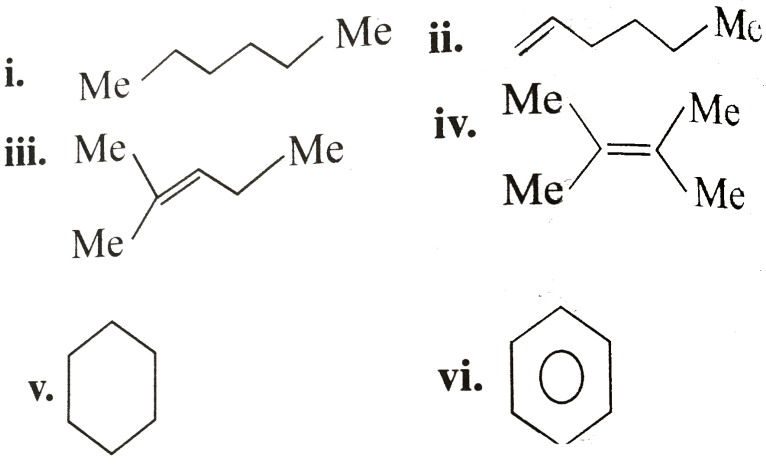
19. Give the decreasing order of the octane rating of the following:

i. 

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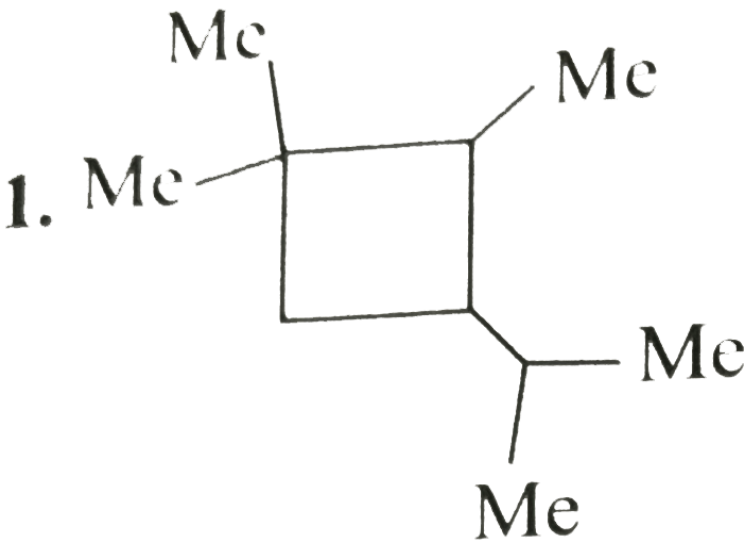
20. a. Write the IUPAC name of the following compounds.

b. Write the type of the cyclic compounds.



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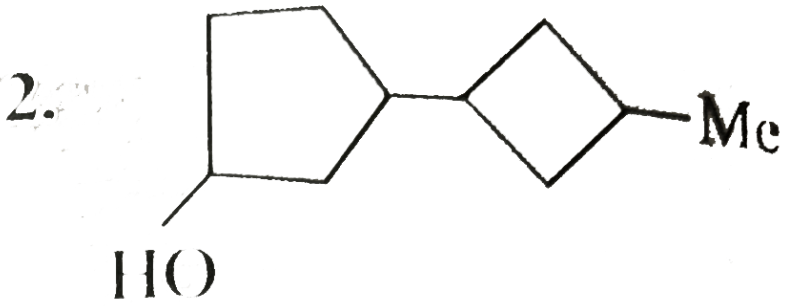

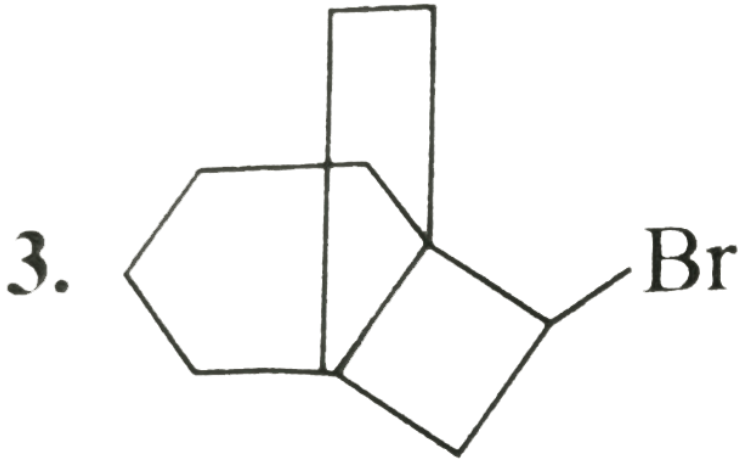

3. 4.

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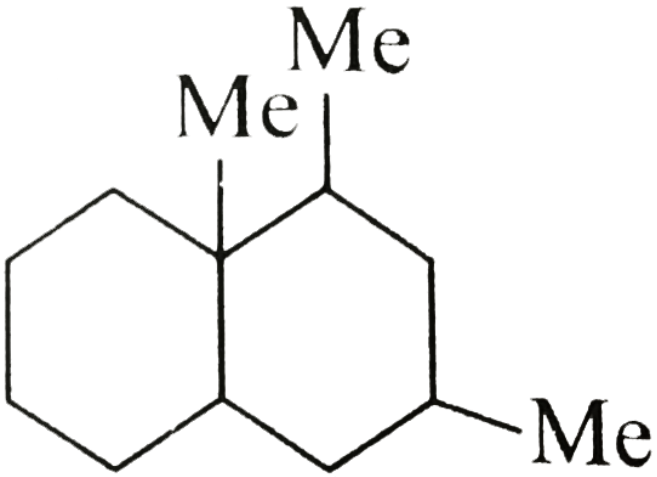

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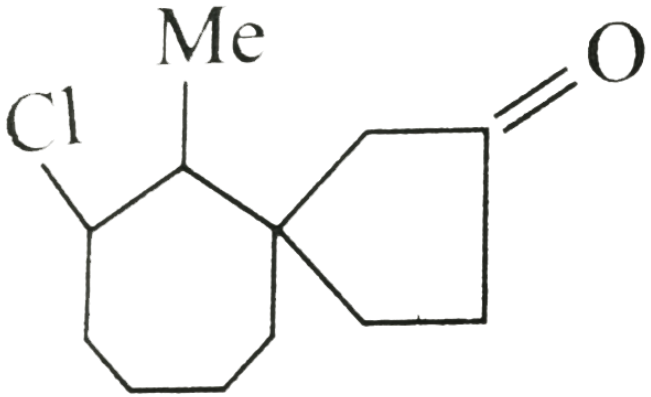

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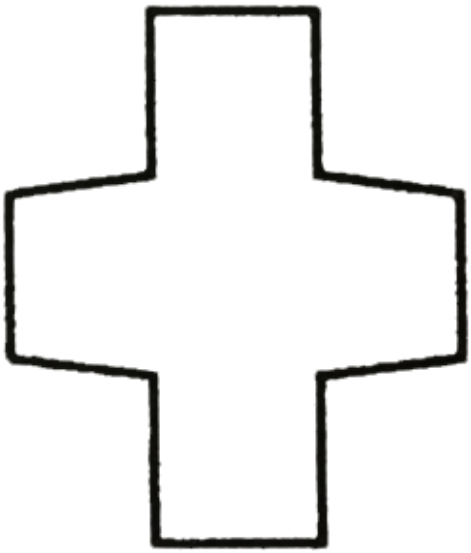
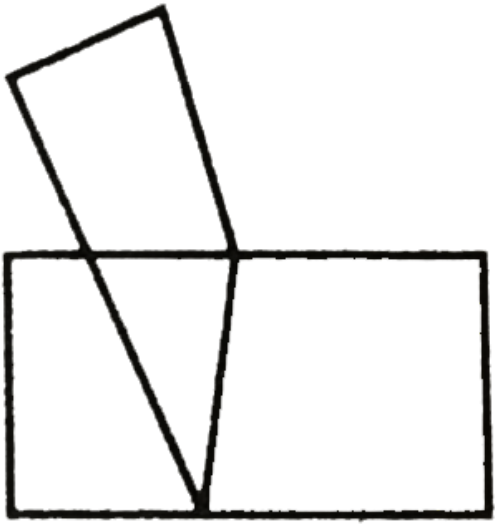


7. HO—Br

7.

8.

8.



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21. Draw the structure of following compounds:

a. 2-Isopropyl-7-chlorobicyclo $[2.2.1]$ heptane

b. 6-Ethan-3-Iodo bicyclo $[3.2.0]$ heptane

c. 3-Methan tricyclo $[3.2.1.0]$ ocation-3-ol

d. 1,4,6,9-Tetramethyl spiro $[4.4]$ nonane

e. Bicyclo $[2.2.1]$ heptane

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22. Explain and differentiate between the following terms.

a. Polycyclic compounds

b. Fused rings

c. Bicyclic compounds

d. Bridgehead C atoms

e. Bridge C atoms

f. Bridged bicyclics

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23. Which of the following compounds show stereoisomers?

a. 2-Bromo spiro $[4.5]$ decane

b. 8-Chloro spiro $[4.5]$ decane

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24. Give the number of stereoisomers of the following compounds.

a. 2-Bromobicyclo $[2.2.1]$ heptane or 2-bromo norborane

b. 2-Ethyl-7-bromo $[2.2.1]$ heptane or 2-ethyl-7-bromonorborane

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25. Classify cycloalkanes by size and ring strain.

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26. a. Draw (i) half chair, (ii) skew or twist boat cyclohexane conformation.

b. Why (i) the skew or twist boat conformation is more stable than the boat conformation, (ii) the half chair is the least stable conformation?

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27. Draw the boat conformation of ccyclohexane in Newman projection.

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28. Compare the orbital overlap in cyclopropane and alkane.

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29. i. Draw the conformation of cyclobutane that can overcome the eclipsing strain.

ii. Draw the puckered conformation of cyclobutane in Newman projection.

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30. Which is more stable, cis - or trans-1,2-dimethyl cyclobutane and whyh?

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31. Which is more more stable, cis - or trans- 1,3-di-(methylcarboxylate) cyclobutane?

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32. Each Me/H, 1,3-diaxial interaction imparts 3.75 kJ mol^{-1} and each Me/Me, 1,3-diaxial interation imparts 15 kJ mol^{-1} of instability to a compound. Find the energy differences

between the more stable conformers of

a. Cis - and trans-1,3-dimethyl cyclohexane.

b. (e,e) and (a,a) trans-1,2-dimethyl cyclohexane.

c. cis- and trans-1,1,3,5-tetramethyl cyclohexane.

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33. Which (------COOH) group is easaily decarboxylated on heating and why?

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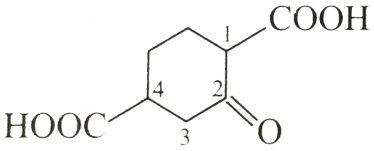
34. Which (------COOH) group is lost as CO_2 on heating in the following?

i.



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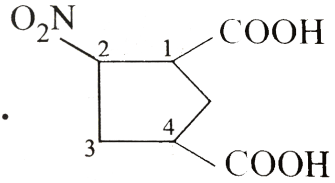
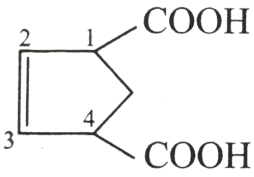


i. ii.

iii.



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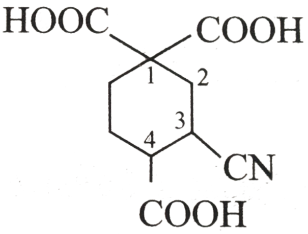

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35. Convert cyclopentanone to cyclo-butanone and vice versa.

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36. Explain:

a. Cyclopropane has the greatest ring strain, yet is readily synthesised.

b. Rings with more than six C atoms are stable but difficult to synthesise, nonetheless can be better achived at a very low concentraction of reactants.

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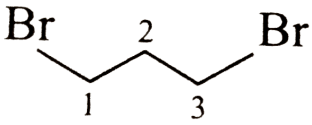
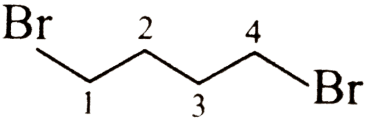
37. Complete the following. Also name the reaction and reaction type.

i. 

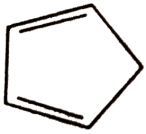
1,3-Dirbromo propane

$\xrightarrow{Mg}$ (A)

ii. 

$\xrightarrow{Mg}$ (B)

1,4-Dibromo propane

iii.  + ||

$\xrightarrow[\text{(ii) } H_2 + Pd]{\Delta}$ (C)

i.

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38. Intramolecular ring closure to form cyclobutane is unfavourable, how would you synthesise cyclobutane from open-chain compounds?

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39. How many isomers are possible (includding geometrical isomers) on monobromination of methyl cyclohexane? Which isomer is in major amount? Compare with monochlorination products.

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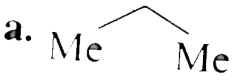
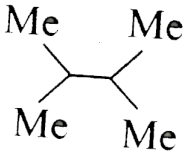
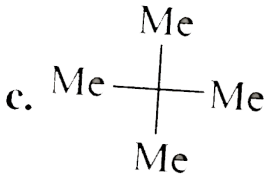
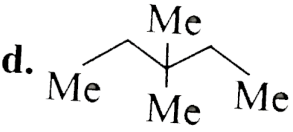
Solved Examples

1. Given the number of products obtained on inserting metjhylene in the following alkanes.

a. 

b. 

c. 

d. 

a.

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2. Given the total number of isomers, including stereoisomers, obtained on monochlorination of isopentane.

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3. Given the total number of isomers, including stereoisomers, obtained on dichlorination of paropane.

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4. a. Why are alkanes inert ?

b. Why the (C----C) bond rather than (C----H) bond breaks when alkanes are pyrolysed ?

c. Why the combustion of alkanes does not occur at moderate temperature, although it is an exothermic process ?

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5. Write the name and structrue of the following optically active compounds with lowest moleuclar weight.

i. alkane ii. Alkene

iii. Alkyne iv. unsaturated hydrocabon

v. alkyl halide vi. Alcohol

vii. Acid viii. Amine.

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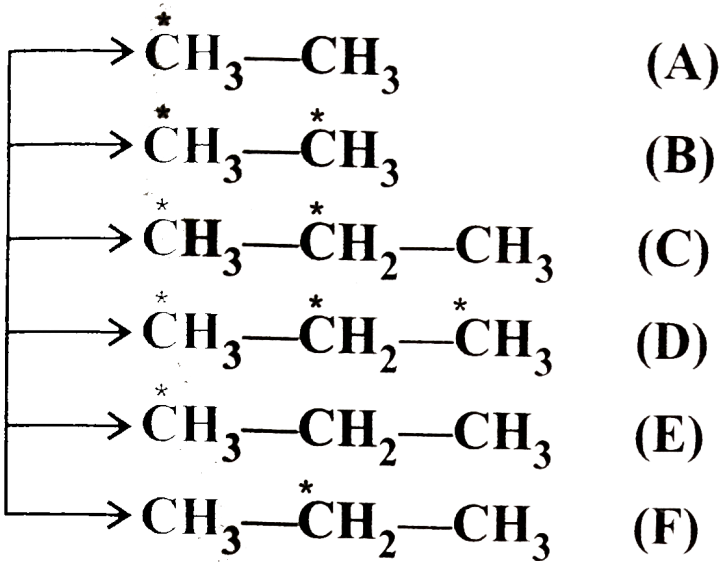
6. Synthesise the following compounds starting with CH_3I.



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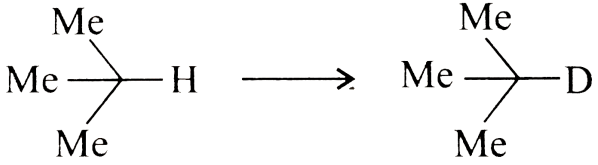
7. Convert the following:

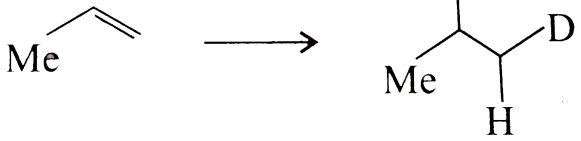
a.

a.

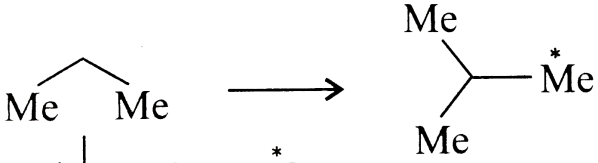
b.



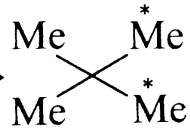
c.



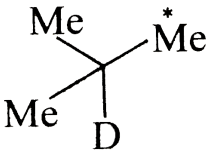
d.



e.



f.



b.

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8. Give the decreasing order of stability at room temperature of the three isomeric pentanes.

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9. a. Given the number of isomers including stereoisomers of alkane C_6H_{14}.

b. Given the decreasing order of stability at room temperature of the isomeric hexane.

c. Given the decreasing order of boiling points of the isomeric hexane.

d. Which of the isomeric hexanes gives two monochloro derivatives when chlorinated?

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10. What is the effect of branching on melting and boiling points of alkanes ?

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11. Both hexane and CF_4 have the same molecular mass and are non-polar, yet the boiling point of hexane (341 K) is greater than CF_4 (144 K). Why ?

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12. Out of 2-methylhexane and 2,2-dimethyl butane, which one has higher melting point and which one has higher boiling point ?

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13. Sulphuryl choride (SO_2CI_2) is also used as a chlorinating agent. Write the mechanism for the chlorinating of alkane using organic peroxide)

$Ph - \overset{O}{\overset{||}{C}} - O - O - \overset{O}{\overset{||}{C}} - Ph$ (benzoyl peroxide) as an initiator.

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14. Explain the difference in the melting point, boiling point, and densities of cycloalkane with those of the corresponding normal alkanes.

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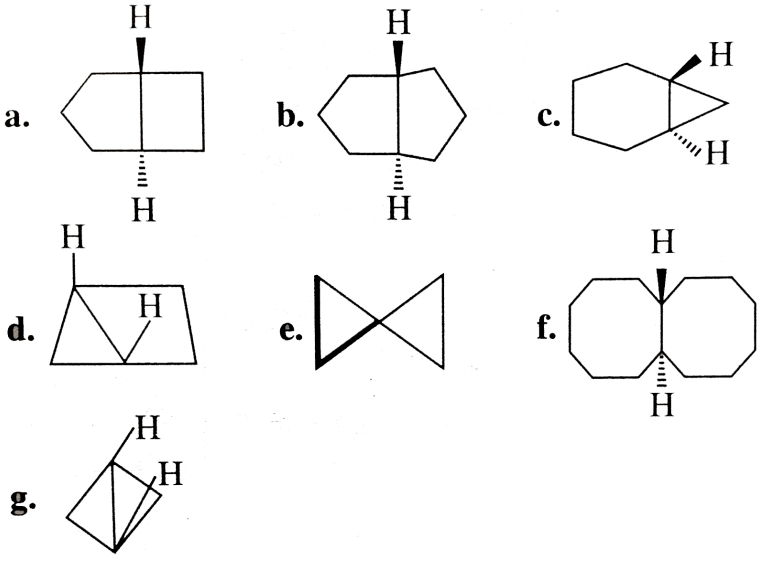
15. Which of the following compounds are isolable ?



a.

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16. How many geometrical isomers are possible for the following?

a. Decalin b. $1-$ Methyldecalin

c. $9-$ Methyldecalin

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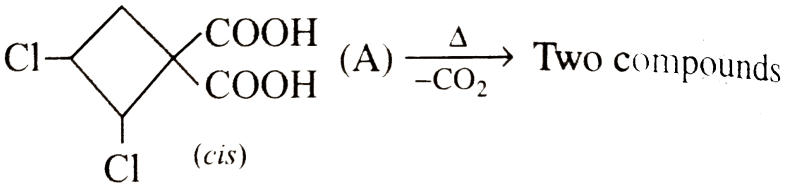
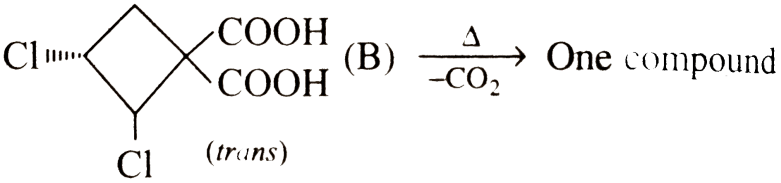
17. Explain the following observation:





Two compounds (C and D)

One compound (E)

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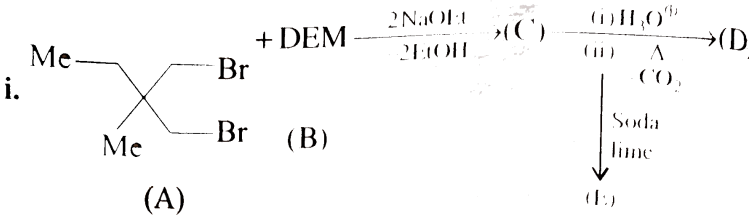
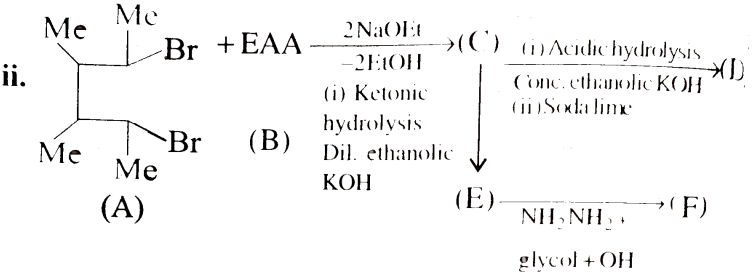
18. Complete the following reactions:

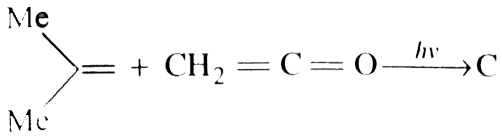
i.



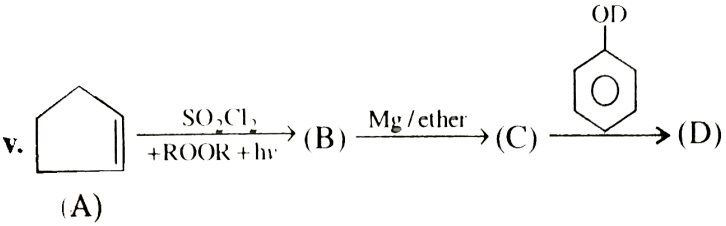
ii.



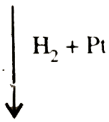
i.

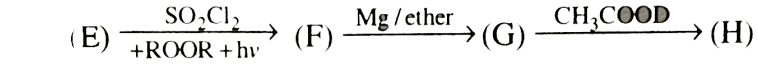
v. 

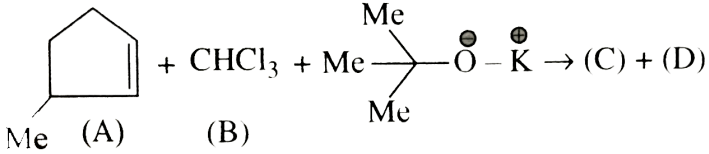
(A) (B)

v. 

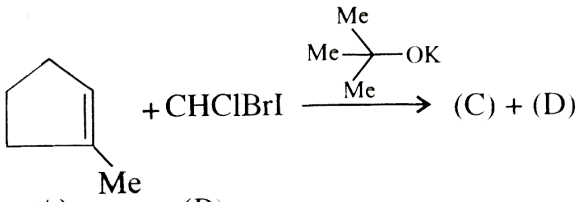
(A)





vi. 

(A) (B)

vii. 

(A) (B)

ii.

iii. Converted cyclohexanone to cycloheptane and vice versa.

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19. How many geometrical isomers are possible for the following ?

a. $1, 2 -$ Dimethylcyclobutane

b. $1, 3, 5 -$ Trimethtylcyclohexane

c. $1, 1, 2 -$ Trimethlcyclopropane

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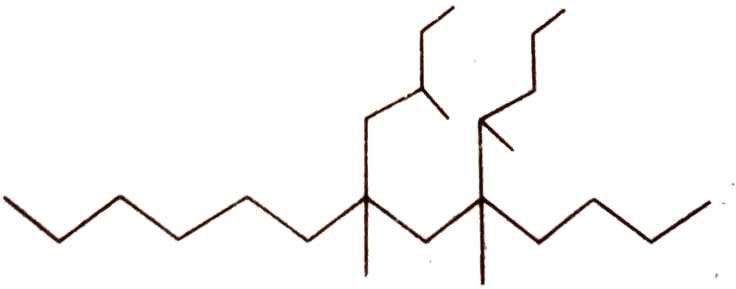
Exercises

1. a. Write the IUPAC name of the following compounds.



b. Identify 1° (primary), 2° (secondery), 3° (teriary), and 4° (quaternary) C atoms.

c. Identify all the 1° , 2° , 3° H atoms.

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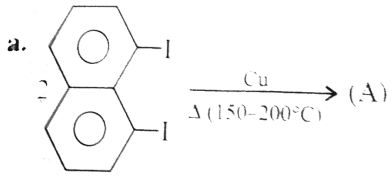
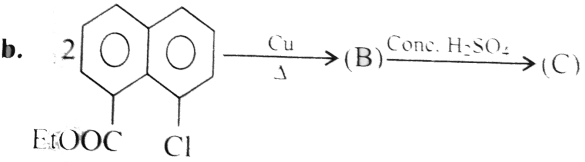
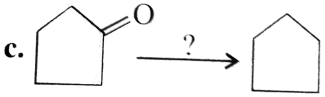
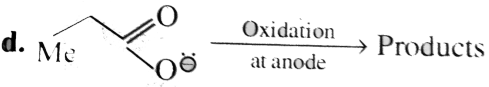
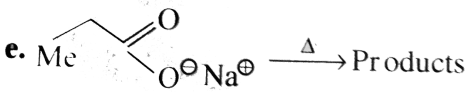
2. Complete the following reactions:

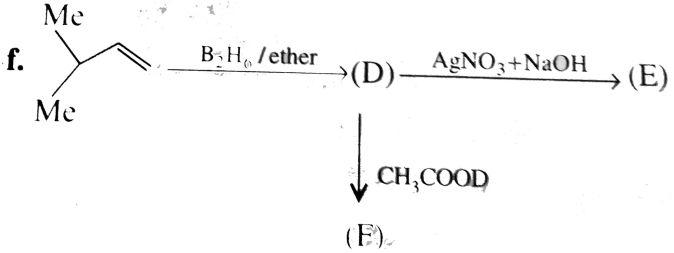


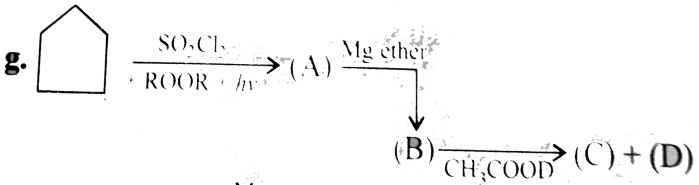


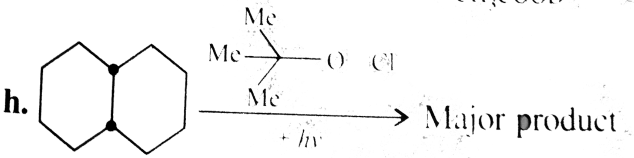












Decalin
or
Bicyclo [4.4.0] decane
or
Decahydronaphthalene

a.

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3. a. Compound A (molecular formula C_5H_{10}) gives only one monochorinated product. Write the structure of Compound A.

b. How many monochlorinated products can be obatined from all the isomeric alkanes having the formula C_5H_{10} (excluding steroisomers) ?

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4. Why dose a fuel with high ocatane number has less tendency to knock, whereas fuel with high centane number has more tendency to knock in an automobile engine ?

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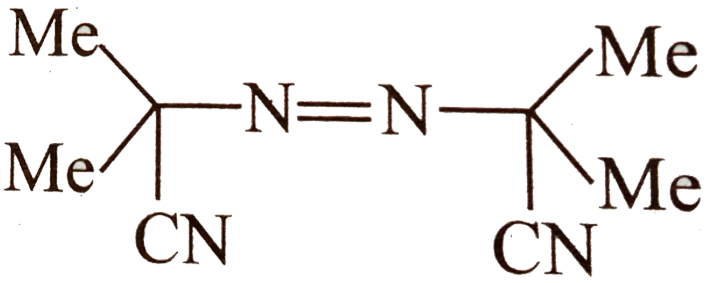

5. a.

What is the relative abstraction of H and D ?

b. Why free-radical chlorination of CH_4 is nearly 11 times faster than CD_4 ?

View Text Solution

6. There are six isomeric alkenes (A, B, C, D, E, and F) that require 1 mol of H_2 per mole of alkene for hydrogenation

and give the same product (G) on hydrogenation. G is an alkane having the lowest molecular mass and is optically active. Write the structure of compounds from A to G.

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7. There are five isomeric alkenes (A, B, C, D, and E) that require 1 mol of H_2 per mole of alkene for hydrogenation and give the same product (F) on hydrogenation. F is an alkane having the lowest molecular mass and is opticalar mass and is optically active. Write the structures of the compounds from A to F.

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8. Write the structure of all the alkenes that can be hydrogenated to from 2-mrthyl pentane.

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9. Write the reaction of benzyl magnesium obmide with CH_3OD and also identify the conjugate acid-base pairs.

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10. Calculate the percentage of compounds obtained by monobromination of isobutane. The relative reactivity of 1° , 2° , 3° H atoms to bromination is $1:82:1600$.

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11. Which factors determine the reactivity of halogens in the subsitution reaction ?

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12. Predict the percentage of ismoers formed during monobromination of 2,3-dimethyl butane at room temperature. Relative reactivity of 1° , 2° , 3° H atoms to chlorination is $(1.0 : 3.8 : 5.0)$.

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13. In the study of chlorination of propane, four prouducts A, B, C, and D of the formula $C_3H_6C1_2$ were isloated. Each of

then was further chlorinated to provide trichloro products, $C_3H_5C1_3$. It was found that A provided one trichloro product, B gave two, and C and D each gave three. What the structural of A, B, C, and D ?

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14. A chloro derivative (A) on treatment with zinc - copper couple gives a hydrocarbon with five C atoms. When 'A' is dissolved in ether and treated with sodium, 2,2,5,5-tetramethyl hexane is obtained. What is the original compound 'A' ?

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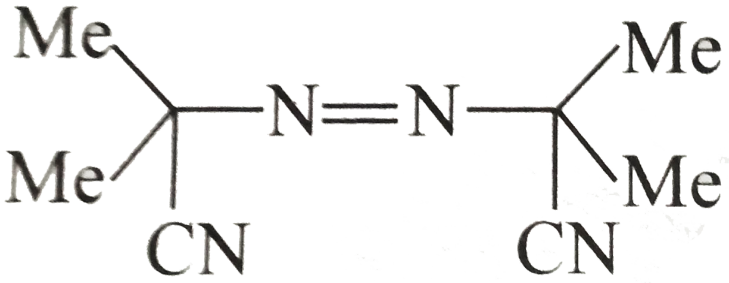
15. An alkyl halide is reduced to the corresponding alkane by tributyl stannane $(C_4H_9)_3SnH$ and by a free radical menchanism in the presence of an initiator, an azo compound



that breaks down to N_2 and a radical. Give the mechanism of the reaction.

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16. When a mixture of 2-merthyl propane and $CC1_4$ is reacted at 403-413 in the presence of a radical intiator, t-

butyl peroxide, 2-chloro-2-methyl propane and chloroform ($CHC1_3$ are formed. Give the mechanism of the reaction.

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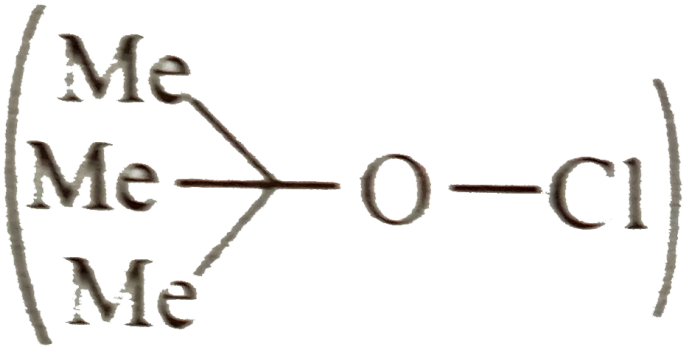
17. Alkanes are monochlorinate with t-butyl hypochlorite



as a radical intiator. Give the mechanism of the reaction.

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18. ΔHc^{-} (the standard enthalpy of combustion) of butane and 2-methyl propane is -2877.0 and -2868.0 kJ mol^{-1}, respectively. Explain the relative stabilities of the two isomers.

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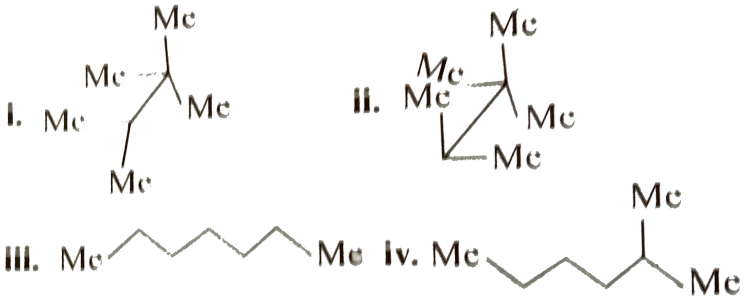
19. Arrange the following compounds according to the decreasing order of heat of combustion.

a. i. Pentane ii. Hexane

iii. 2-Methyl butane iv 2,2-Dimethyl propane

b. i.



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20. Which of the following has the highest boiling point ?

i. 2-Methyl pentane

ii. 2,3-Dimethyl butane

iii. 2,2-Dimethyl butane

b. What effect does branching of an alkane chain has on its melting point ?

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21. How many geometrical isomers are possible for the following compounds:

a. $3-$ Bromo-$5-$ iodomethyl cyclohexane

b. $5-$ Bromo-$1,3-$ diamethyl cyclohexane

c. $1,2,4$-Trimethyl cyclohexane.

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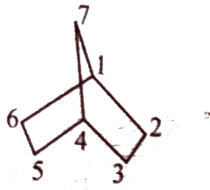
22. Complete the following reaction:

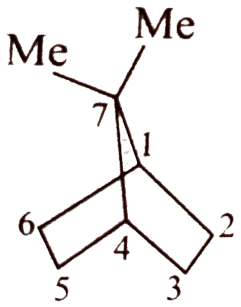
i.



Bicyclo [2.2.1] heptane
(Norborane)

$\xrightarrow[\text{Monobromination}]{Br_2+h\nu}$ A + B (Indicate major and minor products)

ii.



$\xrightarrow{\text{Monobromination}}$ A + B

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23. Equal amounts of (e, e) and (a, a) conformers of trans-1,2-dichloro cyclohexane exist in non-polar solvents but the (e, e) conformer exists in polar solvents. Explain.

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24. Which isomer has the lower energy and which is fiexible in cis and trans decalin ?

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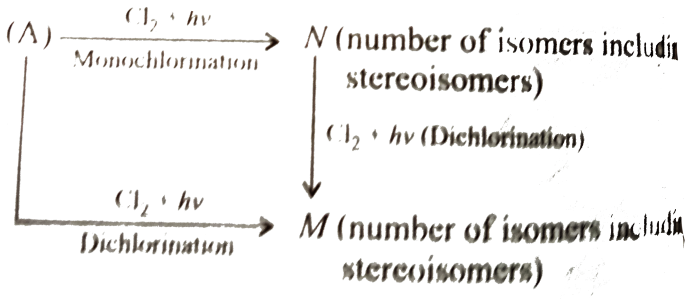
Paragraph For Problem

1. Fifteen milliliters of gaseous hydrocarbo (A) was required for complete combustion 357 ml of air (21 % oxygen by volume) and gaseous products occupied 327 ml (all volumes being measured at STP).



The molecular formula of the hydrocarbon (A) is:

A. C_2H_6

B. C_2H_4

C. C_3H_6

D. C_3H_8

Answer: D

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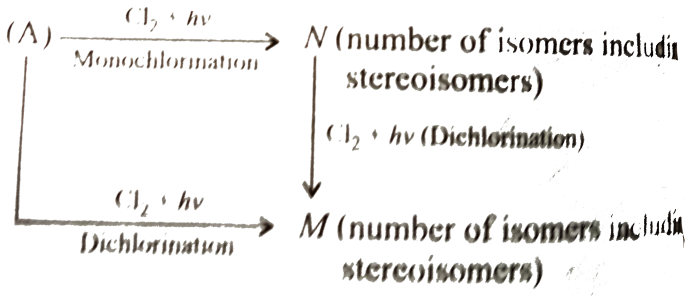
2. Fifteen milliliters of gaseous hydrocarbo (A) was required for complete combustion 357 ml of air (21 % oxygen by volume) and gaseous products occupied 327 ml (all volumes being measured at STP).



The molecular formula of the hydrocarbon (A) is:

A. 2

B. 3

C. 4

D. 5

Answer: A

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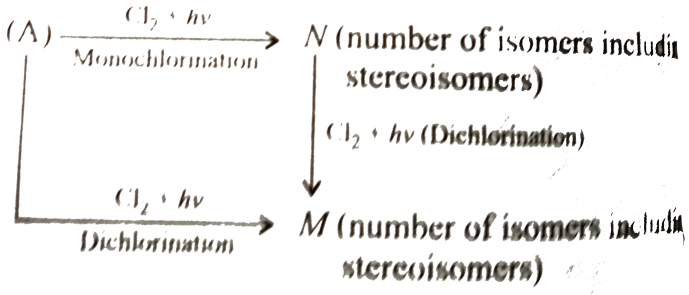
3. Fifteen milliliters of gaseous hydrocarbo (A) was required for complete combustion 357 ml of air (21 % oxygen by volume) and gaseous products occupied 327 ml (all volumes being measured at STP).



The molecular formula of the hydrocarbon (A) is:

A. 2

B. 3

C. 4

D. 5

Answer: D

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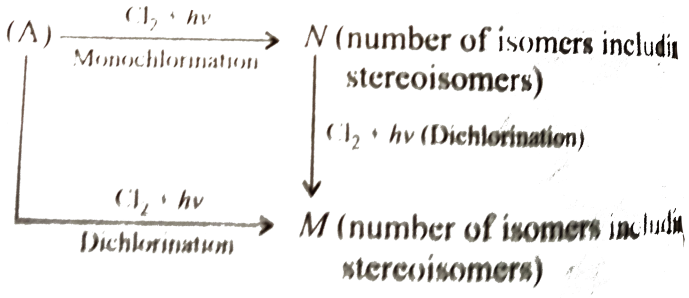
4. Fifteen milliliters of gaseous hydrocarbo (A) was required for complete combustion 357 ml of air (21 % oxygen by volume) and gaseous products occupied 327 ml (all volumes being measured at STP).

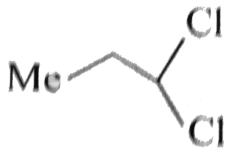


The molecular formula of the hydrocarbon (A) is:

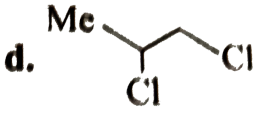
A.

B.

C.



D.



Answer: A

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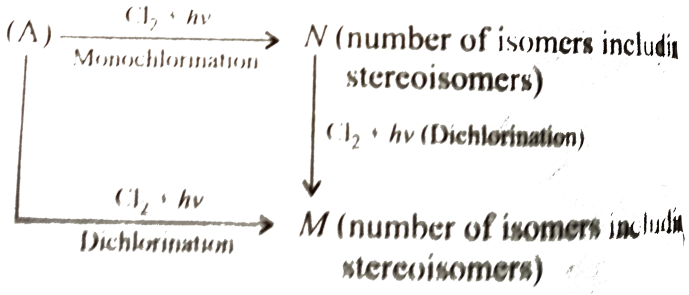
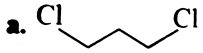
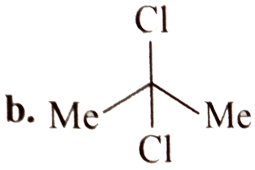
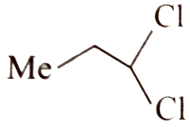
5. Fifteen milliliters of gaseous hydrocarbo (A) was required for complete combustion 357 ml of air (21 % oxygen by volume) and gaseous products occupied 327 ml (all volumes being measured at STP).

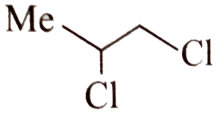


The molecular formula of the hydrocarbon (A) is:

A. a. 

B. b. 

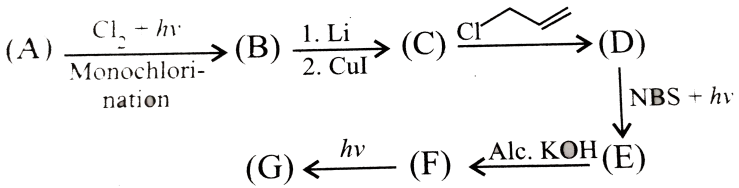
C. c. 

D. d. 

Answer: A

Watch Video Solution

6. Twenty millilitres of a gaseous hydrocarbon (A) was exploded with excess of oxygen in eudiometer tube. On cooling, the volume was reduced by 50ml. On further treatement with KOH solution, there was a further contraction of 40 ml.



The molecular formula of the hydrocarbon (A) is:

A. C_2H_6

B. C_2H_4

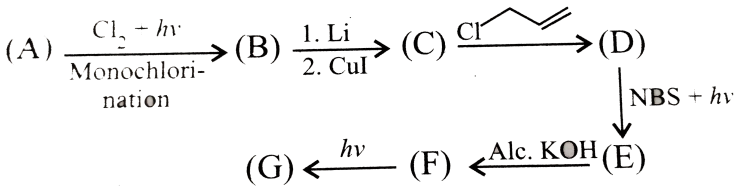
C. C_3H_6

D. C_3H_8

Answer: A

Watch Video Solution

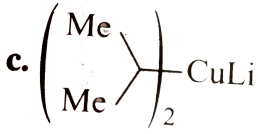
7. Twenty millilitres of a gaseous hydrocarbon (A) was exploded with excess of oxygen in eudiometer tube. On cooling, the volume was reduced by 50ml. On further treatement with KOH solution, there was a further contraction of 40 ml.



Compound (C) is:

A. $(C_2H_5)_2CuLi$

B. $(C_3H_7)_2CuLi$

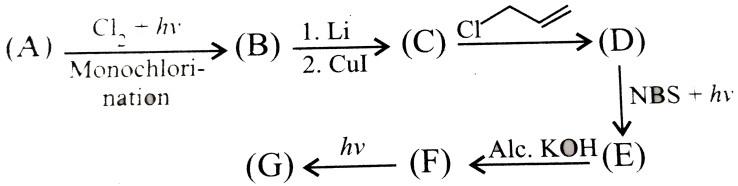
C. c. 

D. d. 

Answer: A

Watch Video Solution

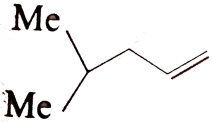
8. Twenty millilitres of a gaseous hydrocarbon (A) was exploded with excess of oxygen in eudiometer tube. On cooling, the volume was reduced by 50ml. On further treatement with KOH solution, there was a further contraction of 40 ml.



Compound (D) is:

A. a. 

B. b. 

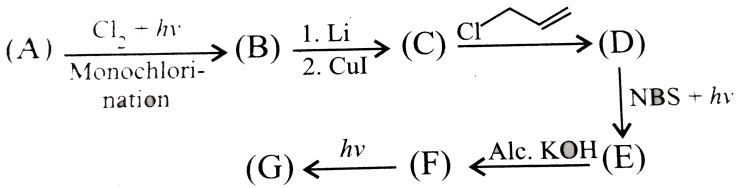
C. c. 

D. d. 

Answer: B

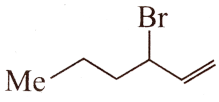
Watch Video Solution

9. Twenty millilitres of a gaseous hydrocarbon (A) was exploded with excess of oxygen in eudiometer tube. On cooling, the volume was reduced by 50ml. On further treatement with KOH solution, there was a further contraction of 40 ml.

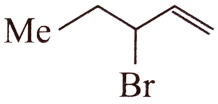


Compound (E) is:

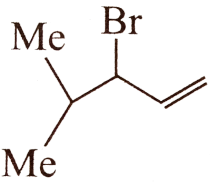
A. **a.**

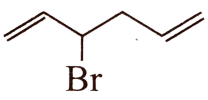


B. **b.**



C. **c.**

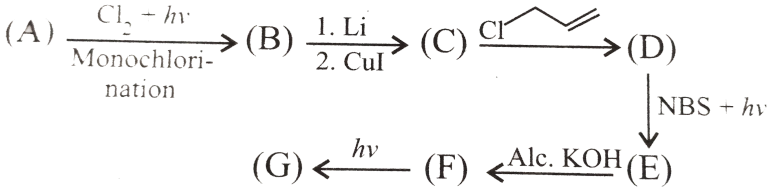


D. d. 

Answer: B

Watch Video Solution

10. Twenty millilitres of a gaseous hydrocarbon (A) was exploded with excess of oxygen in eudiometer tube. On cooling, the volume was reduced by 50ml. On further treatement with KOH solution, there was a further contraction of 40 ml.



Compound (F) is:

A. a. Me

B. b. Me

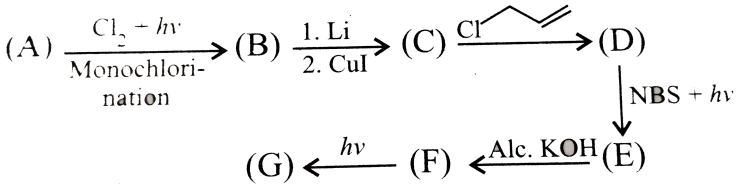
C. c. Me Me

D. d.

Answer: B

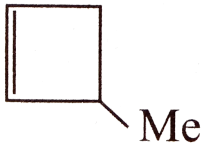
Watch Video Solution

11. Twenty millilitres of a gaseous hydrocarbon (A) was exploded with excess of oxygen in eudiometer tube. On cooling, the volume was reduced by 50ml. On further treatement with KOH solution, there was a further contraction of 40 ml.

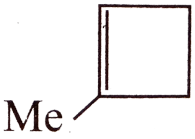


Compound (G) is:

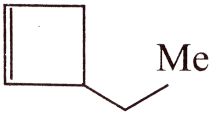
A. a.



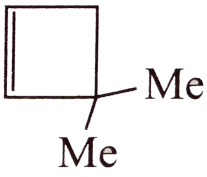
B. b.



C. c.



D. d.



Answer: A

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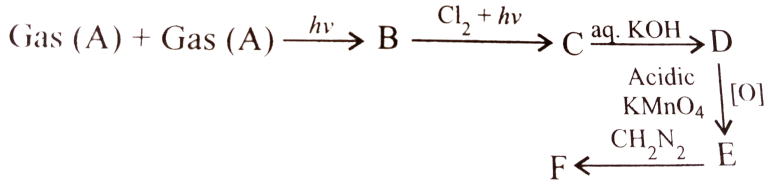
12. Five millilitires of a gas (A) containing only C and H was mixed with an excess of oxygen (30 ml) and the mixture was exploded by means of an electric spaek. After the explosion, the remaining volume of the mixed gasses was 25 ml. On adding a concentrated solution of KOH, the volume further diminished to 15 ml. The residual gas being pure oxyges.



The molecular formula of gas (A) is:

A. C_2H_4

B. C_2H_6

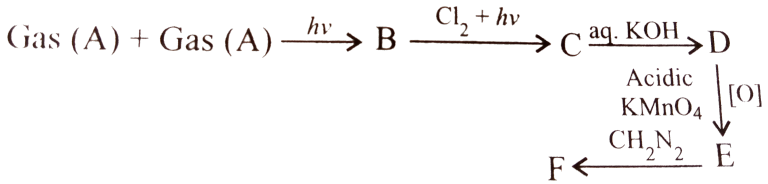
C. C_3H_6

D. C_3H_8

Answer: A

Watch Video Solution

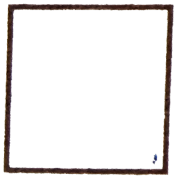
13. Five millilitires of a gas (A) containing only C and H was mixed with an excess of oxygen (30 ml) and the mixture was exploded by means of an electric spaek. After the explosion, the remaining volume of the mixed gasses was 25 ml. On adding a concentrated solution of KOH, the volume further diminished to 15 ml. The residual gas being pure oxyges.



Compound (B) is:

A. a. Me Me

B. b. Me Me

C. c. 

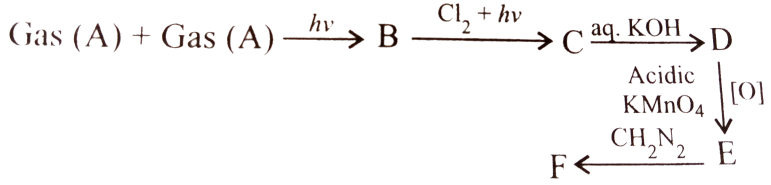
D. d. Me Me

Answer: C

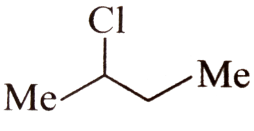
Watch Video Solution

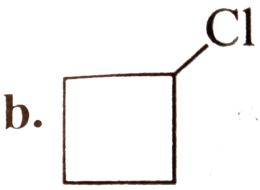
14. Five millilitires of a gas (A) containing only C and H was mixed with an excess of oxygen (30 ml) and the mixture was

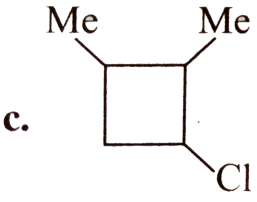
exploded by means of an electric spaek. After the explosion, the remaining volume of the mixed gasses was 25 ml. On adding a concentrated solution of KOH, the volume further diminished to 15 ml. The residual gas being pure oxyges.



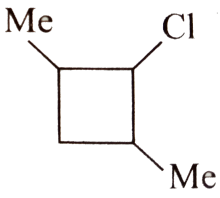
Compound (C) is:

A. 

B. 

C. 

d.

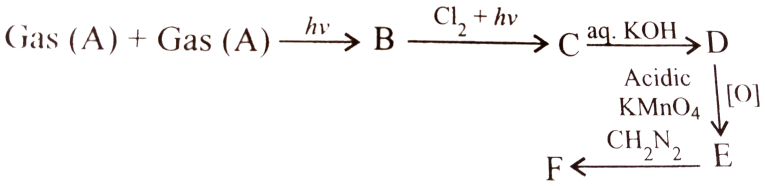


D.

Answer: B

Watch Video Solution

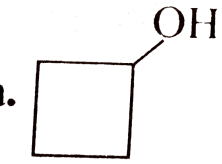
15. Five millilitires of a gas (A) containing only C and H was mixed with an excess of oxygen (30 ml) and the mixture was exploded by means of an electric spaek. After the explosion, the remaining volume of the mixed gasses was 25 ml. On adding a concentrated solution of KOH, the volume further diminished to 15 ml. The residual gas being pure oxyges.



Compound (D) is:

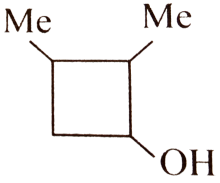
A.

a.



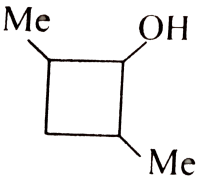
B.

b.



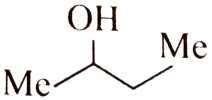
C.

c.



D.

d.



Answer: A

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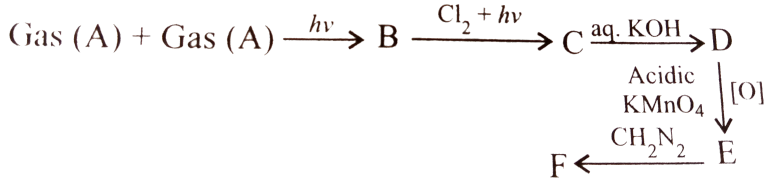
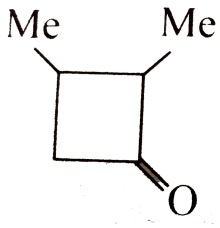
16. Five millilitires of a gas (A) containing only C and H was mixed with an excess of oxygen (30 ml) and the mixture was exploded by means of an electric spaek. After the explosion, the remaining volume of the mixed gasses was 25 ml. On adding a concentrated solution of KOH, the volume further diminished to 15 ml. The residual gas being pure oxyges.



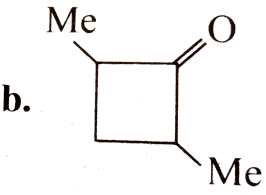
Compound (E) is:

a.

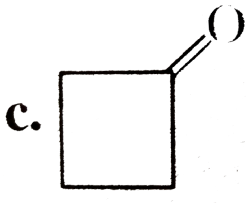


A.

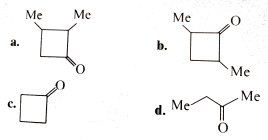
B.



C.



D.

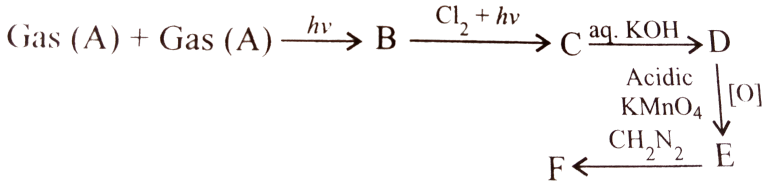


Answer: C

Watch Video Solution

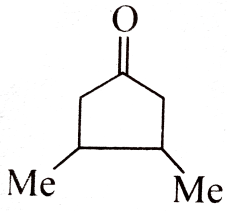
17. Five millilitires of a gas (A) containing only C and H was mixed with an excess of oxygen (30 ml) and the mixture was exploded by means of an electric spaek. After the explosion, the remaining volume of the mixed gasses was 25 ml. On

adding a concentrated solution of KOH, the volume further diminished to 15 ml. The residual gas being pure oxyges.

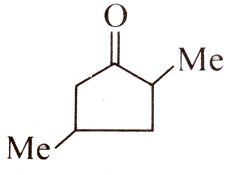


Compopund (F) is:

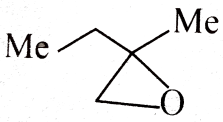
A. a.



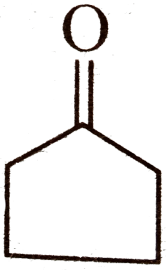
B. b.



C. c.



D. d.



Answer: D

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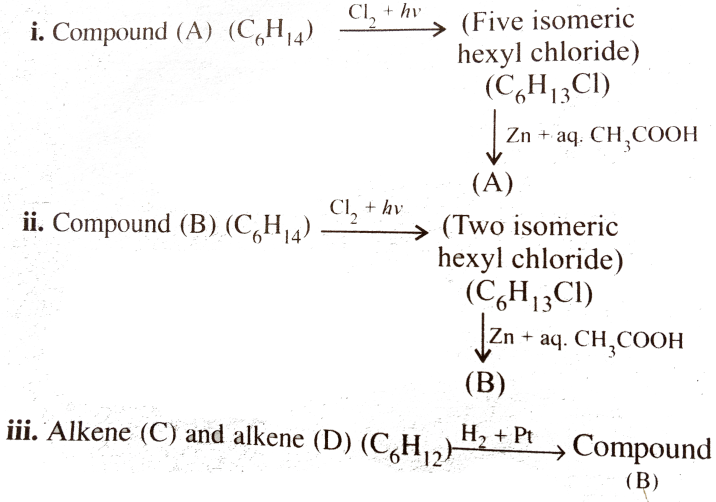
18. i. Compound (A)



ii. Compound (B)

iii. Alkene (C) and alkane (D)

Compound (A) is:

A. (a) 2,3-Dimethylbutane

B. (b) 2-Methylpentane

C. (c) 2,2-Dimethylbutane

D. (d) 3-Methylpentane

Answer: B

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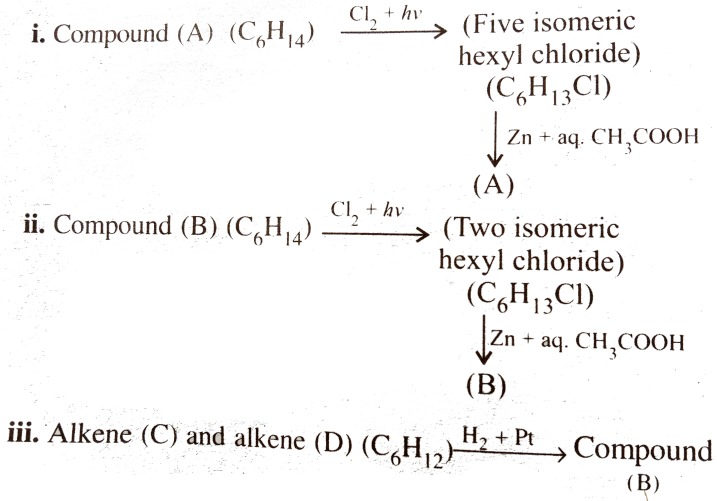
19. i. Compound (A)



ii. Compound (B)

iii. Alkene (C) and alkane (D)

Compound (A) is:

A. (a) 2,3-Dimethylbutane

B. (b) 2-Methylpentane

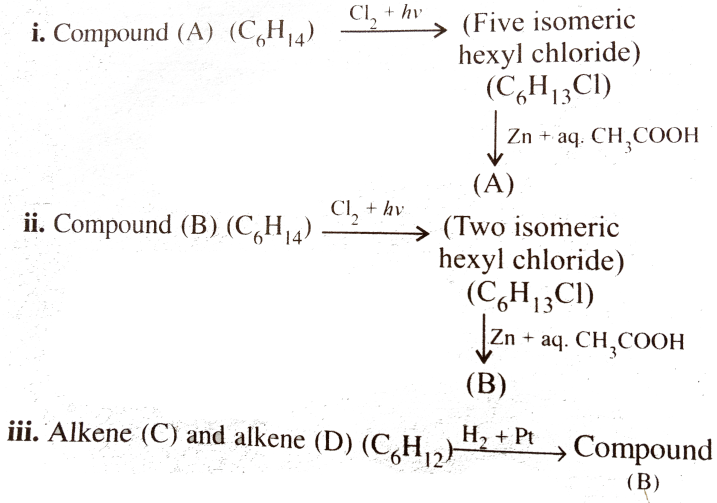
C. (c) 2,2-Dimethylbutane

D. (d) 3-Methylepentane

Answer: A

Watch Video Solution

20. i. Compound (A)

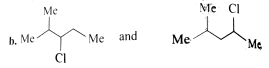


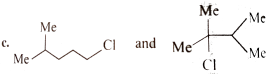
ii. Compound (B)

iii. Alkene (C) and alkane (D)

Compound (A) is:

A. 

B. 

C. 

D. 

Answer: D

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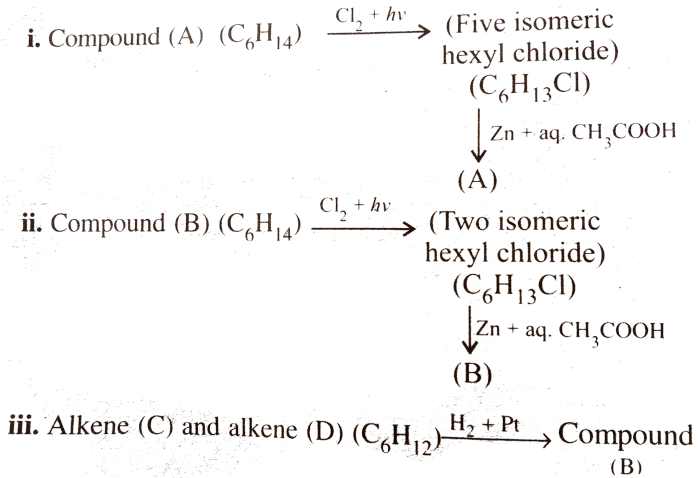
21. i. Compound (A)

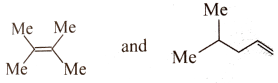


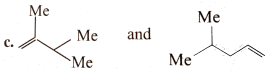
ii. Compound (B)

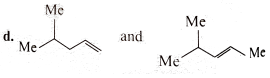
iii. Alkene (C) and alkane (D)

Compound (A) is:

A. 

B. 

C. 

D. 

Answer: A

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22. A schematic analysis of the reaction of the enantiomer with racemic mixture is shows below:

d	$+$	d and l	$\longrightarrow$	$(d)-(d)$
The$(+)$-form of chiral molecules		A racemic mixture of other molecules with $50\,\%\,(d)$ and $50\,\%\,(l)$		$+$ $(d)-(l)$

The products (d-d) and (d-l) are clearly neither identical nor enantiomers (non-superimposable mirror images) as the diastereomers, stereoisomers that are not mirror images' . The formation of diasteromers allows the separation of enantiomers (called resolution) which is not easy as enantiomers have identical physical properties. One general with naturally occurring chiral molecule to form a pair of

diastereomers. These can be separated easily as they have different physical properties. If the original chemical reaction can be reversed, the enantiomers can be isolated. Which of the following is an example of diastereomers ?

A. (a) Two gauche forms of butane.

B. (b) Products of bromination of cis-2-butene in the presence of CCl_4.

C. (c) Gauche and anti fortms of butane.

D. (d) Both (a) and (c).

Answer: C

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23. A schematic analysis of the reaction of the enantiomer with racemic mixture is shows below:

d	$+$	d and l	$\longrightarrow$	$(d)-(d)$
The$(+)$-form of chiral molecules		A racemic mixture of other molecules with $50\,\%\,(d)$ and $50\,\%\,(l)$		$+$ $(d)-(l)$

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Which of the following is not true ?

A. (a) Diastereomers have different melting points and solubilities in a given solvent.

B. (b) Diasteromers have similar chemical properties.

C. (c) Distereomers are optically active compounds with same or optisite sign of rotaion.

D. (d) Diastereomers differ in adsorption.

Answer: C

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24. A schematic analysis of the reaction of the enantiomer with racemic mixture is shows below:

d	$+$	d and l	$\longrightarrow$	$(d)-(d)$
The$(+)$-form of chiral molecules		A racemic mixture of other molecules with $50\,\%\,(d)$ and $50\,\%\,(l)$		$+$ $(d)-(l)$

The products (d-d) and (d-l) are clearly neither identical nor enantiomers (non-superimposable mirror images) as the diastereomers, stereoisomers that are not mirror images' . The formation of diasteromers allows the separation of enantiomers (called resolution) which is not easy as enantiomers have identical physical properties. One general with naturally occurring chiral molecule to form a pair of diastereomers. These can be separated easily as they have different physical properties. If the original chemical reaction can be reversed, the enantiomers can be isolated.

How many diastereomers are possible among all the possible stereoisomers of 2,3-dibromopentane ?

A. (a) 2

B. (b) 1

C. (c) 3

D. (d) 4

Answer: D

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True And False

1. State whether each of the following is true or false.

a. Photobromination of 2-methylpropane gives a mixture of 1-bromo-2-methylpropane gives a mixture of 1-bromo-2-methylpropane and 2-bromo-2-methylpropa ne in the ratio $9:1$

b. The percentage of n-propyl chloride obtained in the chlorination of propane is about 56%.

c. The percentage of 1-chloro-2-methylpropane obtained in the chlorination of isobutane is about 64%.

d. The percentage of n-propyl bromide in the bromination of propane is 44%. The relative reactives of 3°, 2° and 1° H atoms are $1600:82:1$.

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Fill In The Blanks

1. a. A hydrocarbon contains all the three tyopes of H atoms, i.e., $1^\circ, 2^\circ$, and 3°. The relative ratios of abstraction of ..... H atoms are $5.0:3.8:1.0$.

c. The relative rate of abstraction of 3°, 2°, and 1° H atoms

is maximum for ..... H atoms.

d. The relative rate of abstraction of 3°, 2°, and 1° H atoms is minimum for ..... H atoms.

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Reasoning And Assertion

1. a. Statement- 1 and Statement- 2 are true, and state-ment- 2 is the correct explanation of Statement- 1.

b. Statement- 1 and Statement- 2 are true but Statement- 2 is not the correct explanation of Statement- 1.

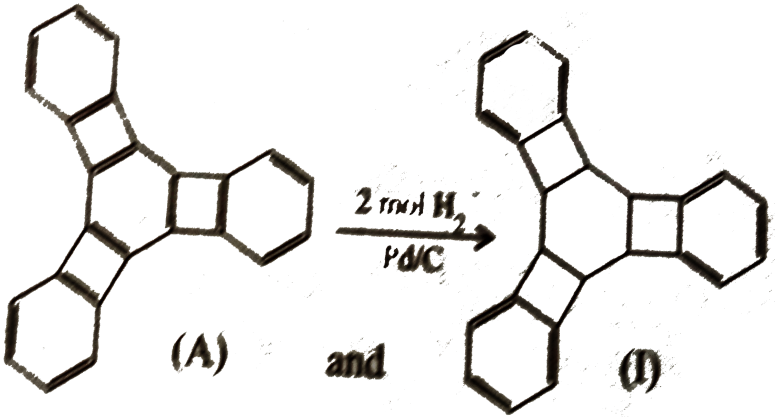
c. Statement- 1 is true and Statement- 2 is false.

d. Statement- 1 is false and Statement- 2 is true.

e. Statement- 1 is false and Statement- 2 is false.

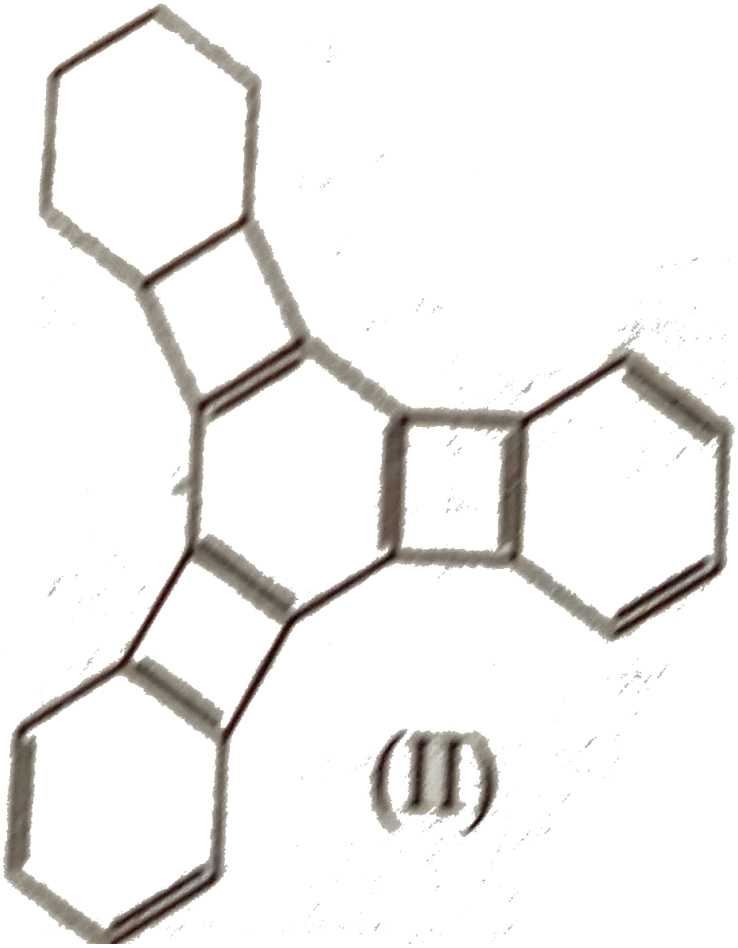
Statement- 1:

Compound (I) is formed not (II).



(A) and (I)

and



(II)

Statement- 2:

Due to the reduction of central ring, 3 four-membered anti-aromatic rings become stable to from (I). In (II), due to the reduction of terminal ring, only one anti-aromatic ring can be stabilised.

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2. a. In compound (A), number of aromatic, antiaromatic, and non-aromatic rings are 4, 3, and 0, respectively.

b. In product (I), the number of aromatic, antiaromatic, and non-aromatic rings are 3, 0, and 4, respectively.

c. In product (II), the number of aromatic, antiaromatic, and non-aromatic rings are 3, 2 and 2, respectively.

The stability order is: aromatic gt antiaromatic gt nonaromatic

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Mcq

1. An automobile engine fuel has cetane number of 80. Which of the following statements is/are true ?

A. (a) Fuel contains $80\,\%$ of α-methyl naphthalene and $20\,\%$ of $C_{16}H_{34}$.

B. (b) Fuel contains $80\,\%$ of centane and $20\,\%$ of α-methyl naphthalene.

C. (c) Knocking property of the given fuel compared to the knocking property of a fuel with cetane number of 90 is high.

D. (d) Centane number determines the quality of diesel fuel in terms of ignition properties.

Answer: B::D

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2. CH_{14} can be prepared by the reaction of H_2O with:

A. (a) Mg_2C_3

B. (b) CaC_2

C. (c) Be_2C

D. (d) $A1_4C_3$

Answer: C::D

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3. When aqueous of sodium ethanote is electrolysed, the product(s) at anode is/are:

A. (a) Ethane

B. (b) Methyl ethanoate

C. (c) CO_2

D. (d) H_2

Answer: A::B::C

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4. In the destructive distillation of coal, at 443 - 503 K temperature, a middle oil or carbolic oil fraction is obtained. This fraction contains:

A. (a) Phenol

B. (b) Xylenes

C. (c) Napthalene

D. (d) Benzene

Answer: A::C

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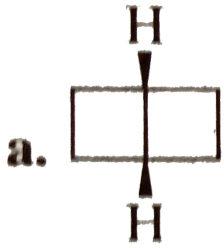
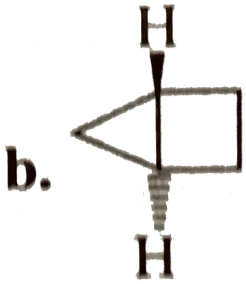
5. Which of the following compounds is/are isolabe ?

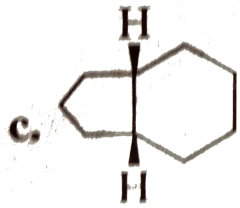
A.



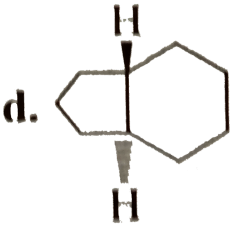
B.



C.



D.



Answer: A::C::D

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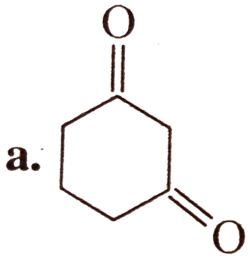
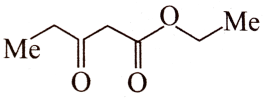
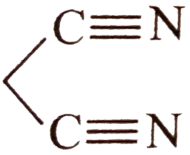
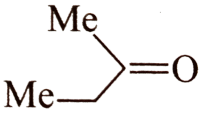
6. Which of the following compounds contain active methylene group ?

A. a. 

B. 

C. c. 

D. d. 

Answer: A::B::C

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7. Which of the following simplest alkanes with fewest number of C atom contains 1°, 2°, 3° and 4° C atoms ?

A. (a) 2,2,3-Trimethyl pentane

B. (b) 2,2,4-Trimrthyl pentane

C. (c) 2,3,3-Trimethyl pentane

D. (d) 2,2,3-Trimethyl butane

Answer: A::B::C

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

A. (a) Decaline exist in two geometrical isomers, cis and trans.

B. (b) cis from is fixible and has (a, e) conformer.

C. (c) trans from is rigible and has (e, e) conformer and is more stable than cis from.

D. (d) cis from is rigid and trans from has lower energy.

Answer: A::B::C

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9. Which of the following statements is/are correct in the synthesis of cycloalkanes by intramolecular cyclisation ?

A. (a) Large rings with more than six C atoms are stable but difficult to prepare.

B. (b) Decreasing order is thermal stability of cyclic rings is: 6 > 7, 5 > 8, 9 >> 4 > 3.

C. (c) Decreasing order of probability of ring closure is: 3 > 4 > 5 > 6 > 7 > 8 > 9

D. (d) Ease of synthesis of cyclo compounds is: 5 > 3, 6 > 4, 7, 8, 9

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

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10. Which of the following statement (s) about cyclohexane is/are wrong ?

A. (a) Stability of different conformations of cyclohexane is: Chair > Boat > Twist boat > Half chair.

B. (b) Only the chair from is free from angle strain.

C. (c) Half chair has five C atoms is one plane and one C atom out of the plane. Hence, it has both eclipsing and bond angle strain and is the least stable conformer of cyclohexane.

D. (d) Twisting the boat to the skew boat conformation moves the 'flagpole' H atoms away from each other

and reduces the eclipsing strain. Hence, the twist boat is more stable than the boat conformation.

Answer: A::B

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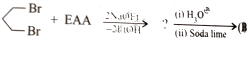
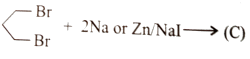
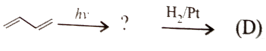
11. Which of the following reactions will not give a four-membered cyclic compound ?

A. a. 

B. b. 

C. c. 

D. d. 

Answer: B::C

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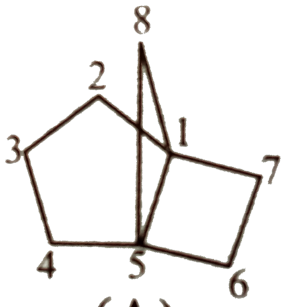
12. Which of the following statements is/are correct ?

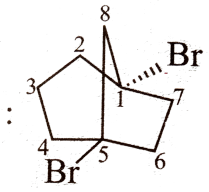


$\xrightarrow[\text{at } -60°C]{Br_2}$

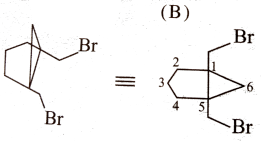
(A)

Tricyclo [3.2.1 0] octane

A. (a) The product is (A)



B. (b)



C. (c) The product (A) is favourable because the strain of both three- and four-membered rings is relieved.

D. (d) The product (B) is favourable because the strain of four-membered ring in relived.

Answer: A::C

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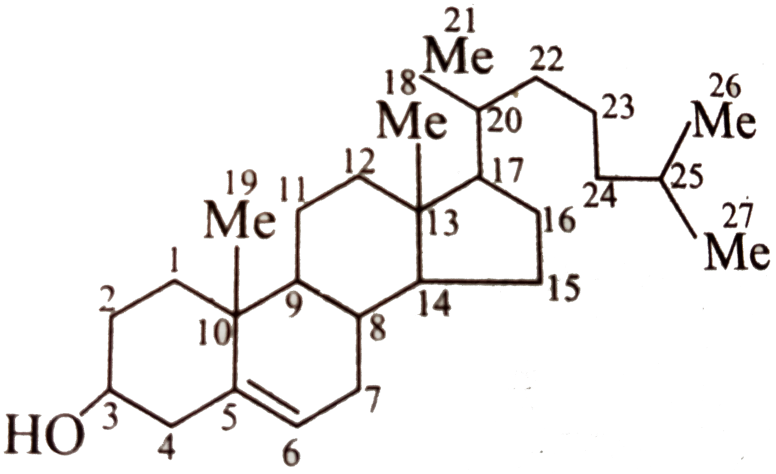
13. Structure of naturally occurring steroide cholesterol is given:



Which of the following statements is/are correct ?

A. (a) There are nine chiral in the cholesterol.

B. (b) It is a pentacyclo compound.

C. (c) There are two 4° C atoms in the compound.

D. (d) There are six 3° C atoms in the compound.

Answer: A::C::D

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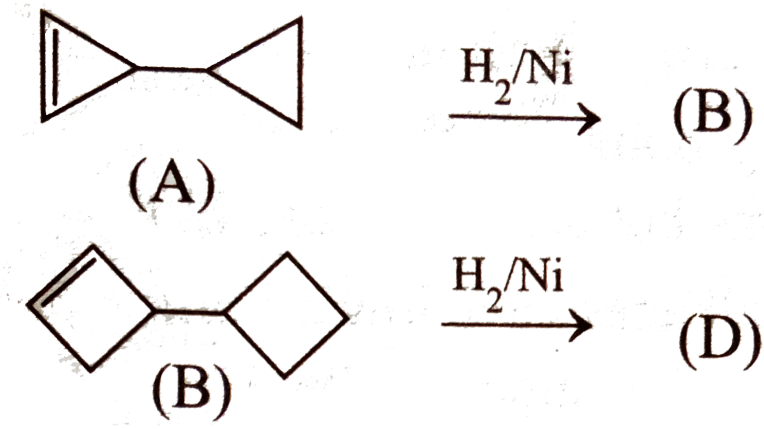
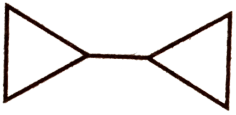
14. Which of the statements is/are correct about the following reactions ?

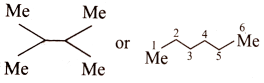


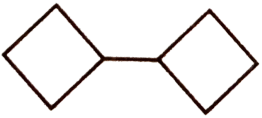
H_2 / Ni $\longrightarrow$

H_2 / Ni $\longrightarrow$

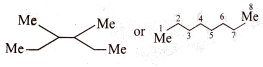
A. (a) The product (B) is 

B. (b) The product (B) is



C. (c) The product (D) is 

D. (d) The product (D) is



Answer: B::C

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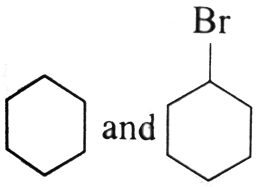
15. C_6H_{12} (A) $\xrightarrow[Monobromination]{Br_2/hv}$ One isomer (B)

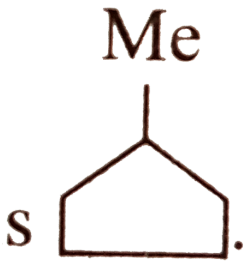
C_6H_{12} (C) $\xrightarrow[Monobromination]{Br_2/hv}$ Number of isomers including geometrical isomers

Both (A) and (C) do not decolourise Baeyer's reagent or Br_2 solution.

Which of the statements is/are correct ?

A. (a) Compound (A) and (B) are, respectively,

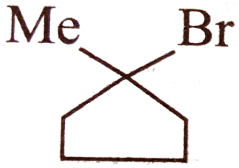




B. (b) Compound (C) is

C. (c) The total number of isomers obtained by monobromination of (C) is six including geometrical isomer.

D. (d) The major product of monobromination of (C) is



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

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16. Which statements is/are correct about the conformer of cis and trans 1,1,3,5-tertramethyl cyclohexane ?

A. (a) cis isomer is more stable than trans isomer.

B. (b) trans isomer is more stable than cis isomer.

C. (c) There are two 1,3-Me/H diaxial interactions in cis isomer.

D. (d) There are two 1,3-Me/H and one 1,3-Me/Me diaxial interaction in trans isomer.

Answer: A::C::D

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17. Which of the following statements is/are wrong about pericyclic reaction ?

A. (a) It is intramolecular cyclisation of acyclic compound.

B. (b) It is intermolecular cyclisation of acyclic compound.

C. (c) It proceeds via coincerted mechanism in which breaking and formation of bonds take place simultaneously.

D. (d) It proceed via free-radical mechanism.

Answer: B::D

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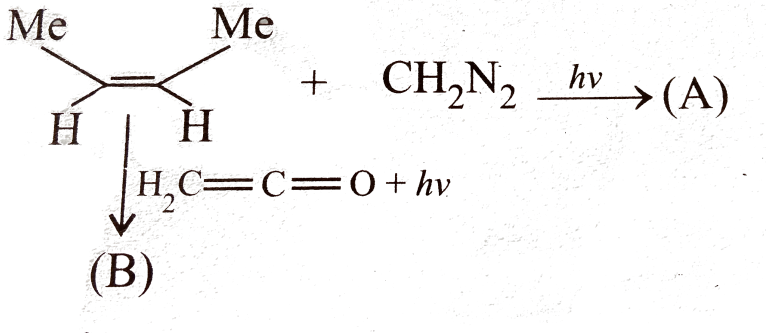
18. Which statements is/are correct about the following reaction ?



A. (a) Both the compounds (A) and (B) are cis-1,2-dimethylcyclopropane.

B. (b) Both the compounds (A) and (B) are trans 1,2-dimethylcyclo propane.

C. (c) The compound (A) is cis, whereas (B) is both cis and trans-1,2-dimethylcyclopropane.

D. (d) Fromation of compound (A) is both stereospecific and stereoselective, but the formation of compound (B) is neither sterospecific nor steroselective.

Answer: C::D

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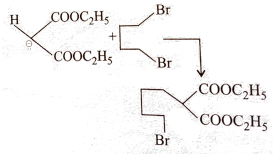
19. Which of the statements is/are correct ?

A. (a) Diels - Alder reaction is an electrocyclic reaction.

B. (b) Both thermal stability and probability (entropy) factors are responsible for affecting the formation of cycloalkanes by intramolecular cyclisation.

C. (c) 

The intermediate in the above reaction is $C^{-}ClBrI$.

D. (d) 

The above step proceeds by SN mechanism (substitution by nucleophile).

Answer: B::D

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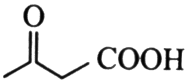
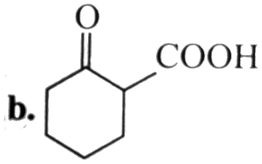
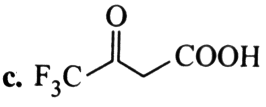
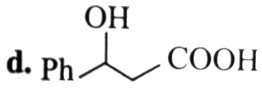
20. Which of the followlwing compounds undergoes easy decarboxylation on heating ?

A. a. 

B. 

C. 

D. 

Answer: A::B

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Single Correct

1. The decreasing order of the anti-knocking value of octane number of the following is: (I) CH_4 (II) C_2H_6 (III) C_3H_8 (IV) C_4H_{10}

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

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

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

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

Answer: A

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2. When aqueous solution of sodium ethanoate is electrolysed, the volume of gases obtained at cathode at a pressure of 1.0 bar and 298 K temperature when 2.0 Faraday of electricity is passed is:

A. (a) 67.2 liters

B. (b) 68.1 liters

C. (c) 73.2 liters

D. (d) 74.1 liters

Answer: A

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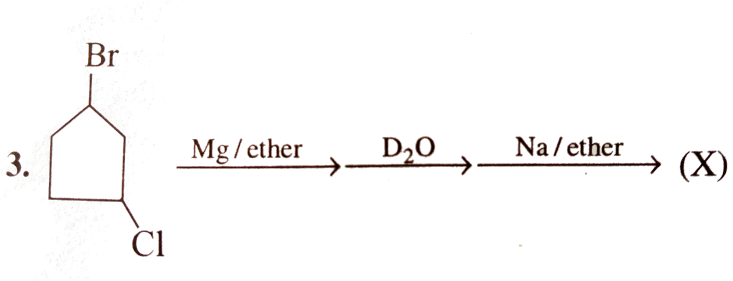
3.

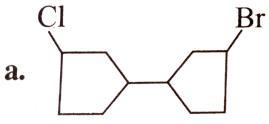


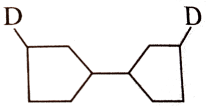
3.

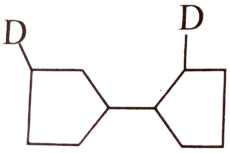
$\xrightarrow{Mg/ether}$ overset (D_(2)O)rarroverset (Na//ether)rarr` (X)

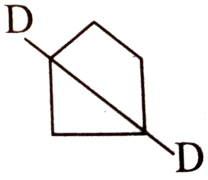
The compound (X) is:

A.



B. b. 

C. c. 

D. d. 

Answer: B

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4. Which of the statement is correct ?

I. Melting point of alkane increases with increase of C atoms and with increase in branching.

II. Boiling point of alkane increases with increase of C atoms

but with decrease in branching.

III. Cycloalkanes have lower boiling point than normal alkane with same numer of C atoms.

IV. Alkenes have lower boiling point than same number of C atoms in alkanes.

A. (I), (II)

B. (I), (II), (III)

C. (III), (IV)

D. (IV)

Answer: A

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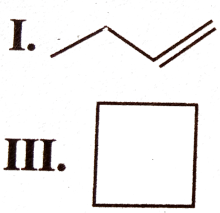
5. Arrange the following in the decreasing order of their boiling points:

I. 

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

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

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

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

Answer: A

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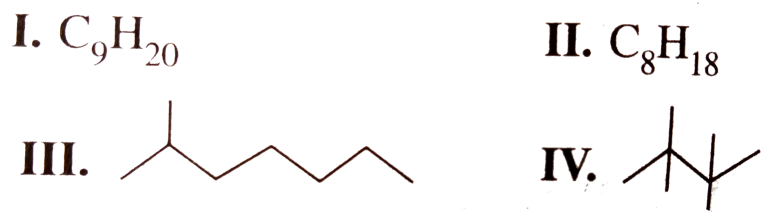
6. Arrange the following in the decreasing order of their boiling points:

I. C_9H_{20} II. C_8H_{18}



III.

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

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

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

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

Answer: A

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7. Arrange the following in the decreasing order of their melting points:

I. Decane II. Nonane

III. Octane IV. Heptane

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

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

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

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

Answer: C

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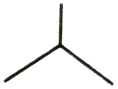
8. Which one of the following products would produce a racemic mixture on monochlorination ?

I. 

II. 

III. 

IV. 

I.

A. I, II

B. II, III

C. II, IV

D. III, IV

Answer: D

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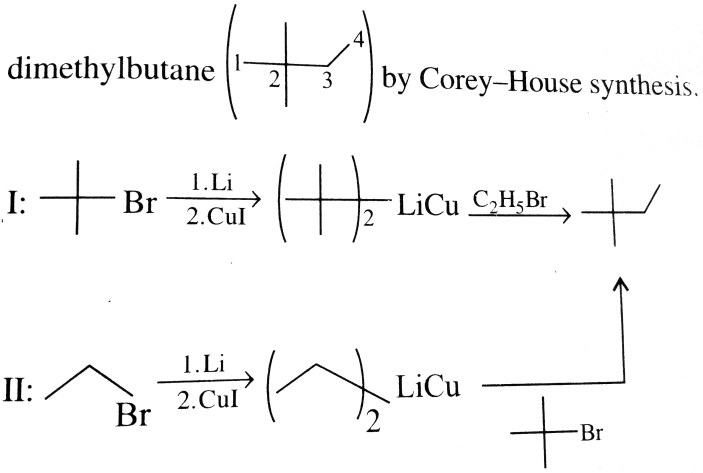
9. There are two ways for the preparation of 2,2-dimethylbutane



by Corey - House synthesis.

Which of the following statements is correct ?

A. (a) Both Part I and II are feasible.

B. (b) Part I is feasible.

C. (c) Path II is feasible.

D. (d) Both Path I and II are not feasible.

Answer: B

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10. Which of the statement is/are true about the reactivity of halogenation of alkanes ? The reactivity ordar is $F_2 > C1_2 > Br_2 > I_2$.

I. Lower the activation energy for the chain initiation step, more reactive is the halogen.

II. Lower the activation energy for the first chain propagation step, more reactive is the halogen.

III. More negative is the overall heat of the reaction (ΔH_r°) of halogenation ofg alkane, more reactive is the halogen.

IV. Lower the activation energy for the second chain-propagation step, more reactives is the halogen.

A. (a) (I), (II)

B. (b) (I), (II), (III)

C. (c) (II),(III)

D. (d) (II), (III), (IV)

Answer: C

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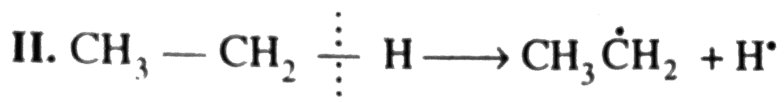
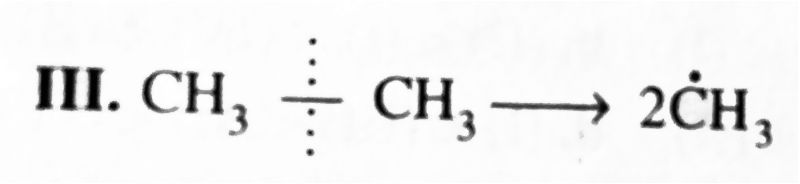
11. With the help of the following equation and data choose the wrong statement .

I. 

$E_{act} = +435.1kJ$

II. 

$E_{act} = +410.0kJ$

III. 

$E_{act} = +368.0kJ$

IV. 

$E_{act} = +343.0kJ$

V. 

$E_{act} = 355.6kJ$

A. (a) Thermal creaking of (C--H) bond of methane occurs at 1500 K and that of (C--H) bond of ethen break at 800 - 900 K.

B. (b) during homolysis of ethane at high temperature, the (C--C) bond breaks more radily than (C--H) bonds.

C. (c) During the cracking of n-butane, reaction (IV) occurs more readily than reaction (V).

D. (d) Formation of $CH_3C^{\cdot}H_2$ radical by reaction (II) will take place at lower temperature than the formation of $C^{\cdot}\_(2)H_5$ radical by reaction (IV).

Answer: D

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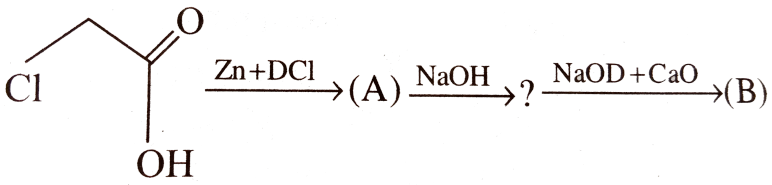

12.

The compounds (A) and (B) in the equation given above are:

A. (a) (A) CH_3COOH (B) CH_3CH_3

B. (b) (A) $DCH_2 - - COOD$ (B) CH_4

C. (c) (A) $DCH_2 - - COOH$ (B) CH_2D_2

D. (d) (A) $CH_3 - - COOD$ (B) CH_3D

Answer: C

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13. Which of the following statements is wrong ?

A. (a) The decreasing order of the numerical value of heat of combustion is:

B. (b) Cycloalkanes are planar.

C. (c) Cyclopropane has higher heat of combustion per methylene $(--CH_2--)$ group than that of cyclobutane.

D. (d) With the exception of cyclopropane, cycloalkanes are non-planar.

Answer: B

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14. Arrange the following compounds in the increasing order of homolytic (C--C) bond dissociation energy.

I. Propane II. Ethane

III. 2,2-Dimethyl propane IV. 2-Methyl propane

A. (a) $(III) < (IV) < (II) < (I)$

B. (b) $(II) < (I) < (IV) < (III)$

C. (c) $(III) < (IV) < (I) < (II)$

D. (d) $(I) < (III) < (II) < (IV)$

Answer: C

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15. There is no ring strain in cyclohexane, but cyclobutane has an angle strain of 9° 44'. If ΔH_c° of cyclohexane per (CH_2) group is 660 kJ mol^{-1} and ΔH_c° of cyclobutane is 2744 kJ $mmol^{-1}$, what is thering strain in kJ mol^{-1} of cyclobutane ?

A. -104

B. 104

C. -2084

D. 2084

Answer: B

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16. Octane number can be changed by:

A. (a) Alkylation

B. (b) Cyclisation

C. (c) Isomerisation

D. (d) All of the these

Answer: D

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17. Which of the following yields both alkane and alkene ?

A. (a) Williamson's synthesis

B. (b) Kolbe's reaction

C. (c) Wurtz reaction

D. (d) Sandmeyer's reaction

Answer: B

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18. Hydrocarbon that is liquid at room temperature is:

A. (a) Ethane

B. (b) Propane

C. (c) Butane

D. (d) Pentane

Answer: D

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19. In the free-radical chlorination of methane, the chain-intiation step involves the formation of:

A. (a) HC1

B. (b) CH_3

C. (c) CH_2C1

D. (d) $C1^{\cdot}$

Answer: D

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20. 2-Mrthyl butane reacting with Br_2 in sunlight mainly gives:

A. (a) 1-Bromo-2-mrthyl butane

B. (b) 2-Bromo-2-mrthyl butane

C. (c) 2-Bromo-3-mrthyl butane

D. (d) 1-Bromo-3-mrthyl butane

Answer: B

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21. Which of the following has the lowest boiling point ?

A. (a) 

B. (b) 

C. (c) 

D. (d) 

Answer: D

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22. Which hydrocarbnon is mainly present in gobar gas ?

A. (a) Methane

B. (b) Ethane

C. (c) Propane

D. (d) Butane

Answer: A

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23. Merthyl bromide is converted into ethen by heating it in ether medium with:

A. (a) Zn

B. (b) Cu

C. (c) Na

D. (d) Al

Answer: C

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24. Reactivity of hydrogen atoms attached to different carbon atoms in alkane has the order:

A. (a) $Tertiary > Primary > \sec ondary$

B. (b) $Tertiary > \sec ondary > Primary$

C. (c) $\sec ondary > Tertiary > Primary$

D. (d) Both (a) and (c).

Answer: B

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25. Out of the five isomeric hexanes, the isomer that can give two monochlorinated compounds is:

A. (a) 2,3-Dimethylbutane

B. (b) 2,2-Dimethyl butane

C. (c) 2-Dimrthyl pentane

D. (d) n-Hexane

Answer: A

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26. The compound having only primary hydrogen atom is:

A. (a) Butane

B. (b) Isobutene

C. (c) Cyclohexane

D. (d) 2,2-Dimethyl butane

Answer: B

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27. Which of the following has the higest knocking property ?

A. (a) Olefins

B. (b) Straight-chain paraffins

C. (c) Branched-chain paraffins

D. (d) Aromatic hydrocarbons

Answer: B

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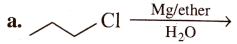
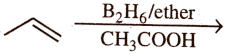
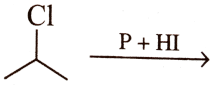
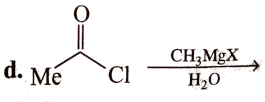
28. Which of the following reactions will not give propane ?

A. a. 

B. b. 

C. c. 

D. d. 

Answer: D

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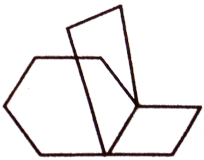
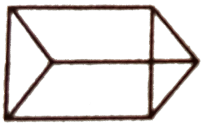
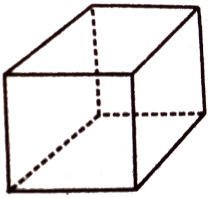
29. Which of the following is a tetracyclic compound ?

A. a. 

B. b. 

C. c. 

D. d. 

Answer: C

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30. The most stable confomation of cis-1,4-di-t-buty1 cyclohexane is:

A. (a) Boat

B. (b) Chair

C. (c) Twist boat

D. (d) Half chair

Answer: C

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31. The the most stable conformer of cis-cyclohexan-1,4-diol is:

A. (a) Diaxial boat from

B. (b) Diequatiorial boat from

C. (c) Diaxial chair from

D. (d) Diequatiorial chair from

Answer: C

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32. The most stable conformer cis-cyclohexan-1,4-diol is:

A. (a) Diaxial boat from

B. (b) Diequatiorial boat from

C. (c) Diaxial chair from

D. (d) Diequatiorial chair from

Answer: C

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33. The total number of isomer including stereosisomers for 1,2-dimethyl cyclobutane is:

A. (a) 2, one cis and one trans (both optically inactive)

B. (b) 3, one cis and two opticaly active trans froms

C. (c) 3, one trans and two optically active cis froms

D. (d) 4, two cis (optically active) and two trans (optically active)

Answer: B

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34. The toal number of isomers including stereoisomers for 1,3-dimethly cyclohexane is:

A. (a) 2, cis and trans both optically inactive

B. (b) 3, one cis and two optically active trans froms

C. (c) 3, one trans and two optically active cis froms

D. (d) 4, two cis (optically active) and two trans (optically active)

Answer: B

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35. The most stable from trans-1,2-dimethyl cyclohexane is:

A. (a) (1e, 2e)

B. (b) (1a, 2a)

C. (c) (1e, 2a)

D. (d) (1a, 2e)

Answer: A

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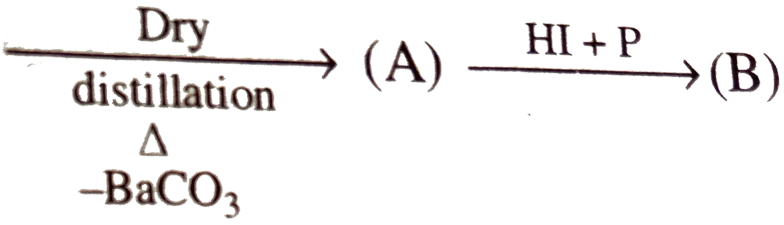
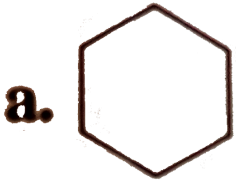
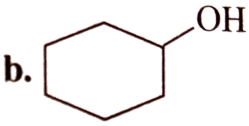
36. Consider the following reaction:

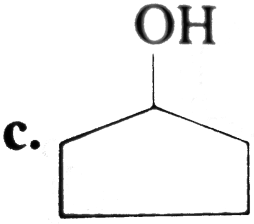
Barium adipate

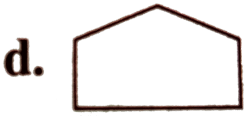


Compound (B) is:

A. 

B. 

C. 

D. 

Answer: D

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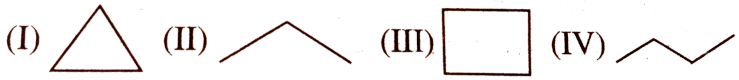
37. The decreasing order of boiling points of the following compounds is:

(I) 

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

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

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

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

Answer: C

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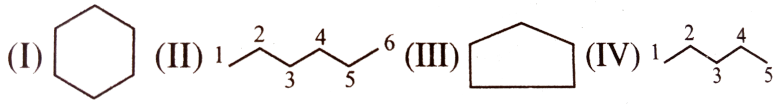
38. The decreasing order of melting points of the following compounds is:

(I) 

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

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

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

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

Answer: A

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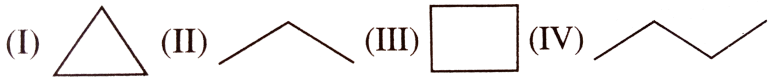
39. The decreasing order of the acidic character of the following is: (I)



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

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

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

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

Answer: B

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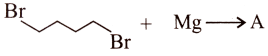
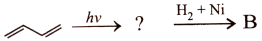
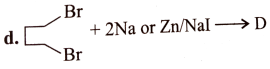
40. Which of the following reactions will not give four-membered cyclic compound ?

A. a. 

B. b. 

C. c. $2\,CH_2=CH_2 \xrightarrow{h\nu} C$

D. d. 

Answer: A

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41. The structue of alkane or cycloalkane with molecular formula C_8H_{18} that has only 1° H atoms is:

A. (a) 2,2,3,3-Tetramethylbutane

B. (b) 2,2,3-Trimethylpentane

C. (c) 2,2,4-Trimethylpentane

D. (d) 2,3,3-Trimethylpentane

Answer: A

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42. The structure of the compound with molecular formula C_6H_{12} that has only 2° H atoms is:

A. (a) 1-Methyl cyclopentane

B. (b) Cyclohexane

C. (c) 2,3-Dimethyl but-2-ene

D. (d) 2-Methyl pent-2-ene

Answer: B

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43. The structure of the compound with molecular formula C_6H_{12} that has only 1° and 2° H atoms is:

A. (a) 1-Methyl cyclo-pentane

B. (b) 1,1-Dimethyl cyclobutane

C. (c) Cyclohexane

D. (d) 2-Methyl pent-2-ene

Answer: B

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44. The structure of the compound with molecular formula C_8H_{14} that has 12 secondary and 2 tertiary H atoms is:

A. (a) Bicyclo $[2.2.2]$ octane

B. (b) 1,2-Dimethyl cyclohexane

C. (c) Bicyclo $[3.2.1]$ octane

D. (d) Tricylo $[2.2.2.0]$ octane

Answer: A::c

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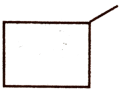
45. Give the decreasing order of the stability of the following or increasing order of heat of combustion.

(I)  (II)  (III) 

(I)

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

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

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

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

Answer: B

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Archives

1. Marsh gas mainly contains:

A. (a) CO

B. (b) H_2S

C. (c) C_2H_2

D. (d) CH_4

Answer: D

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2. The compound with the highest boiling point is:

A. (a) n-Pentane

B. (b) n-Hexane

C. (c) 2-Methyl butane

D. (d) 2,2-Dimethyl propane

Answer: B

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3. The highest boiling point is expected for:

A. (a) Isooctane

B. (b) n-Octane

C. (c) 2,2,3,3-Tetramethyl butane

D. (d) n-Butane

Answer: B

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4. The compound which has one isopropyl group is –

A. 2-Methyl pentane

B. 2,2,3,3-Tetramethyl pentane

C. 2,2,3,3-Dimethyl pentane

D. 2,2,3-Trimethyl pentane

Answer: A

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5. The (C--H) bond distance is longer in:

A. (a) $C_2H_2Br_2$

B. (b) C_2H_4

C. (c) C_2H_6

D. (d) C_2H_2

Answer: C

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6. When cyclohexane is poured in water, it floats because:

A. (a) Cyclohexane is in boat from.

B. (b) Cyclohexane is denser than water.

C. (c) Cyclohexane is in chair form.

D. (d) Cycloherxane is in crown from.

Answer: B

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7. The products obtained at cathode and anode on electrolysis of aqueous sodium succinate are

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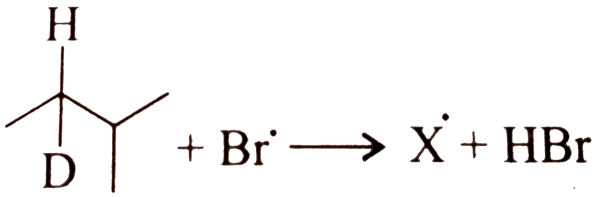
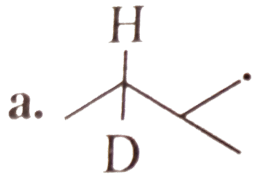
8. Consider the following reaction:

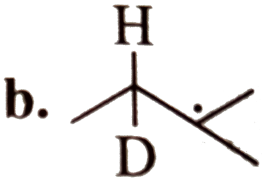


Identify the structure of the major product X.

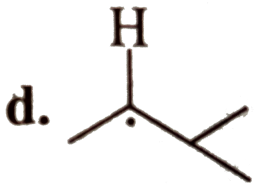
A.



B.



C. 

D. 

Answer: B

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9. How many chiral compounds are possible on monochlorination of 2-Methyl butane ?

A. (a) 2

B. (b) 4

C. (c) 6

D. (d) 8

Answer: B

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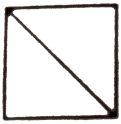
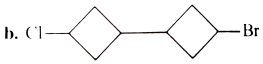
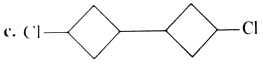
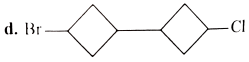
10. What would be the product formed when 1-bromo-3-chlorocylobutane reacts with two equivalents of metallic sodium in water ?

A. a. 

B. b. 

C. c. 

D. d. 

Answer: C

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11. μ observed $= \Sigma \mu_i X_i$

where μ_i is the dipole moment of the stable conformer and X_i is the mole fraction of that conformer.

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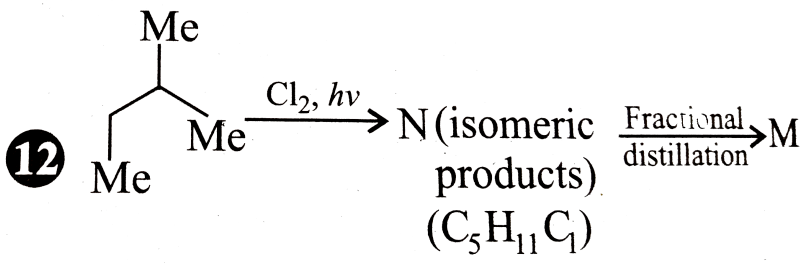
12.



The value of N and M are:

A. (a) 3,3

B. (b) 4,4

C. (c) 6,6

D. (d) 6,4

Answer: D

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13. The total number of cyclic structure as well as stereoisomers possible for a compound with the molecular formula C_5H_{10} is:

A. (a) 7

B. (b) 9

C. (c) 12

D. (d) 13

Answer: A

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