CHEMISTRY

BOOKS - CENGAGE CHEMISTRY (HINGLISH)

ISOMERISM

Illustration

1. Give various functional isomers of butanol and give their isomeric relations.

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2. Give various functional isomers of pentanal and give their isomeric relations.

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3. Give various functional isomers of butanoic acid and give their isomeric relations.

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4. (I) Give various functional isomers of butan-1-amine and give their isomeric relations.

(II) Give various isomers of butan -1-amine and their isomeric relations.

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5. I. Give the various functional isomers of pent-1-yne and give their isomeric relations.

II. Give the various isomers of pent-1-yne and their isomeric relations.

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6. Give various functional isomers of 2-phenyl ethanol and give their isomeric relations.

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7. I. Give various functional isomers of butanenitrile and give their isomeric relations.

II. Give the various isomers of butanenitrile and give their isomeric relations.

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8. Write more stable tautomeric structrues of the following:

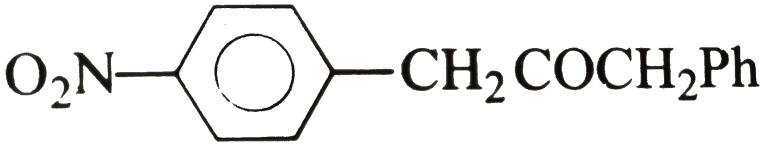
(a) Phenol

(b) Methyl-3-oxobutane

(c)Cyclohexan -1,3,5 trione

(d) Butan-2-one

(e)1-Phenyl butan-2- one

(f) 

(g). 2-Bicyclo[4.1.0] heptan-2-one

$$\underset{(A)}{\text{Glycerol}} \xrightarrow[\substack{\text{or} \\ P_2O_5 \\ -2H_2O}]{KHSO_4} (B) \xrightleftharpoons{\text{Tautomeric form}} (C)$$

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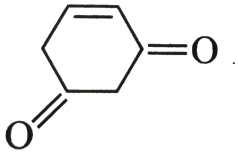
9. Keto-enol tautomerism is observed in :

(i) a.$PhCHO$, b.$PhCOCH_3$

c. $PhCOPh$, d. $PhCOCH_2COCH_3$

a. PhCH=CH—OH

b. 

c. 

(II) Arrange the following in the decreasing

order of enol content:

(i) a.CH_3COCH_2CHO , b. CH_3COCH_3

c. CH_3CHO , d. $CH_3COCH_2COCH_3$

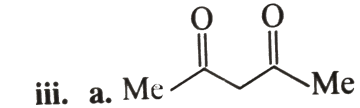
(ii) a. $CH_2(COOEt)_2$ (Diethyl malonate)

b. $CH_3COCH_2COOEt(EAA)$

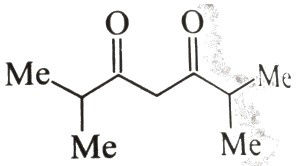
c. $CH_3COCH_2COCH_3$

d. $PhCOCH_2COCH_3$

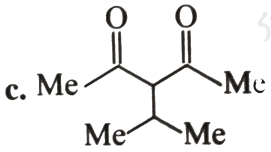
iii. a.



b.



c.



(III) Give the decreasing order of enol content of ethyl acetoacetate in the following solvents:

a. Water b. Methanol

c. Benzene d. Acetone

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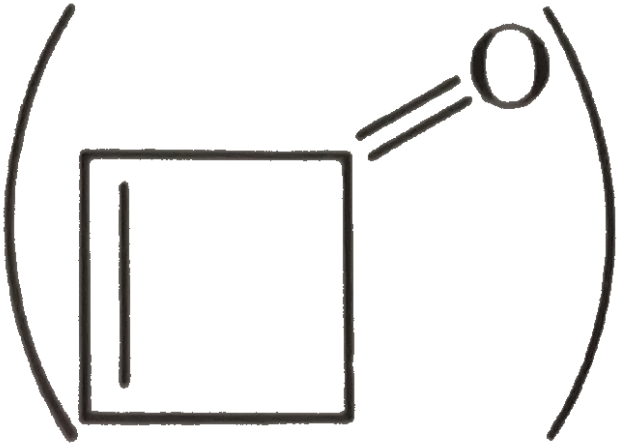
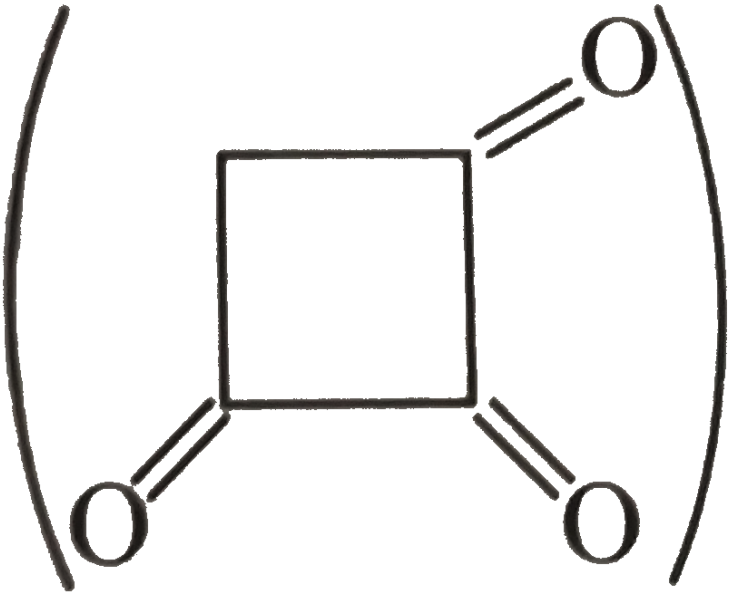
10. Explain the following:

I. Which of the following is more easily enolised?

a. Cyclobutenone



b. Triketo cyclobutane



II. Why are keto forms of 2-pyridinol and 4-pydridinol more stable than enol form?

III. Why is keto form generally much stable than enol form?

IV. Why is enol content of butane $-2,3$ dione(biacetyl) (A) slightly higher than that of butan-2 one (B) and much less than that of cyclohexane $-1,2-$ dione(C)

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11. Write all the acyclic and cyclic isomers of a compound having molecular formula C_3H_6O.

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12. Write all the ring-chain isomers of (a) pent-1-ene and (b) Pent-1-yne.

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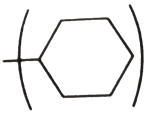
13. Arrange the following ligands in the decreasing order of priority.

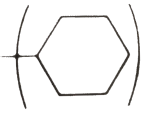
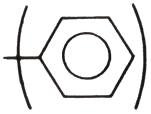
a. i.$-OH$, ii. $-COOH$

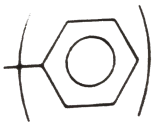
iii $-CH_2OH$, iv.$CH(OH)CH_3$

b. i. $-NH_2$ ii. $-C \equiv N$

iii. $-NO_2$ iv. $-CH_2NH_2$

c. i. $CH(CH_3)_2$ ii. 
cyclohexyl

d. i.  ii. 
Phenyl

e. i. 
Phenyl ii. $-C(CH_3)_3$

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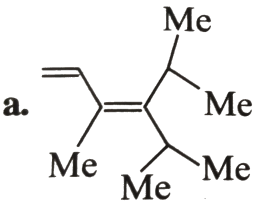
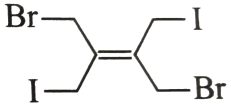
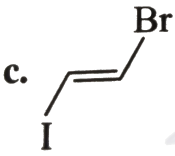
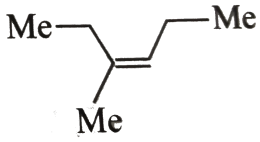
14. Which of the following alkenes have diasteremores?

a. 

b. 

c. 

d. 

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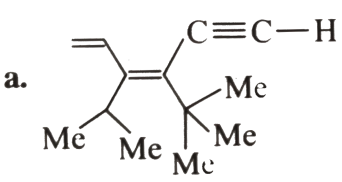
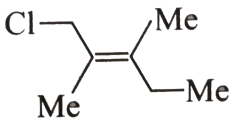
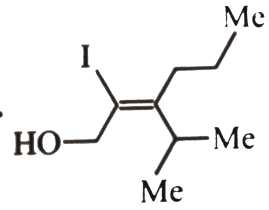
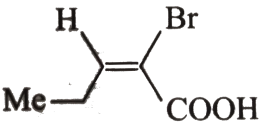
15. Assign $E - Z$ configuration to each of the following:

a. 

b. 

c. 

d. 

a.

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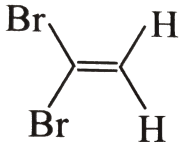
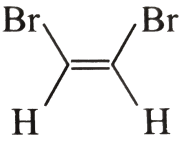
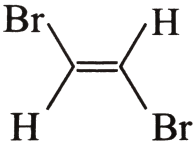
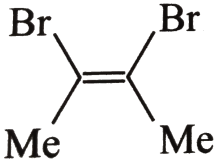
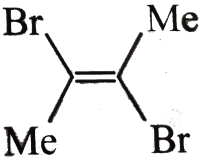
16. Give the decreasing order of net dipole moments of the following:

a. (I) 

(II) 

(III) 

b. (I) 

(II) 

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17. Give the structural and diastereomers of pent-1-ene.

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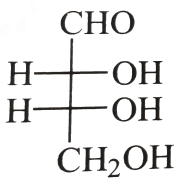
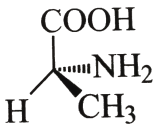
18. Specify the configuration of following compounds in D of L.

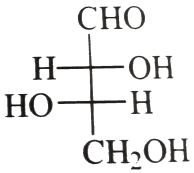
(a)



(b)



(c)



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19. The optical rotation of an optically active compound is $+20^{\circ}$. The length of tube is $10cm$ and the density of solution is $0.4gmml^{-}$. The specific rotation of the

compound is:

i. $+50^\circ$ ii. $+500^\circ$ iii. $+5^\circ$ iv. $+0.5^\circ$

b. Which of the following are optically active compounds and why?

i. Butan-1-ol ii. 2-Chlorobutane

II. Lactive acid iv. 3-Chloropentane

c. Which of the following are optically active and why?

i. $CH_3CH(Cl)CH_3$

ii. $CH_3CH_2CH(CH_3)COOH$

iii. $CH_3CH_2CH(NH_2)CH_3$

iv. CH_2OHCH_2OH

d. Which of the following are optically active

and why?

i. Propan-1-ol , ii. Butan-2-ol

iii. Heptan-4-ol , iv. 3-Aminohexane

v. 2-Chloropentane , vi. 2,2-Dichloropropane

e. Mark $(*)$ on the asymmetric carbon atom, if any, in the following compounds:

(i) $CH_3 - CHCl - CH_2 - CH_3$, ii. $CH_3 - CHOH - CH_3$.

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20. Explain the following:

a. What is stereocentre and how it is related to a chiral centre?

b. What kinds of sp^2-hybridised C atoms cannot be chiral centres?

c. What kinds of sp^3- hybridised atom other than C atom can be chiral?

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21. 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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22. a. How many stereoisomers are possible for the compound $CH_3CH = CHCHClCH_3$?

b. How many stereoisomers are possible for the compound $HOOCCH_2 - COOH$?

c. Isopentane on monochlorination gives _____ isomers and out of them _____ are optically active.

d. Which of the following compounds exhibits (s) geometrical isomerism?

i. C_2H_5Br , ii. $(CH)_2(COOH)_2$

iii. CH_3CHO , iv. $(CH_2)_2(COOH)_2$

e. Write down the structuers of stereoisomers

of the following:

i. 2,3-Dihydroxybutane

ii. 3-Phenyl-2-propenoic acid

f. Write down the number of asymmertric carbon atoms in each optically active compound and report the number of isomers.

i. $CH_3(CHOH)_2COOH$

ii. $COOH.(CHOH)_2COOH$

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23. How many structural isomers and stereoisomers of bromopiperidine are possible?

b. How many stereoisomers of 4-chlorocyclohexane are possible?

c. How many optically active and inactive isomers of $2, 3, 4, 5$- tetrachloroadipic acid are possible?

d. How many meso diastereomers of $C_6H_{12}Br_2$ are possible

e. How many optically active inactive isomers of $1, 2, 3 -$ trimethylcyclohexane are possible?

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24. a. The specific rotation of a pure enantiomer is $+10^{\circ}$. What will be its observed rotation if its is isolated from a reaction with

i. 30% racemisation and 70% retention.

ii. 70% racemisation and 30% inversion.

b. What is the percentage composition of a mixtrue of two enantiomers whose rotation is -10°? The specific rotation of pure enantiomers is -20°.

c. What is the optical purity of a sample having an $[\alpha]_{obs.} = +9.0^\circ$ if $[\alpha]_D = +12^\circ$.

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25. An aqueous solution containing $10gm$ of optically pure fructose was diluted to $500ml$ with water and placed in a polarimeter tube $20cm$ long. The measured roatation was -5.0°. To this solution, $500ml$ of a solution containing $10gm$ of racemic fructose is added. What will be the change in specific rotation?

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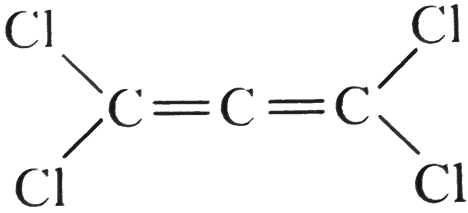
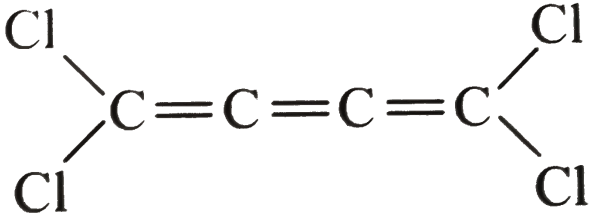
26. Which of the following will show dipole moment (μ)?

I.



II.



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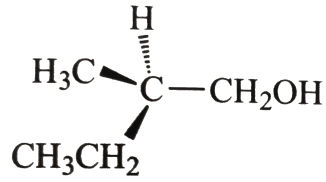
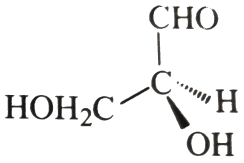
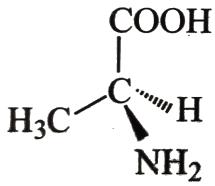
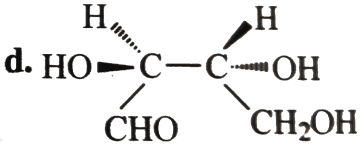
27. Draw Fischer projection formulae for the following molecules:

a. 

b. 

c. 

d. 

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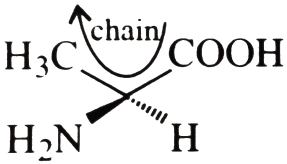
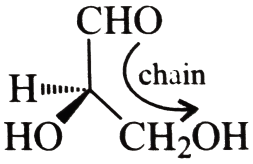
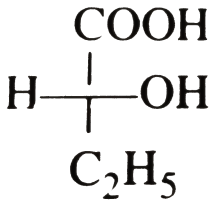
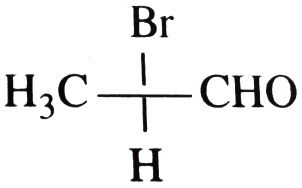
28. a. Convert Wedge formula to Fischer formula.

(1) 

(2) 

b. Convert Fischer formula to Wedge formula.

(1) 

(2) 

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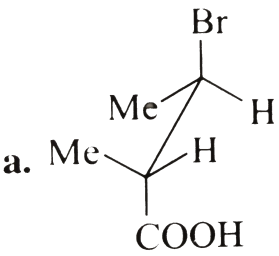
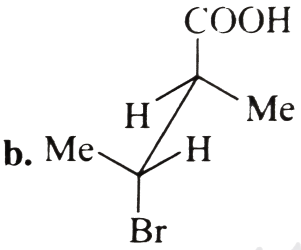
29. Convert Sawhorse formula to Fischer formula.





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30. Assign the R and S configurations to the enantiomers of 2-chlorobutane.

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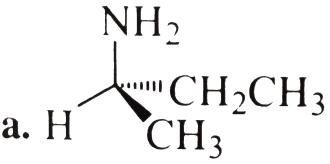
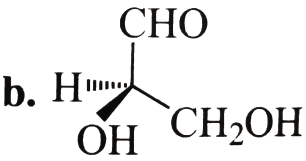
31. Assign the R and S designation to the following compounds:





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32. Give the effect of the configuration of $(S)-2-$ bromo butane on performing the following operations:

a. Exchanging ligands across the horizontal bond.

b. Exchanging ligands across the vertical bond.

c. Making both switches (a) and (b)

d. Exchanging a horizontal and vertical ligand.

e. A 180° verticle or horizontal rotation outside the plane of paper.

f. A 90° rotation on the plane of paper.

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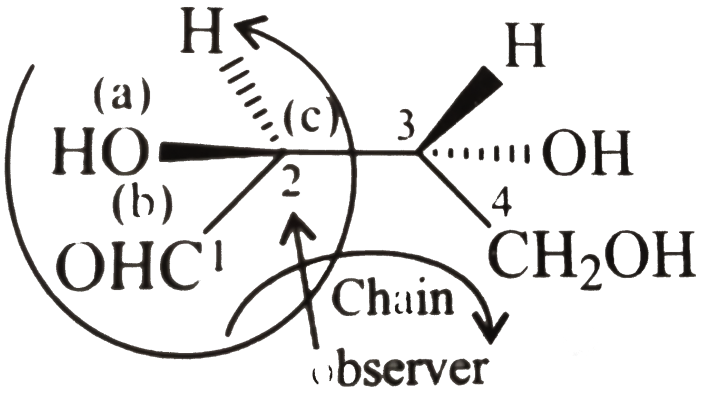
33. Assign R and S configuration of the following compound.



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Example

1. State whether the following statements are true or false.

a. D and L stereoisomers are enantiomers.

b. D enantiomer rotates the plane-polarised light to the right and L enantiomer to the left.

c. Conversion of an erythro to a threo stereoisomer always occur by inversion at one chiral C.

d. A racemate can be distinguished from a meso or a chiral compound by an attempted resolution.

e. Racemisation of an enantiomer can only

occure by breaking of at least one bond to the chiral centre.

f. A reaction catalysed by an enzyme always gives an $O.A$ product.

g. When an achiral molecule reacts to give achiral molecule, the product is always racemic

h. In chemical reactions, the change from an S reactant to an R product always signals an inversion of configuraion.

i. An optically inactive substance must be achiral.

j. An achiral compound can have chiral centres.

K. A compound with S configuration is the $(-)$ enantiomer.

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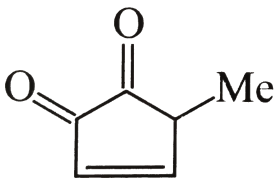
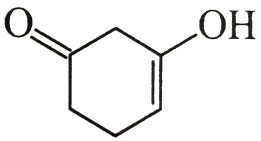
2. a. Write the stable tautomer form the following:

I.



II.



b. Explain why α methyl acetone enolises to a smaller extent than acetylacetone.

c. Why is the $(-CH_2-)$ group in acetyl

acetone $\left(Me - \overset{O}{\overset{||}{C}} - CH_2 - \overset{O}{\overset{||}{C}} - Me \right)$ called active methylene group?

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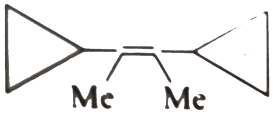
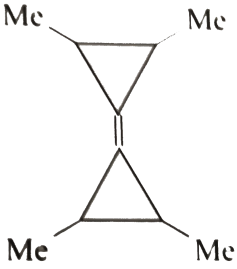
3. Some possible structrues of a compound A $(C_{10}H_{16})$ are:

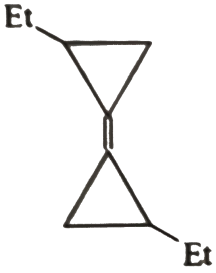
a.



b.



c.



Write the possible stereoisomers of (a), (b), and (c)

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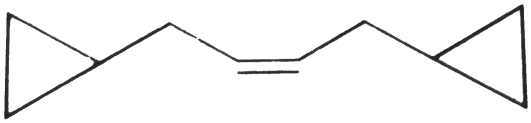
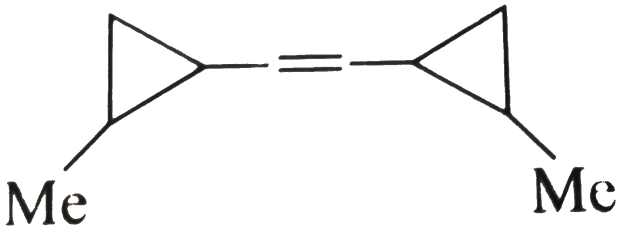
4. Some possible structrues of a compound A $(C_{10}H_{16})$ are:

a.



b.



Write the possible stereoisomers of (a) and (b).

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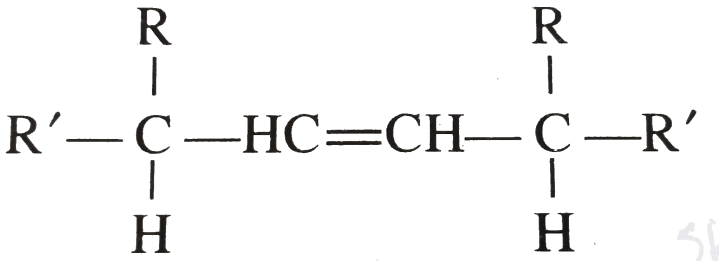
5. Consider the compound (A) given below:



a. Give the total number of stereoisomers possible for (A).

b. If the stereochemistry about the double bond in (A) is *cis*, give the number of enantiomers possible for (A).

c. If the stereochemistry about the double bond (A) is *trans*, give the number of enantiomers possible for (A).

d. Give the total number of diastereomers possible for (A).

e. Give some examples of the types of (A).

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

a. Decalin b. $1-$ Methyldecalin

c. $9-$ Methyldecalin

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

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

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

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

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9. How many isomaric dienes with a six-membered ring are possible of the compound with the molecular formula C_7H_{10} ?

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10. Give the name and structrues of six C atom cyclic diene with lowest molecular mass that shows only geometrical isomers (diastereomers) and not optical isomers.

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11. Give the structural formula of an unsaturated hydrocarbon with the lowest number of C atoms (or with lowest molecular mass) which shows:

a. Optical isomers

b. Geometrical isomers

c. Both optical and geometrical isomers

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12. Give the structural formula of a cyclic alkyne with the lowest number of C atoms and showing:

a. Both geometrical and optical isomerisms.

b. Geometrical isomerism with meso stereoisomers.

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13. Give the type of isomerism exhibited by each of the following pairs:

a. Acetic acid and methyl formate

b. $o-$ Nitrophenol and $m-$ nitrophenol

c. $n-$ Butance and isobutance

d. Maleic and fumaric acid

e. Benzyl alcohol and $o-$ methyl phenol

f. Propionic acid and methyl acetate

g. $n-$ Butyl alcohol and diethyl ether

h. $1,1-$ Dibromoethane and $1,2-$ dibromoethane

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14. $2,2'-$ Dofluoro$-6,6'-$ dimethylbiphenyl is non-resolvable, whereas $2,2'-$ dinitro$-6,6'-$ disulfonic acid biphenyl is resolvable. Account for this fact.

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15. What is the observed rotation when $0.1M$ solutions of $(R) - 2$ butanol is mixed with an equal volume of $0.05M$ solution of recemic $2 - butnol$ and the resulting solution is taken in a cell of $5cm$ long tube in a polarimeter? The specific rotation of $(R - 2)$ butonal is $+13.9^{\circ}$

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Exercise

1. $0.90gm$ of an organic compound $C_4H_{10}O_2(A)$ when treated with sodium gives $224ml$ of hydrogen at NTP. Compound (A) can be separated into fraction (B) and (C), by crystallisation of which the fraction (B) is resolved into isomers (D) and (E). Write down the structural formula of (A) to (E) with proper reasoning.

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2. Write dwon the structrues of close homologues of heptane having one quaternary C atom in their molecule and the other having two tertiary carbon atoms.

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3. An alkance (A) C_5H_{12} on chlorination at $300^\circ C$ gives a mixtrue of four different monochlorinated derivatives $(B), (C), (D),$ and (E). Two of these derivatives give the

same stable alkene (F) on dehydrohalogenation. On oxidation with hot alkaline $KMnO_4$ followed by acidification, (F) gives two products (G) and (H). Give the structrues of $(A) to (H)$ with proper reasoning.

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4. Which alkane, having a molecular weight of 86, will form only two monobromo alkanes?

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5. A hydrocarbon (A) was found to have vapour density 36. If forms only a single monochloro substitution product. Suggest (A).

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6. Write the appropriate structural formule for:

a. A cyclic molecule that is a consitutional isomer of cyclohexane

b. Molecules with the formula C_6H_{12} that contain one ring and are enantiomers of each other.

c. Molecules with formula C_6H_{12} that contian one ring and are diastereomers of each other.

d. Molecules with formula C_6H_{12} that contain no ring and are enantiomers of each other.

e. Molecules with formula C_6H_{12} that contain no ring and are diastereomers of each other.

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7. There are four dimethylcyclopropane isomers.

a. Write the three-dimensional formulas for these isomers.

b. Which of these isomers is chiral?

c. If a mixtrue consisting of $1mol$ of each of these isomers is subjected to simple gas chromatography, how many fractions would be obtained and how many compounds each fraction will have?

d. How many of these fractions would be optically active?

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8. Which of the follwing objects listed below possess a plane of symmetry and are, therfore, achiral?

a. A hammer

b. A car

c. A woodscrew

d. An ear

e. A screwdriver

f. A tennis shoe

g. A golf club

h. A baseball bat

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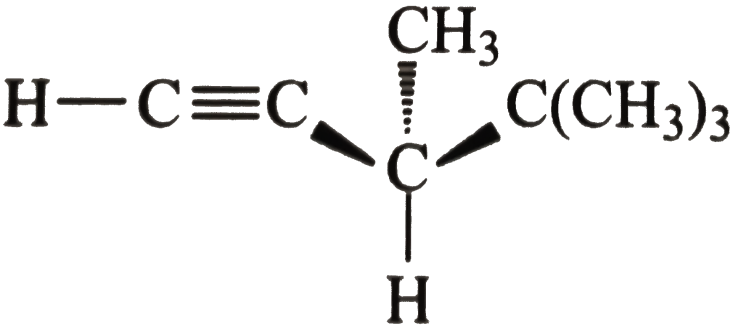
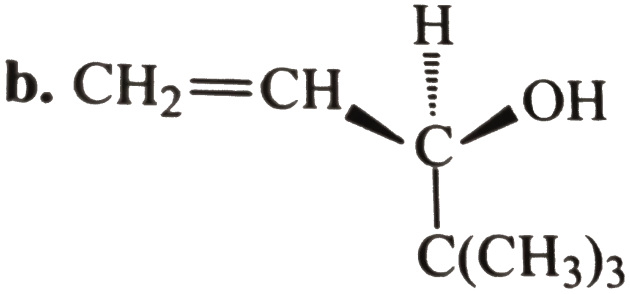
9. Assign (R) or (S) designations to each of the following compounds

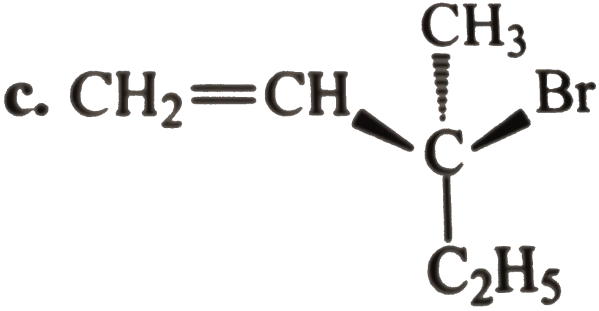
a)



b.



c.



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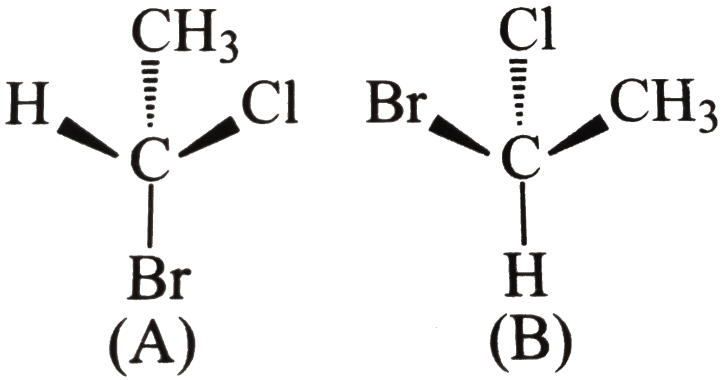
10. Consider the following pair of structrue and tell whether they represent enantiomer or two molecules of the same compound in different oreintation.



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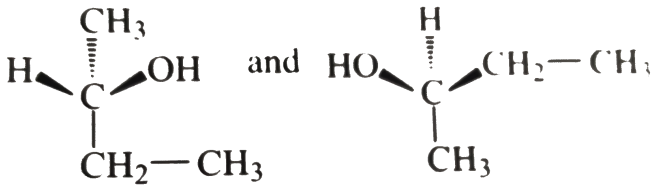
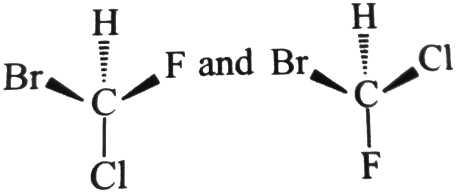
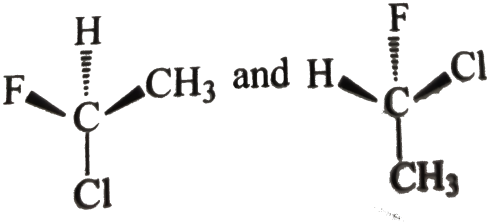
11. Tell whether the two structrues in each pair represent enantiomers or two molecules of the same compound in different orientions.

a. 

b. 

c. 

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12. A sample of optically active alochol has a specific ratation, $[\alpha]_D^{25}$, equal to $+1.51^\circ$.

a. What is the percentage enantiomeric excess of the sample?

b. Which enantiomer is in excess, (R) or (S)?

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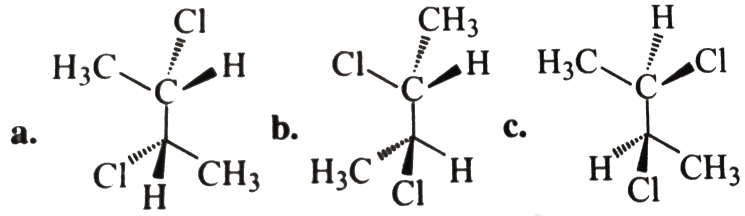
13. The following are the formule for three compounds $2,3-$ dichlorobutane written in non-eclipsed confromations. In each instance,

tell which compounds are enantiomers and which are meso.



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14. Write the three-dimensional formulas for all of the stereoisomers of each of the following compounds. Label pairs of enantiomers and meso compounds.

a. $CH_3CHBrCHFCH_3$

b. $CH_3CHOCH_2CHClCH_3$

c. $CH_2ClCHFCHFCH_2Cl$ ltbr d. $CH_3CHOHCH_2CHOHCH_3$

e. $CHCHClCHClCH_3$

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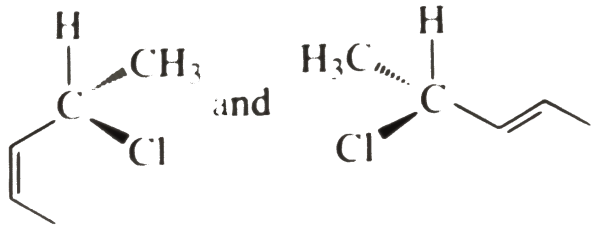
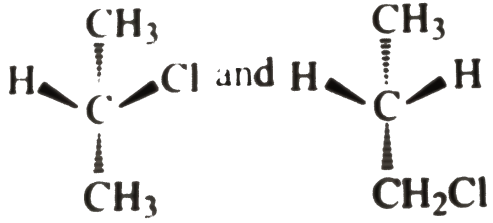
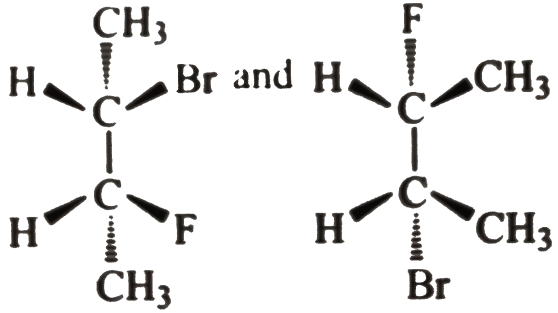
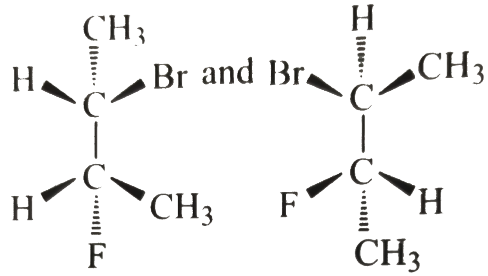
15. Consider the following pairs of structrue. Identify the relationship between them by describing them as presenting enantiomers, diastereomers, consitutional isomers, or two molecule of the same compound.

a. 
H
CH3
C
Cl
and
H3C
H
C
Cl

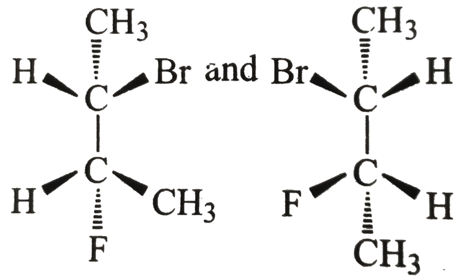
b. 
CH3
H
Cl
C
CH3
and
CH3
H
H
C
CH2Cl

c. 
CH3
H
Br
C
C
H
F
CH3
and
F
H
CH3
C
C
H
CH3
Br

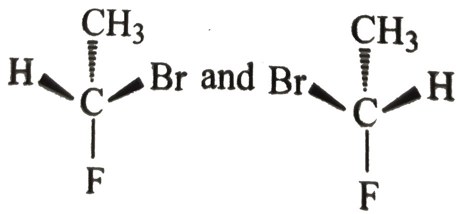
d.



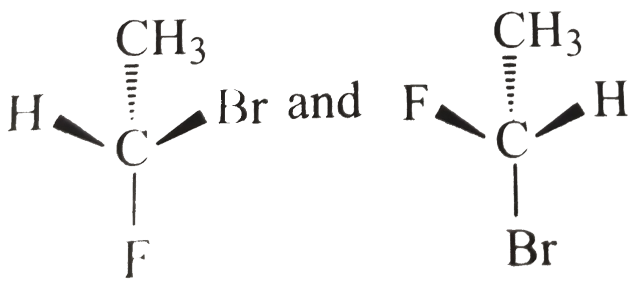
e.



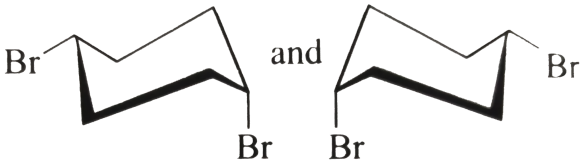
f.



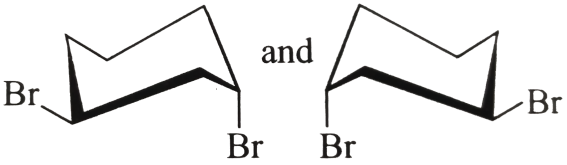
g.



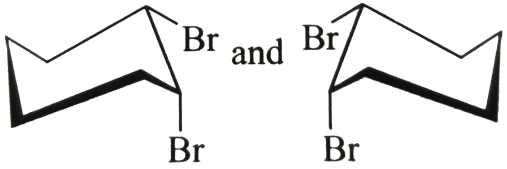
h.

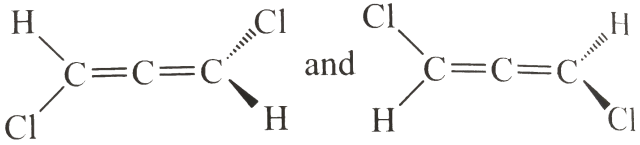


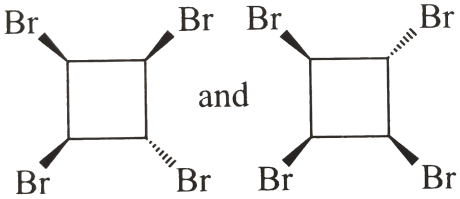
i.

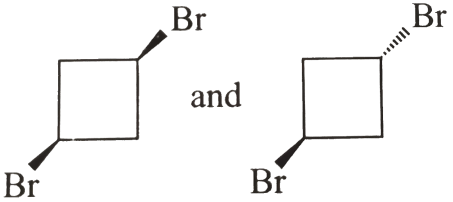


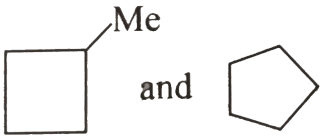
j.



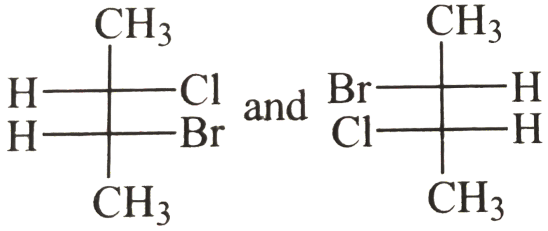
k. 
H
Cl
C=C=C
Cl
H
and
Cl
H
C=C=C
H
Cl

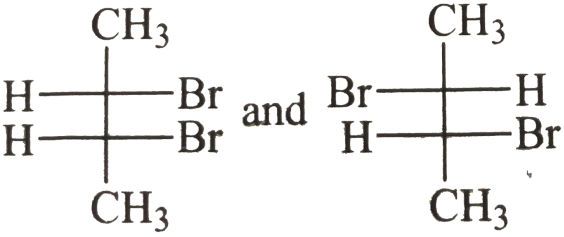
l. 
Br
Br
Br
Br
and
Br
Br
Br
Br

m. 
Br
Br
and
Br
Br

n. 
Me
and

o. 
and

p. 

q. 

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16. Discuss the anticipated stereochemistry of each of the following compounds.

a. $BrCH = C = C = CHBr$

b. $CH_2 = C = C = CHBr$

c. $BrCH = C = C = CBr_2$

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17. Write formulae for all the isomers of each of the following. Designate pairs of enantiomers and achiral compounds where they exist.

a. 1-Bromo-4- chlorocyclohexane

b. 1-Bromo-3-chlorocyclohexane

c. 1-Bromo-2- chlorocyclohexane

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18. Which of the following are chiral and capable of existing as enantiomers?

a. $1-3-$ Dibromobutane

b. $1,2-$ Dichloropropane

c. $1,5-$ Dibromopentane

c. $3-$ Ethylpentane

e. $2-$ Chlorobicyclo $[1.1.0]$ butane

f. $2-$ Iodobicyclo $[2.2.2]$ octane

g. $2-$ Bromobicyclo $[2.1.1]$ hexane

h. $5-$ Bromobicyclo $[2.1.1]$ hexane

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19. a. Write the structrue of $2,2-$ dibromobicyclo $[2.2.1]$ heptane.

b. How many stereocenters does it contain?

c. How many stereoisomers are predicted by the 2^{nd} rule?

d. Only on pair of enantiomers is possible for $2-2$, dibromobicyclo $[2.2.1]$ heptane. Explian.

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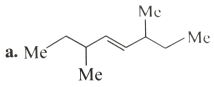
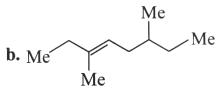
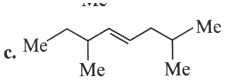
Linked Comprehension Type Exercise

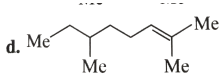
1. An organic compound (A) $(C_{10}H_{20})$ on reductive ozonolysis gives $2-$ methyl butanal. Based on this information, answer the following question.

1. Compound (A) is

A. 

B. 

C. 

D. 

Answer: A

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2. An organic compound (A) $(C_{10}H_{20})$ on reductive ozonolysis gives $2-$ methyl butanal. Based on this information, answer the following question.

The total number of stereoisomers possible for (A) is :

A. 8

B. 7

C. 6

D. 4

Answer: C

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3. An organic compound (A) $(C_{10}H_{20})$on reductive ozonolysis gives $2-$ methyl butanal. Based on this information, answer the following question.

If the stereochemistry about the double bond in (A) is cis, the total number of stereoisomers for (A) is :

A. 2

B. 3

C. 4

D. 5

Answer: B

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4. An organic compound (A) $(C_{10}H_{20})$ on reductive ozonolysis gives $2-$ methyl butanal. Based on this information, answer the following question.

If the stereochemistry about the double bound in (A) is cis, the total number of enantiomers for (A) is :

A. None

B. 2

C. 4

D. 6

Answer: B

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5. An organic compound (A) $(C_{10}H_{20})$on reductive ozonolysis gives $2-$ methyl butanal. Based on this information, answer the following question.

If the stereochemistry about the double bound in (A) is trans, the total number of stereoisomers for (A) is:

A. 2

B. 3

C. 4

D. 5

Answer: B

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6. An organic compound (A) $(C_{10}H_{20})$ on reductive ozonolysis gives $2-$ methyl butanal. Based on this information, answer the

following question.

If the stereochemistry about the double bond in (A) is trans, the total number of enantiomers for (A) is :

A. None

B. 2

C. 4

D. 6

Answer: B

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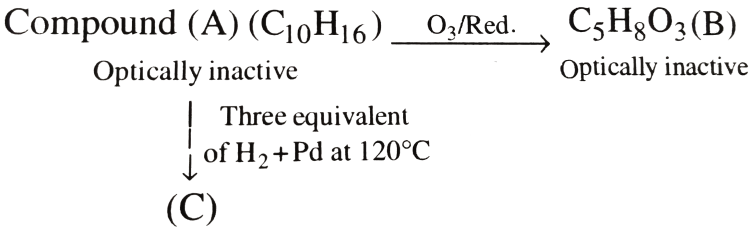
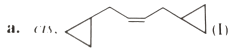
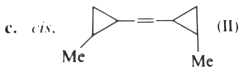


7.

The possible structrue of (A) is :

A. 

B. trans(I),

C. 

D. trans, (II)

Answer: A::B

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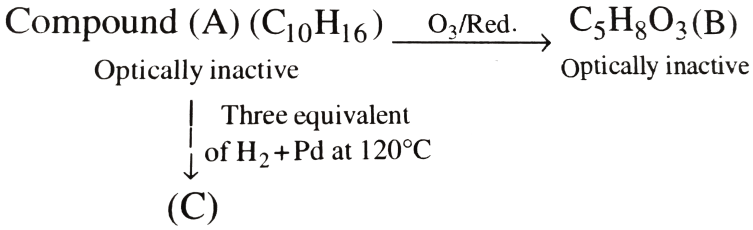
8.



If the both compound (A) and (B) are optically active, the possible structrue of (A) is:

A. $cis - I$

B. $trans - I$

C. $cis - II$

D. $trans - II$

Answer: C::D

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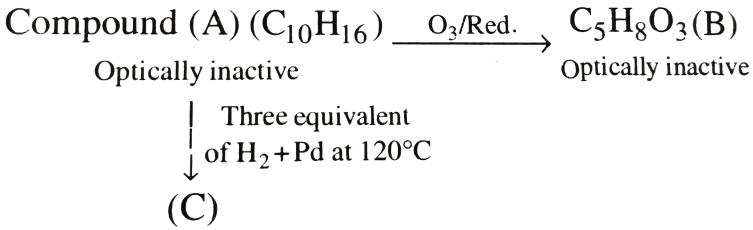
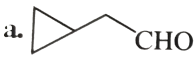
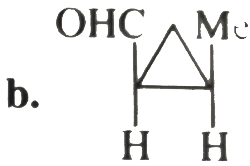
9.



If the both compoundsd (A) and (B) are optically inactive, the possible structrue of (B) are:

A. 

B. 

C. 

D. All

Answer: A

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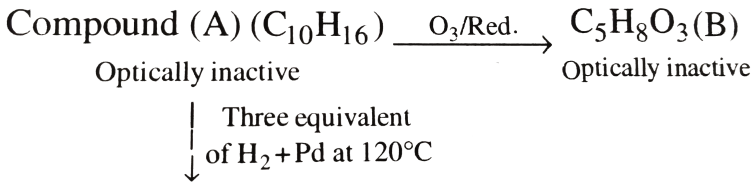
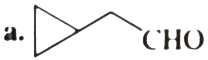


10.

If both compounds (A) and (B) are optically active, the possible structrues of (B) are:

A. 

B. 

C. 

D. All

Answer: B::C

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11. In this paragraph, some statements are given based on isomerism. Read the following statements given for every question and provide the answer.

How many isomeric dienes with a six membered ring are possible for the compound with molecular formula C_7H_{10}?

A. 5

B. 6

C. 7

D. 8

Answer: D

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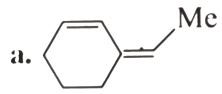
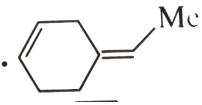
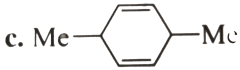
12. In this paragraph, some statements are given based on isomerism. Read the following statements given for every question and

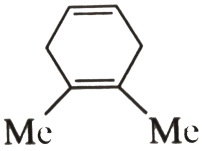
provide the answer.

Which of the following cyclic dienes does not show geometrical isomerism?

A. a. 

B. b. 

C. c. 

D. d. 

Answer: D

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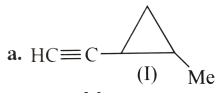
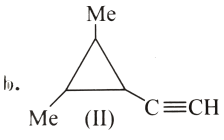
13. Which of the following structures of a cyclic alkene with the lowest number of C atoms shows both geometrical and optical isomerism?

A. 

B. 

C. Both

D. None

Answer: A

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14. In this paragraph, some statements are given based on isomerism. Read the following statements given for every question and provide the answer.

Which of the following structrues of a cyclic alkene with the lowest number of C atoms shows geometrical isomerism having two meso stereiosomers?

A. (I)

B. (II)

C. Both

D. None

Answer: B

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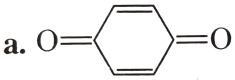
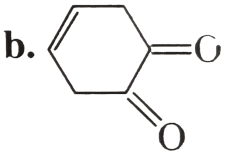
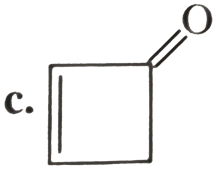
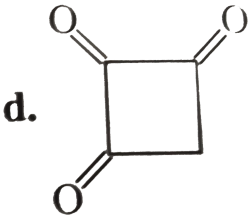
Multiple Choice Questions Exercise

1. Which of the following show stable or major form of tautomerism?

A. a. 

B. b. 

C. c. 

D. d. 

Answer: B::D

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2. Keto enol tautomerism is not observed in:

A. Phenol

B. Glycerol

C. HCN

D. Benzophenone

Answer: D

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3. Arrange the following in decreasing order of enol content:

i. Diethyl malonate

ii. Acetoacetic easter (AAE or EAA)

iii. Acetyl acetone

iv. $PhCOH_2COH_3$

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

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

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

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

Answer: A

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4. Which of the following will not show geometrical isomerism?

A. $Ph - N = N - Ph$

B. $2, 4 -$ Dinitro phenyl hydrazone of acetone

C. Oxime of formaldehyde

D. Cyclohexan $1, 2-$ diol

Answer: B::C

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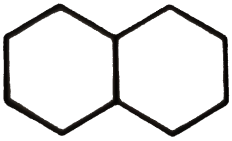
5. Which of the following will show geometrical isomerism ?

A. $CH_3 - \overset{C_2H_5}{\overset{|}{C}} = CH_2$

B. $\left[Pt(NH_3)_2Cl_2\right]$

C. $\left[Cr(NH_3)_4Cl_2\right]^{\oplus}$

D. 

Answer: B::C::D

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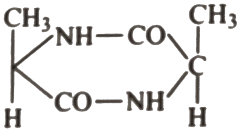
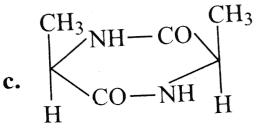
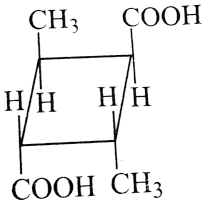
6. Which of the following are not resolvable?

A. $2, 3 -$ Pentadiene

B. 

C. 

D. d. 

Answer: C::D

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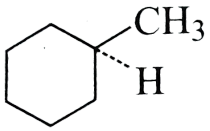
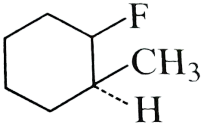
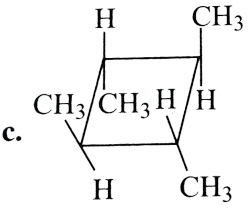
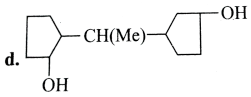
7. Which of the following are resolvable ?

A. a. 

B. b. 

C. c. 

D. d. 

Answer: B::D

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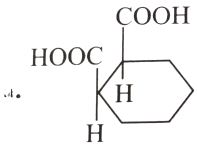
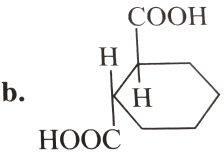
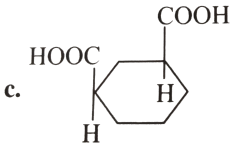
8. Which of the following is/are optically active?

A. 

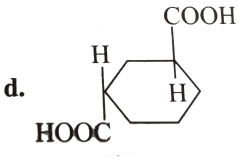
B.



C.



D.



Answer: B

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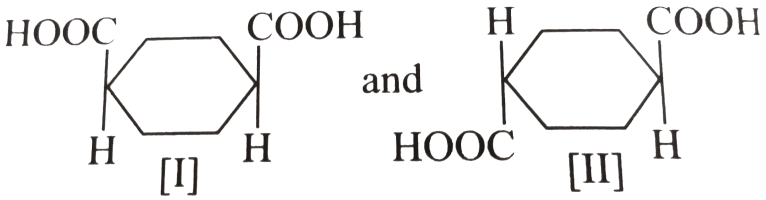
9. The compounds



are optically inactive because

A. Both compounds have the plane of symmetry.

B. Both compounds have the centre of symmetry.

C. Compound (I) has the plane of symmetry, while compound (II) has the centre of

symmetry.

D. Compound (I) has the centre of symmetry, while compound (II) has the plane of symmetry.

Answer: C

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10. The stable conformer (s) of trans $-1-4-$ dimethyl] cyclohexane is/are:

A. $1-$ axial -$4-$ equatorial form

B. $1-$ axial $-4-$ axial form

C. $1-$ equatorial $-4-$ axial from

D. $1-$ equatorial$-4-$ equatorial from

Answer: D

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11. The stable conformer (s) of cis-cyclohexane $1-3-$ diol is/are:

A. $1-$ axial $-3-$ axial form

B. $1-$ axial $-3-$ equatorial form

C. 1-equatorial- 3- axial form

D. 1- equatorial -3- equatorial form

Answer: A

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12. Which form (s) of cyclohexane is/are free from angle strian?

A. Chair form

B. Boat form

C. Twist boat form

D. All

Answer: D

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13. Which of the following statements is/are wrong, about the more stability of chair form than boat form?

A. In chair conformation, all the $(C-H)$ bonds in adjacent carbons are in the skew position.

B. In boat conformation, there are four skew interactions and two eclipsed interaction.

C. In a boat conformation, there are three skew interactions and three eclipsed interactions.

D. Boat form has an angle strain

Answer: C::D

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14. Which of the following methods are used for resolution ?

A. Biological methods by using special enzymes

B. By making their diastereomers

C. Chromatographic method using special absorbents

D. Azetotropic distillation

Answer: A::B::C

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15. According to Baeyer's strain theory, which of the following is/are most stable cyclic compounds?

A. Cyclopropane

B. Cyclobutane

C. Cyclopentane

D. Cyclohexane

Answer: D

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16. The angle strain in cyclohexane is :

A. $9^{\circ}, 44'$

B. $0^\circ, 44'$

C. $-5^\circ, 16'$

D. $5^\circ, 16'$

Answer: C

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17. Which of the following statements are correct?

A. Methyl cyclopropane and methyl cyclobutane do not show stereoismerism.

B. Both show stereoisomerism.

C. Dimethyl cyclopropane shows stereoisomerism, but methyl cyclobutane does not.

D. Dimethyl cyclopropane does not show stereoisomerism, but methyl cyclobutane shows.

Answer: A::C

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18. Which of the following statement regarding $1,2$- dimethylcyclopropane (I) and $1,2$- dimethyl cyclobutane (II) are wrong

A. Both of them show three stereoisomers.

B. The cis form of both is optically inactive (meso) and the trans form the both has a pair of enantiomers.

C. The cis form of both has a pair of enantiomers and the trans form of both is optically inactive (meso).

D. The meso form of both is optically inactive due to the presence of the centre of symmetry.

Answer: C::D

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19. Which of the following statements regarding $1,3$- dimethyl cyclobutane is/are correct?

A. Both cis and trans forms are optically active.

B. Both cis and trans forms are optically inactive.

C. The cis form is optically active, while the trans form is optically inactive.

D. The trans form is optically active, while the cis form is optically inactive.

Answer: B

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20. Which of the following statements regarding $1,3$- dimethl cyclobutane is/are correct?

A. The cis has plane of symmetry, while the trans form has both plane and centre of symmetry.

B. The cis form has both plane and centre of symmetry, while the trans form has only plane of symmetry.

C. Both have only plane of symmetry.

D. Neither of them has any element of symmetry.

Answer: A

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21. Which of the following statements regarding $1,2$-dimethyl cyclo-pentane and $1,3$ -dimethyl cyclopentane is/are correct?

A. In both, cis form is meso, while trans from is resolvable

B. In both, trans form is meso, while cis form is resolvable

C. In both cis and trans forms are meso.

D. In both, cis and trans forms are resolvable.

Answer: A

22. The configuration of sugars is related to glyceraldehyde and that of amino acids is related to:

A. Serine

B. Leucine

C. Alanine

D. Glycine

Answer: A

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23. Which of the following statement are true?

A. 2-Butanone on reaction with $2, 4 - DNP$ forms two compounds

which are geometrical isomers and can be separated.

B. Acetophenone on reaction with HCN forms two compounds which are geometrical isomers.

C. Acetone on reaction with NH_3 forms two compounds which are resolvable.

D. Acetaldehyde on reaction with NH_2OH forms two compounds which have different melting points.

Answer: A::D

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24. Which of the following statements are correct?

A. Butan $-2-$ one shows tautomerism.

B. Compounds containing asymmetric C atoms are always optically active.

C. Members belonging to the same class of compounds are called isomers.

D. Isomers have the same molecular formula.

Answer: A::D

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25. Which of the following statements are wrong?

A. m-Chlorobromo benzene is an isomer of m-bromochloro benzene.

B. All alkenes show geometrical isomerism.

C. Dimethyl ether and ethanol are functional isomers.

D. Geometrical isomers have different physical properties.

Answer: A::B

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26. Which of the following statements are correct?

A. $2, 3, 4$- Tribromo pentane has three chiral C atoms..

B. Tartaric acid has two asymmetric C atoms.

C. d and l forms of an optically active compound have different specific rotations with opposite signs.

D. Staggered and eclipsed forms of ethane have different stabilities.

Answer: B::D

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27. Which of the following satements are wrong?

A. Isobutane and n- butane are chain isomers.

B. Ethyl cyanide and ethyl isocyanide are functional isomers.

C. $H - C \equiv N$ and $H - \overset{\oplus}{N} \equiv \overset{\ominus}{C}$ are tautomers.

D. Maleic and fumaric acids are enantiomers.

Answer: D

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28. Which of the following statements are correct?

A. A reaction in which different stereoisomers produced different products or act a different rates is called stereospecific reaction.

B. A reaction in which a given substrate produces diastereoisomeric products in different amounts and where one

diastereomer predominates very much over the other is called stereoselective reaction.

C. If the replacement of one group at an achiral centre by a new substituent generates a chiral centre by a new substituent generates a chiral centre, the original molecule is said to be enantiotopic.

D. The E and Z system of naming geometrical isomers is based on the CIP sequence rule.

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

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29. Which of the following statements are correct?

A. diastereomers have different physical properties but not identical chemical properties.

B. Enantiomers have the same physical and chemical properties but different physiological properties.

C. Polarimeter is used in measuring the optical rotation of compund.

D. Only organic molecules show optical isomerism.

Answer: A::B::C

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30. Which of the following statements are wrong?

A. Ethyl benzene is the chain isomer of xylene.

B. Alkenes can exhibit the position, chain, functional, and geometrical isomerism.

C. Esters and carboxylic acids are examples of metamerism.

D. Metamers belong to different classes of compounds.

Answer: C::D

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31. Only two isomeric monochloro derivatives are possible for

A. n Butane

B. $2, 4$-Dimethyl pentane

C. Benzene

D. 2-Methyl propane

Answer: A::D

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32. Keto-enol tautomerism is observed in

A. $C_6H_5 - \overset{O}{\overset{||}{C}} - H$

B. $C_6H_5 - \overset{\overset{O}{||}}{C} - CH_3$

C. $C_6H_5 - \overset{\overset{O}{||}}{C} - C_6H_5$

D. $C_6H_5 - \overset{\overset{O}{||}}{C} - CH_2 - \overset{\overset{O}{||}}{C} - CH_3$

Answer: B::D

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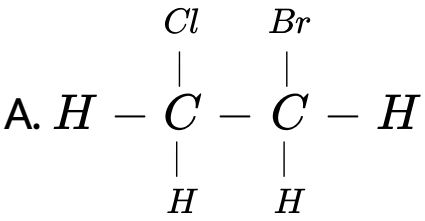
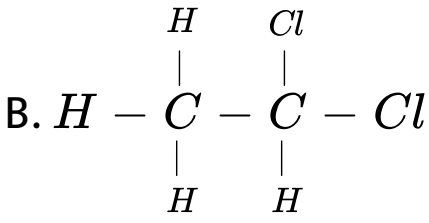
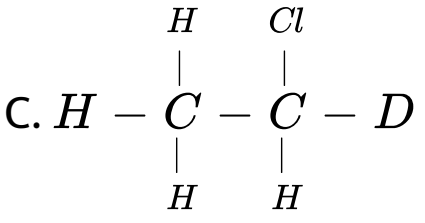
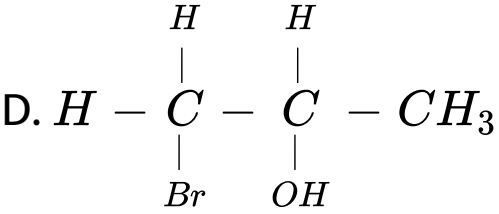
33. Which of the following has/have asymmetric carbon atom?

A. 

B. 

C. 

D. 

Answer: C::D

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34. The molecule (s) that will have dipole moment is/are:

A. 2, 2 Dimethyl propane

B. trans-2-Pentene

C. cis -3- Hexene

D. 2, 2, 3, 3-Tetramethyl butane

Answer: B::C

Watch Video Solution

35. Which of the following compounds will show geometrical isomerism?

A. 2-Butene

B. Propene

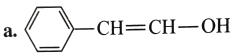
C. 1-phenyl propane

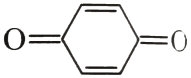
D. 2-Methyl-2-butene

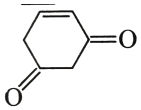
Answer: A::C

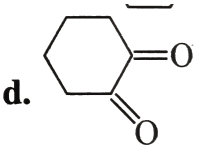
Watch Video Solution

36. Tautomerism is exhibited by :

A. a. 

B. b. 

C. c. 

D. d. 

Answer: A::C::D

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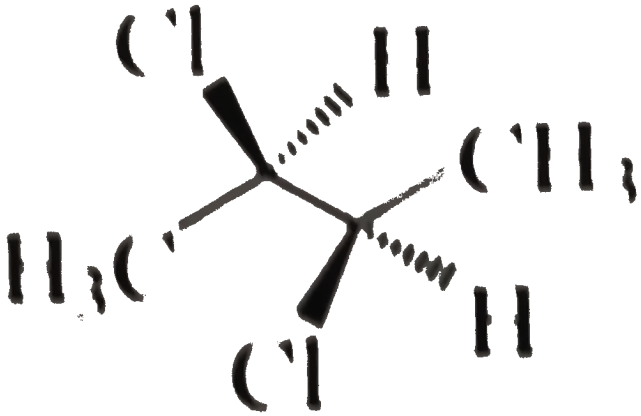
37. The correct statements (s) about the compound given below is/are:



A. The compound is optically active

B. The compound possesses plane of symmetry.

C. The compound possesses plane of symmetry.

D. The compound possesses axis of symmetry.

Answer: A::D

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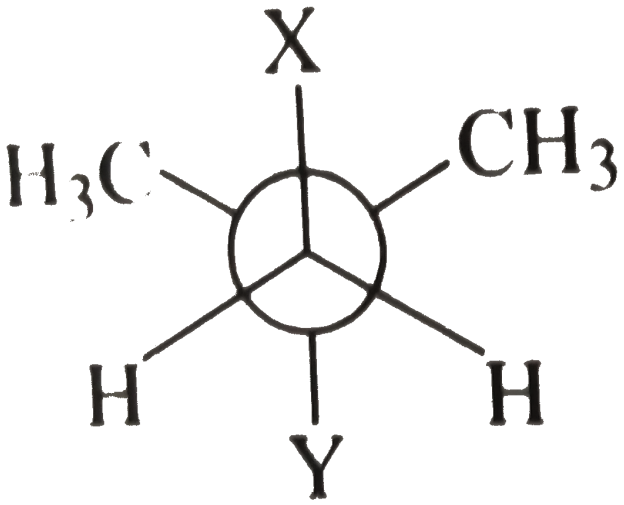
38. In the Newman projection for $2,2$-dimethylbutane



X and Y can, respectively, be

A. H and H

B. H and C_2H_5

C. C_2H_5 and H

D. CH_3 and CH_3

Answer: B::D

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Single Correct Answer Type

1. Which of the following will not be able to show optical isomerism (enantiomerism)?

A. 1, 2-Propadiene

B. 2, 3-Pentadiene

C. sec-Butyl alcohol

D. All exibit enantiomerism

Answer: A

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2. The type of isomerism exihibited by the compound with formula $C_4H_{10}O$ is :

A. Chain and position

B. Functional and position

C. Metamerism

D. Chain, position, functional, and metamerism

Answer: D

 Watch Video Solution

3. Acids and ester having the same number of carbon atoms are:

A. Functional isomers

B. Tautomers

C. Metamers

D. Not isomers

Answer: A

Watch Video Solution

4. Which of the following kinds of isomerism can nitroethane exhibit?

A. Metamerism

B. Optical activity

C. Tautomerism

D. Position isomerism

Answer: C

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5. Which among the following is likely to show geometrical isomerism?

A. $CH_3CH = CH_2$

B. $CH_3CH = N - OH$

C. $CH_3C(Cl) = C(CH_3)_2$

D. $CH_2 = CH - CH = CCl_2$

Answer: B

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6. How many gem dihalides with different formulas are possible for $C_3H_6CI_2$?

A. 1

B. 2

C. 3

D. 4

Answer: B

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7. Which of the following statement is correct?

A. The presence of chiral carbon is essential condition for enantiomerism.

B. Functional isomerism is a kind of stereoisomersim.

C. The compounds containing one chiral carbon only are always chiral.

D. All statements are wrong.

Answer: C

 Watch Video Solution

8. The total number of halogenated products likely to be formed by ethance is:

A. 4

B. 6

C. 9

D. 8

Answer: C

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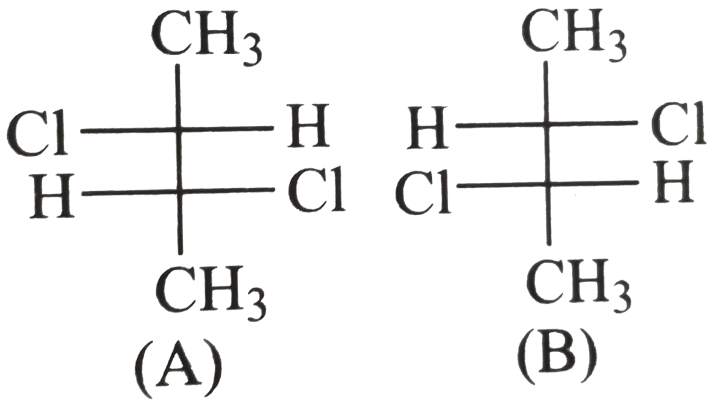
9. If the optical rotation produced by the compound (A) is $+52^\circ$, the one produced by compound (B) is :



A. -52°

B. $+52^\circ$

C. 0°

D. Unpredictable

Answer: A

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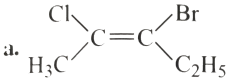
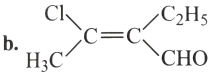
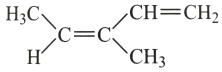
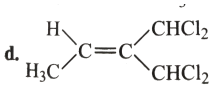
10. The E-isomer among the following is:

A. a. 

B. b. 

C. c. 

D. d. 

Answer: B

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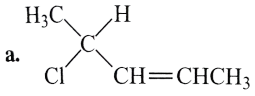
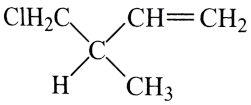
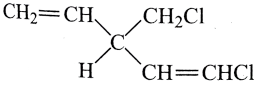
11. Which of the following will not show geometrical isomerism?

A. 

B. 

C. 

D. $CH_3CH = CHCH_2CH_3$

Answer: B

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12. The dihedral angle between the hydrogen atoms of two methyl groups is staggered conformation of ethane is

A. 120°

B. 180°

C. 90°

D. 60°

Answer: D

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13. Which of the following object is chiral?

A. Nail

B. Blade

C. Tennis racket

D. Laced football

Answer: D

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Single Correct Answer Type Exercise

1. Predict the number of stereoisomers in $CH_2OH.(CHOH)_4.CHO.$

A. 16

B. 8

C. 4

D. 2

Answer: A

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2. Predict the number of stereoisomers for $2, 5$ heptadiene.

A. 4

B. 3

C. 2

D. 5

Answer: B

Watch Video Solution

3. Symbol D stands for:

A. Dextrorotatory, which rotates $P.P.L.$ towards right.

B. Dextrorotatory, which rotates $P.P.L.$ towards left.

C. Relative configuration with respect to lactic acid taken as standard.

D. Relative configuration with respect to glyceraldehyde taken as standard and (OH) group is on the right side.

Answer: D

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4. Which of the following compounds will not show geometrical isomerism?

A. 3- Phenyl-2 propinoic acid

B. 2 Butene

C. 3- Methyl-2 butenoic acid

D. 3- Methyl-2 pentenoic acid.

Answer: C

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5. The enolic form of acetone contains:

A. 9σ-bond, 1π-bound, and 2 lone pairs.

B. 8σ-bonds, 2π-bonds, and 2 lone pairs.

C. 10σ- bonds 2π-bonds and 1 lone pair.

D. 9σ- bonds, 2π-bonds, and 2 lone pairs.

Answer: A

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6. Arrange the following in the increasing order of expected enol content.

i. CH_3COCH_2CHO

ii. CH_3COCH_3

iii. CH_3CHO

iv. $CH_3COCH_2COCH_3$

A. $iii < ii < iv$

B. $iii < ii < i < iv$

C. $i < iv < ii < iii$

D. $iv < i < ii < iii$

Answer: B

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7. The decreasing order of reactivity of the following alkenes is:

i. $2, 3$ -Dimethyl-2 butene

ii. 2- Methyl-2 butene

2- Butene

iv. Ethane

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

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

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

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

Answer: A

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8. Which of the following is the least stable form of cyclohexane?

A. Boat-form

B. Chair form

C. Skew- boat form

D. Crown form

Answer: A

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9. The minimum number of carbon atoms an alkane should contain in order to exhibit optical activity is:

A. 5

B. 6

C. 7

D. 8

Answer: C

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10. A compound whose molecule is superimposabel on its mirror image despite containing chiral carbon atoms is called:

A. Threo isomer

B. Meso compound

C. Enantiomer

D. No special name

Answer: B

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11. The $IUPAC$ name of the compound with formula C_nH_{2n+2}, having the lowest possible molecular mass and capable of showing enantiomerism, is:

A. 3- Methyl hexane

B. $2, 3$-Dimethyl pentane

C. Methane

D. Both (a) and (b)

Answer: D

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12. A racemic mixtrue is optically inactive due to :

A. The presence of plane of symmetry

B. External compensation

C. Internal compensation

D. None of these

Answer: B

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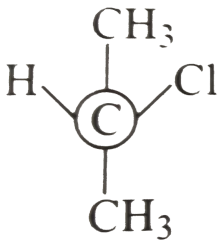
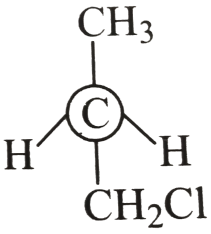
13. The pair of structures given below represents:





A. Enantiomers

B. Position isomers

C. Conformers

D. None of these

Answer: B

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14. The degree of unsaturation or index of hydrogen deficiency in the following is :

i. C_6H_{14}

ii. C_4H_6

iii. C_6H_6

A. 0,2,4

B. 1,0,2

C. 4,1,0

D. 2,0,4

Answer: A

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15. The degree of unsaturation in

i. $C_3H_3Cl_3$, $ii.\ C_3H_4O$, $iii.\ C_4H_5N$ is :

A. 2,1,3

B. 1,2,3

C. 3,2,1

D. 2,3,1

Answer: B

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16. Which of the following alkenes is the most stable ?

A. $(CH_3)_2CH = CH_2$

B. $CH_3CH = CHCH_3$

C. $(CH_3)_2C = C(CH_3)_2$

D. $CH_3CH = CH_2$

Answer: C

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17. Which of the following will have zero dipole moment?

A. cis, $-1,2$-Dichloroethene

B. trans $-1,2$-Dichloroethene

C. Dichloromethane

D. o- Phenylene dichloride

Answer: B

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18. The total number of conformations of ethane is:

A. Infinite

B. Two

C. Three

D. Four

Answer: A

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19. Which of the following is not an isomer of butanal?

A. 2-Butanone

B. 2-Methyl propanal

C. 2- Butanol

D. But-2-en-1-ol

Answer: C

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20. The least energetic conformation of cyclohexane is:

A. Boat form

B. Half chair form

C. Chair form

D. Twisted form

Answer: C

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21. How many chiral carbons are present in glucose molecule $CHO(CHOH)_4CH_2OH$?

A. 4

B. 3

C. 2

D. 1

Answer: A

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22. The process of separation of racemic modifications into d and l enantiomers is called:

A. Resolution

B. Dehydration

C. Revolution

D. Dehydrohalogentation

Answer: A

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23. If a compound has n asymmetric carbon atoms with different terminal groups, the number of stereoisomers is given by the formula:

A. $(1/2)^n$

B. 2^n

C. $2\sqrt{n}$

D. $\sqrt{2}n$

Answer: B

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24. The number of isomers that can be obtained theoretically on monochlorination of 2-methylbutane is:

A. 1

B. 2

C. 3

D. 4

Answer: D

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25. A hydrocarbon with formula C_8H_{18} gives one monochloro derivative. The hydrocarbon can be:

A. n-octane

B. 2 Methyl heptane

C. $2, 2, 4$-Trimethyl pentane

D. $2, 2, 3, 3$-Tetramethyl butane

Answer: D

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26. The most stained cycloalkane is :

A. Cyclopropane

B. Cyclobutane

C. Cyclopentane

D. Cyclohexane

Answer: A

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27. The total number of acyclic isomers, including the stereoisomers, with formula C_4H_7Cl is

A. 12

B. 11

C. 10

D. 9

Answer: A

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28. Mesotartaric acid is optically inactive due to the presence of:

A. Geometrical isomerism

B. Two chiral carbon atoms

C. Molecular symmetry

D. External compensation

Answer: C

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29. Butene when treated with chlorine at about $500^\circ C$ forms:

A. $MeCH_2CHCl - CH_2Cl$

B. $MeCH(Cl) - CH = CH_2$

C. $ClCH_2CH_2CH = CH_2$

D. $MeC(Cl)_2CH = CH_2$

Answer: B

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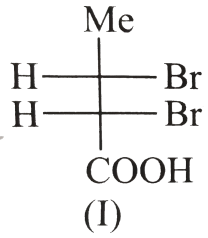
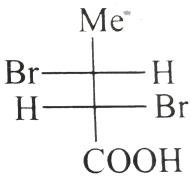
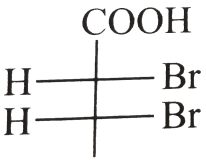
30. Which of the following are diastereomers ?

i.


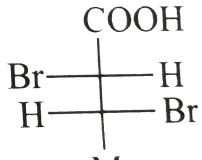
(I)

ii.


(II)

iii.


(III)

iv.


(IV)

A. (I) and (III)

B. (II) and (IV)

C. (I) and (II)

D. None

Answer: C

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31. An organic compound contains $66\,\%\,C$ and $13.3\,\%\,H$. Its vapour density is 37. The possible number of isomers of resonance is not correct?

A. 6

B. 7

C. 5

D. 8

Answer: B

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32. Which of the following statements regarding the concept of resonance is not correct?

A. The different resonating structure of a molecule have fixed arrangement of

atomic nuclei

B. The different resonating structures differ in the arrangement of electrons.

C. None of the individual resonating structure explains the various characteristics of the molecule.

D. The hybrid structure have equal contribution from all the resonating structures.

Answer: D

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33. The keto form of phenol contains:

A. 3π, 13σ, 4 non-bonding electrons.

B. 3π, 9σ, 4 non-bonding electrons.

C. 3π, 9σ, 4 non-bonding electrons.

D. 3π, 8σ, 4 non-bonding electrons.

Answer: A

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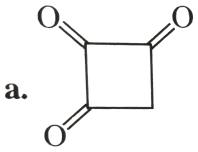
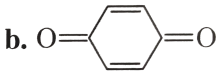
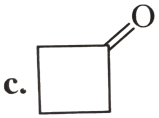
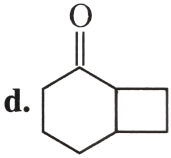
34. Tautomerism is not exhibited by :

A. 

B. 

C. 

D. 

Answer: B

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35. The number of isomers of the compound $C_2FClBrl$ is :

A. 3

B. 4

C. 5

D. 6

Answer: D

Watch Video Solution

36. Pure enantiomeric acid+optically active alcohol having chiral C atom $\rightarrow$?

The product will be:

A. An optically active mixtrue

B. A meso compound

C. A racemic mixtrue

D. A pure enantiomer

Answer: A

Watch Video Solution

37. Racemic acid + optically active alcohol having chiral C atom $\rightarrow$?

The product will be:

A. Optically active mixtrue

B. Meso compound

C. Diastereomeric mixtrue

D. Racemic mixtrue

Answer: C

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38. $PhCH_2CH(Br)Ph \xrightarrow{Alc.KOH} Product$

How many product are possible?

A. 1

B. 2

C. 3

D. 4

Answer: B

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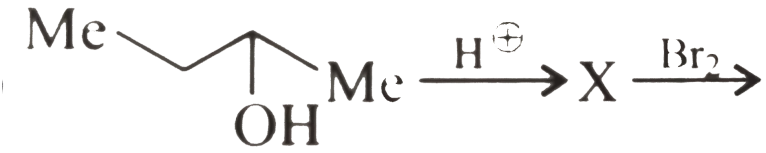

39. formula $C_4H_8Br_2$.

Five compounds with formula $C_4H_8Br_2$

How many structrue of (X) are possible?

A. 2

B. 3

C. 4

D. 5

Answer: B

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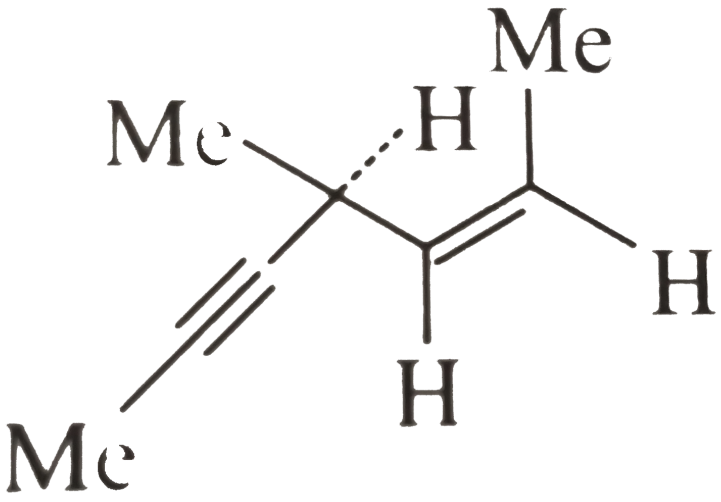
40. 

Hydrogenation of the above compound in the presence of poisoned Pd catalyst gives:

A. An optically active compound

B. An optically inactive compound

C. A racemic mixture

D. A diasteromeric mixture

Answer: B

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41. Hydrogenation of the compound by Brich reduction $(Na + liq.\ NH_3 + C_2H_5OH)$ gives:

A. An optically active compound

B. An optically inactive compound

C. A racemic mixtrue

D. A diasteromeric mixtrue

Answer: C

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42. An SN^2 reaction at an asymmetric C of a compound always gives:

A. A enantiomer of the substrate

B. A product with opposite optical rotation

C. A mixtrue of diastereomers

D. A single stereoisomers

Answer: D

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43. The nodal plane in the π-bond of ethene is located in:

A. The molecular plane

B. A plane parallel to the molecular plane

C. A plane perpendicular to the molecular plane which bisects the carbon-carbon σ -bond at right angle

D. A plane perpendicular to the molecular plane which contains the carbon-carbon σ bond

Answer: A

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44. Which of the following compounds exhibits stereoisomerism?

A. 2-Methylbutane

B. 3- Methylbutane

C. 3-Methylbutanoic acid

D. 2-Methylbutanoic acid

Answer: D

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45. Consider the following reaction:

$$CH_3 - \underset{\underset{D}{|}}{CH} - \underset{\underset{CH_3}{|}}{CH} - CH_3 - Br \rightarrow X + HBr$$

Identify the structrue of the major product X

A. $H_3C - \underset{\underset{D}{|}}{CH} - \underset{\underset{CH_3}{|}}{CH_3} - \dot{C}H_2$

B. $H_3C - \underset{\underset{D}{|}}{CH} - \underset{\underset{CH_3}{|}}{\dot{C}} - CH_3$

C. $H_3C - \underset{\underset{D}{|}}{\dot{C}} - \underset{\underset{CH_3}{|}}{CH} - CH_3$

D. $H_3C - \dot{C}H - \underset{\underset{CH_3}{|}}{C} - CH_3$

Answer: B

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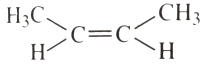
46. Which of the following hydrocarbons has the lowest dipole moment?

A. a. 

B. $CH_3C \equiv CCH_3$

C. $CH_3CH_2C \equiv CH$

D. $CH_2 = CH - C \equiv CH$

Answer: B

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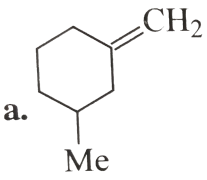
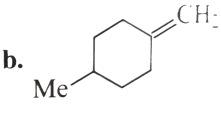
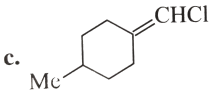
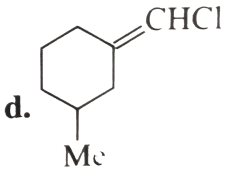
47. The geometrical isomerism is shown by:

A. 

B. 

C. 

D. 

Answer: D

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48. The number of geometrical isomers in $CH_3CH = N - OH$ is

A. 2

B. 4

C. 5

D. 6

Answer: D

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49. The smallest aldehyde and its next homologue are treated with NH_2OH to form oxime. Find out the correct answer out of the following.

A. Two different oximes are formed

B. Three different oximes are formed.

C. Two oximes are optically active.

D. All oximes are optically active.

Answer: B

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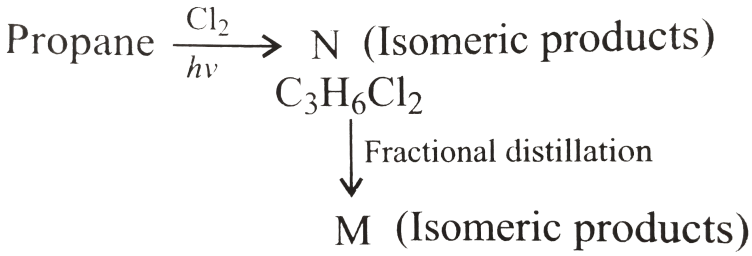

50.

What are the numerical values of N and M?

A. $6, 6$

B. $5, 4$

C. $4, 4$

D. $3, 3$

Answer: B

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51. The compound in which the distance between the two adjacent carbon atoms is largest is :

A. Ethane

B. Ethene

C. Ethyne

D. Benzene

Answer: A

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52. The compound which is not isomeric with diethyl ether is :

A. n- Propyl methyl ether

B. Butan-1 $-$ ol

C. 2- Methyl propan-2 $-$ ol

D. Butanone

Answer: D

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53. Among the following, the compound that can be most readily sulphonated is:

A. Benzene

B. Nitrobenzene

C. Toluene

D. Chlorobenzene

Answer: C

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54. Which of the following compounds will exhibit cis-trans (geometrical) isomerism ?

A. 2-Butene

B. 2-Butyne

C. 2-Butanol

D. Butanal

Answer: A

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55. An isomer of ethanol is:

A. Methanol

B. Diethyl ether

C. Acetone

D. Dimethyl ether

Answer: D

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56. Which of the following will have the least hindered rotation about carbon-carbon bonds?

A. Ethane

B. Ethylene

C. Acetylene

D. Hexachlorethane

Answer: A

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57. The number of isomers of C_6H_{14} is:

A. 4

B. 5

C. 6

D. 7

Answer: B

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58. The enolic form of acetone contains:

A. 9σ-bonds, 1π-bound, and 2 lone pairs.

B. 8σ-bonds, 2π-bonds, and 2 lone pairs.

C. 10σ- bonds 1π-bonds and 1 lone pair.

D. 9σ- bonds, 2π-bonds, and 2 lone pair.

Answer: A

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59. The isomers that can be interconverted through rotation around a single bond are:

A. Conformers

B. Diastereomers

C. Enantiomers

D. Positional isomerisms

Answer: A

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60. How many optically active stereiosomers are possible of butane $2, 3$ diol?

A. 1

B. 2

C. 3

D. 4

Answer: B

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61. The optically active tartaric acid is named as $D-(+)-$ tartaric acid because it has a positive

A. Optical rotation and is derived from D-glucose.

B. pH in organic solvent.

C. Optical rotation and is derived from $D-(+)-$ glyceral-dehyde.

D. Optical rotation when substituted by deuterium.

Answer: C

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62. Which of the following compounds will exhibits geometrical isomerism ?

A. 1- Phenyl-2 butene

B. 3-Phenyl1-butene

C. 2-Phenyl-1-butene

D. 1, 1-Diphenyl $1-$ 1-propene

Answer: A

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63. The number of isomers for the compound with molecular formula $C_2BrClFI$ is:

A. 3

B. 4

C. 5

D. 6

Answer: D

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64. Which of the following compounds exhibits stereoisomerism?

A. 2-Methyl butene

B. 3-Methyl butyne

C. 3-Methyl butanoic acid

D. 2-Methyl butanoic acid

Answer: D

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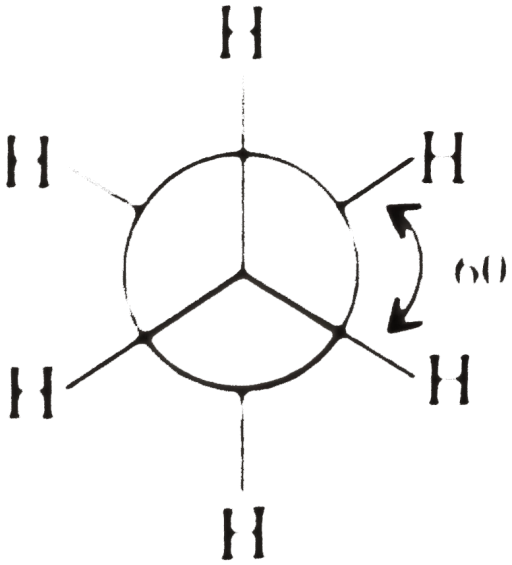

65.

In the above compound, C_2 is rotated

clockwise 120° about $C_2 - C_3$ bond. The resulting conformer is:

A. Partially eclipsed

B. Eclipsed

C. Gauche

D. Staggered

Answer: C

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Assertion Reasoning Type Exercise

1. Assertion (A): Metamers can also be position or chain isomers.

Reason (R): Tautomerism was introduced by $C.P.$ Laar to explain the chemical reactivity of a substance according to two possible structrues.

A. If both (A) and (R) are true and (R) is the correct explanation for (A).

B. If both (A) and (R) are true and (R) is not the true explanation for (A)

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

D. If both (A) and (R) are false

Answer: B

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2. Assertion (A): Pentane and 3 methyl pentane are chain isomers.

Reason (R): Pentane is a straight-chain alkane while 3-methyl pentane is branched-chain alkane.

A. both (A) and (R) are true and (R) is the correct explanation for (A).

B. both (A) and (R) are true and (R) is not the true explanation for (A)

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

D. (A) is false and (R) is true.

Answer: D

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3. Assertion (A): Pent -1-ene and 2-methyl but 1-ene are position isomers

Reason (R): Position isomers have the same molecular formula but differ in the position of functional group.

A. If both (A) and (R) are true and (R) is the correct explanation for (A).

B. If both (A) and (R) are true and (R) is not the true explanation for (A)

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

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

Answer: D

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4. Assertion (A): Both cis $1,3$-dimethyl cyclobutane and trans $1-3,$ dimethyl cyclobutane are optically inactivity

Reason (R): cis-1,3- Dimethyl cyclobutane has the plane of symmetry, wheras trans form has the centre of symmetry.

A. If both (A) and (R) are true and (R) is the correct explanation for (A).

B. If both (A) and (R) are true and (R) is not the true explanation for (A)

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

D. If both (A) and (R) are false

Answer: A

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5. Assertion (A): The cis form of

$$\left(CH_3 - \underset{\underset{Cl}{|}}{CH} - CH = CH - \underset{\underset{Cl}{|}}{CH} - CH_3 \right)$$

exist in three-diastereomers.

Reason (R): One form is optically inactive due to the presence of centre of symmetry.

A. If both (A) and (R) are true and (R) is the correct explanation for (A).

B. If both (A) and (R) are true and (R) is not the true explanation for (A)

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

D. If both (A) and (R) are false

Answer: C

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Fill In The Blanks Exercise

1. Isomers which are ..... mirror images are knows as ..... (superimposable, non-

superimposable, enantiomers, diastereomers, epimers)

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2. The structrue of the enol form of $CH_3 - CO - CH_2 - CO - CH_3$ with intermolecular hydrogen bonding is.....

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3. The total number of cyclic isomers possible for a hydrocarbon with the molecular formula C_4H_6 is .....

A. 4

B. 5

C. 6

D. 7

Answer: B

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True False Exercise

1. m-Chloro bromobenzene is an isomer of m bromo chloro benzene.

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2. $2, 3, 4$- Trichloropentane has three asymmetric carbon atoms.

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Analytical And Descriptive Type Exercise

1. Write structural formula for all the isomeric alcohols having the molecular formula $C_4H_{10}O$.

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2. Write the structural of all the possible isomers of dichloroethene. Which of them will have zero dipole moment?

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3. Write tautomeric form of phenol

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4. Discuss the hybridisation of carbon atoms in allene (C_3H_4) and show the π-orbital overlap.

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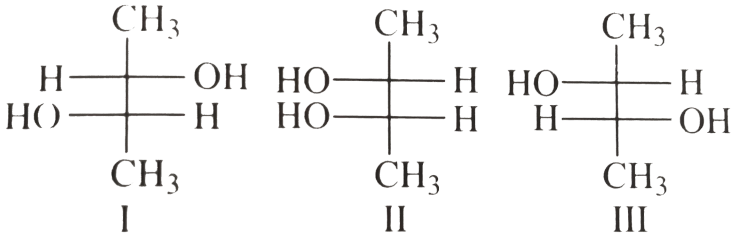
5. Identify the pairs of enantiomers and diastereomers from the following:



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6. Draw Newman projection of the less stable staggered from of butane.

b. Give reason for the relatively less stability of the staggered form.

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Assertion Reasoning Type

1. Statement I: Molecules that are non-superimposable on their mirror images are chiral.

Statement II: All chiral molecules have chiral centres.

A. Statement I and II are true and Statement II is the correct explanation

for Statement I.

B. Statement I and II are true, but Statement II is not the correct explanation of Statement I.

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

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

Answer: C

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