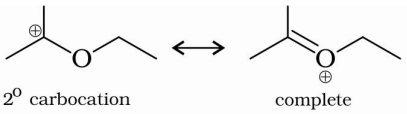
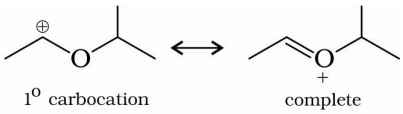
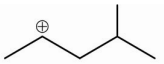
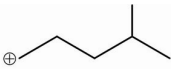
61.(AD) The given compound is optically active. For a compound to be optically active it should not have plane of symmetry as well as centre of symmetry. It may have axis of symmetry. Given compound possess two fold axis of symmetry.

62.(B) Hyperconjugation involve overlap of electrons of σ bond with vacant p-orbital.

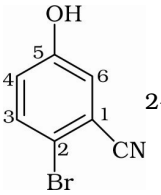
63.(D) (I) 

(II) 

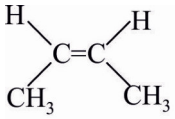
(II) 

; (IV) 

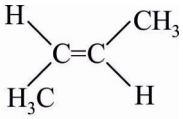
Order of stability is (I) > (III) > (II) > (IV)

64.(B) 

2-Bromo-5-hydroxy benzonitrile

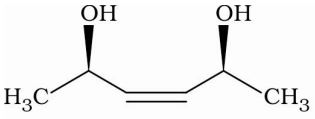
65.(C) 

cis



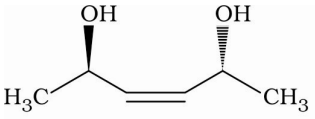
Trans

66.(AD) There are three stereocenters in the given compound and it is symmetrical hence some of the isomers may be identical due to presence of plane of symmetry or center of symmetry.



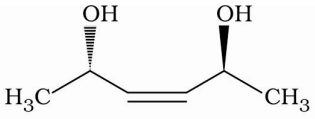
(A)

No enantiomer is possible because it is optically inactive due to plane of symmetry



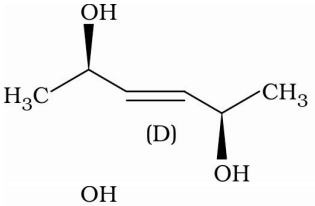
(B)

and



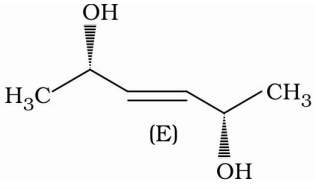
(C)

are enantiomers



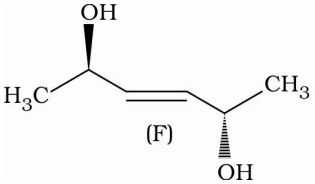
(D)

and



(E)

are enantiomers

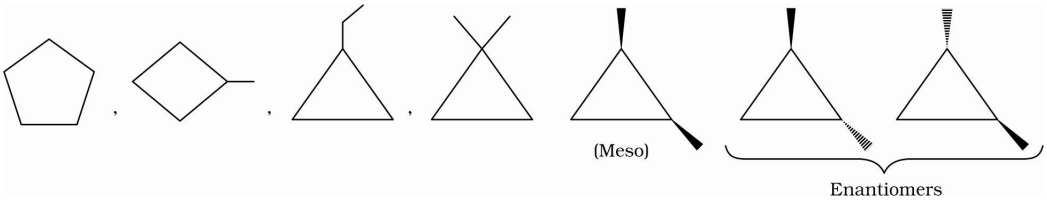


(F)

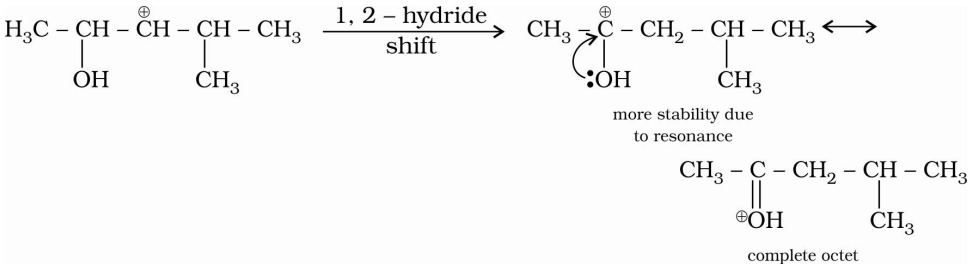
No enantiomer is possible because it is optically inactive due to centre of symmetry

- Total six stereoisomers are possible for (X).
- Total four diastereomers are possible for (X) when double bond is cis or trams.
- For trans stereochemistry of double bond in (X), two enantiomers are possible for (X).
- For cis stereochemistry of double bond in (X), two enantiomers are possible for (X).

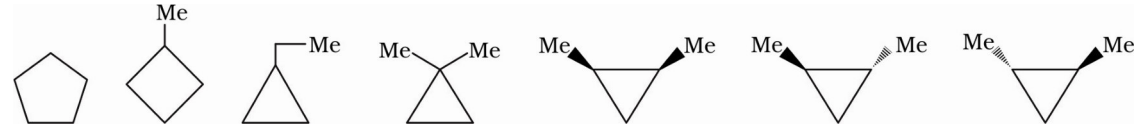
67.(7)



68.(D)

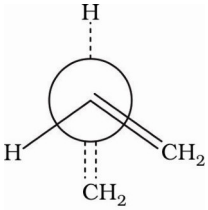


69.(7)



70.(A) Twisted boat is chiral as it does not have plane of symmetry centre of symmetry & alternating axis of symmetry.

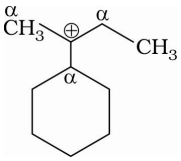
71.(BC) Consider conformers of (A) about c-2 and c-3. One of the conformer of (A) will not have all atoms in one plane.



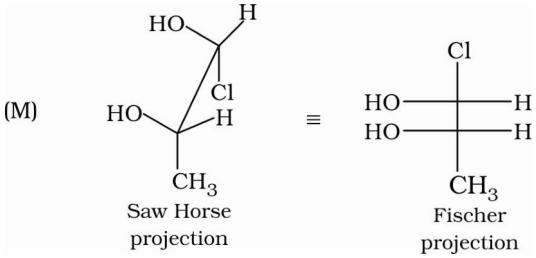
All conformers for compound (B) about c-2 and c-3 are planar. No conformers are possible for compound (C) and it is planar.

No conformers are possible for compound (D) and it is non planar.

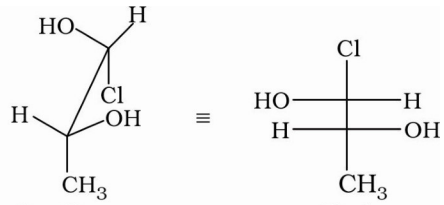
72.(6) Number of contributing structures are equal to the number of hyper conjugative αH atoms. In this case total six αH atoms are present.



73.(ABC) Convert all of them into Fischer projection. Fischer projection represents eclipse form of sawhorse projection. For comparison purpose similar types of eclipse conformers must be drawn i.e., both vertically up or both vertically down.

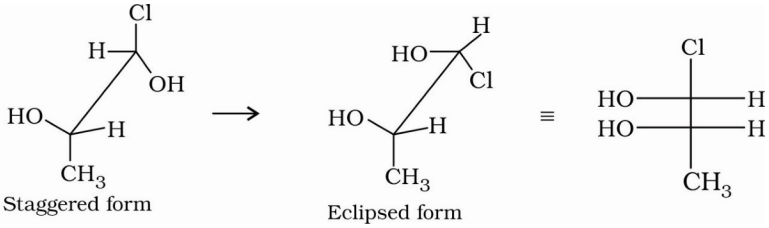


(N)

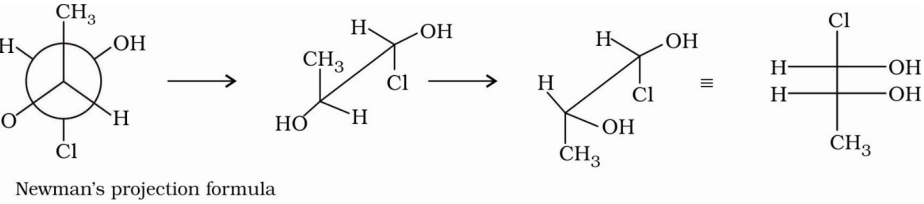


Saw Horse projection | Fischer projection

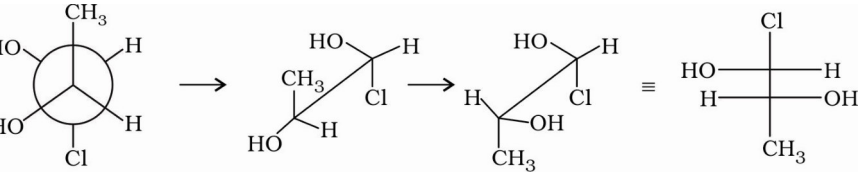
(O)



(P)

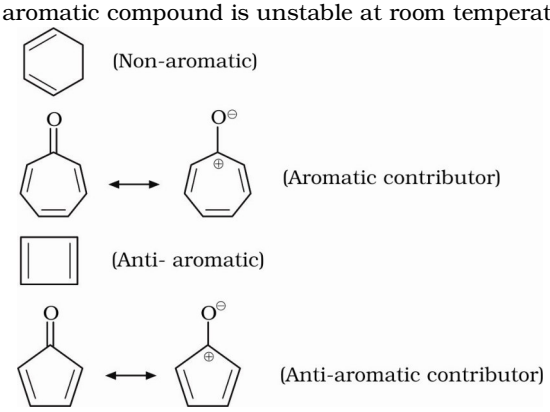


(Q)



- (M) and (N) are non-mirror image stereoisomers i.e. diastereomers
- (M) and (O) are identical
- (M) and (P) are non-superimposable mirror images i.e. enantiomers
- (M) and (Q) are non-mirror image-stereoisomers i.e. diastereomers

74.(BC) Anti aromatic compound is unstable at room temperature.

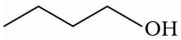


75.(A) Hyper conjugation in t-butyl carbocation is due to delocalization of electrons of σ bond to vacant p-orbital i.e. σ-p(empty) delocalization.

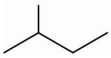
Hyperconjugation in 2-butene is due to delocalization of electrons of σ bond to empty pi antibonding molecular orbital i.e. σ-π* delocalization.

76.(ACD)

-tert-butanol and 2-methylpropan-2-ol

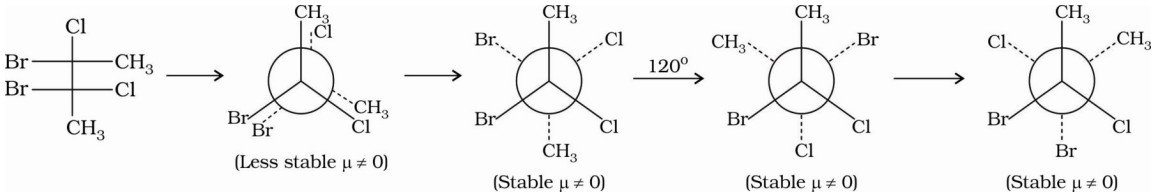


-n-butanol and butan-1-ol



-Isobutanol and 2-methyl propan-1-ol

77.(3) Staggered conformers are stable.



78.(2) Although there are 2 chiral carbons but the number of stereo-isomers will not be 4.
The bridged carbon can't be oriented in opposite manner.
So only 2 isomers are possible.

79.(5) Compound having a close loop of $(4n+2)\pi$ electrons is an aromatic compound.

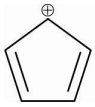
1.  Not aromatic due to non planar tub shape structure

2.  Antiaromatic due to close loop of $4\pi e^-$

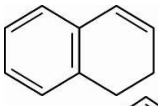
3.  Aromatic due to close loop of $2\pi e^-$

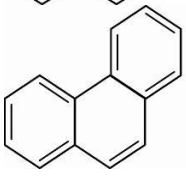
4.  Not aromatic due to absence of close loop of electrons

5.  Aromatic due to close loop of $6\pi e^-$

6.  Antiaromatic due to close loop of $4\pi e^-$

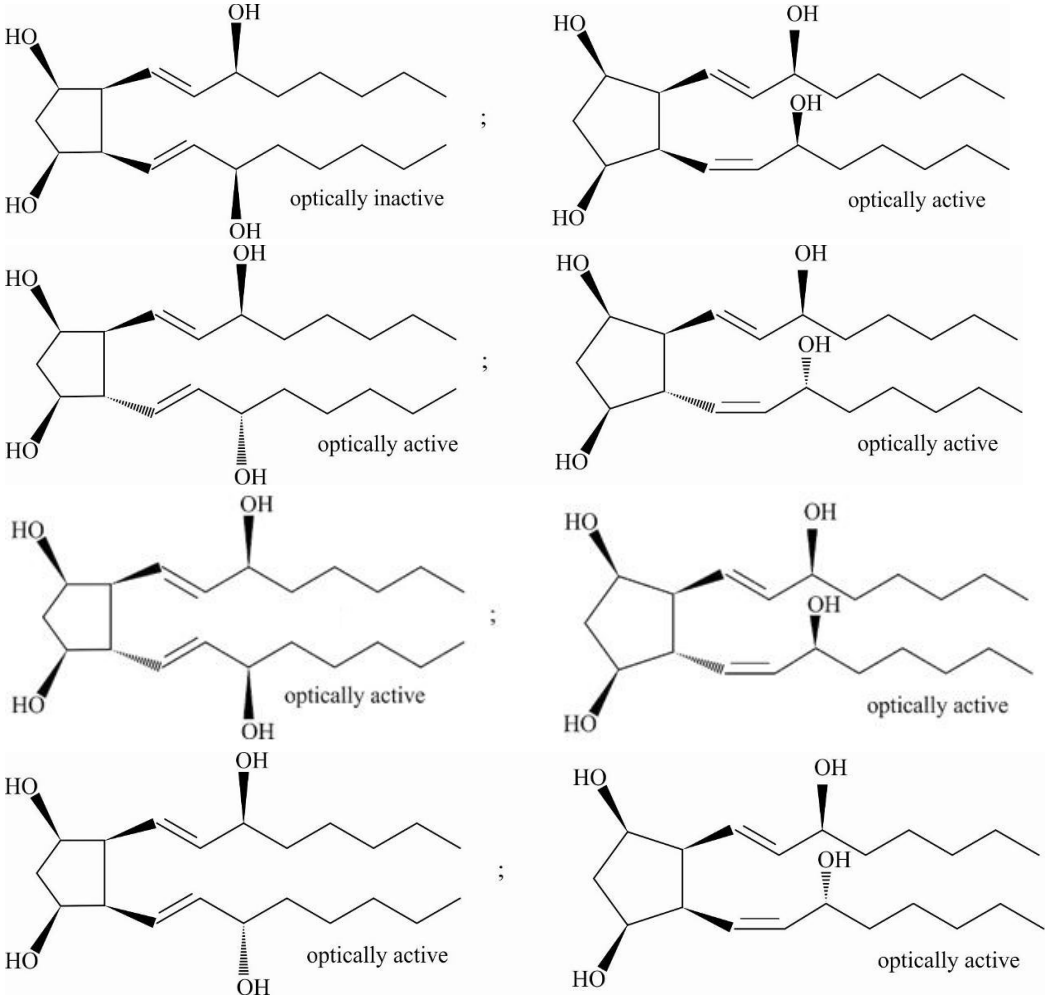
7.  Aromatic due to close loop of $6\pi e^-$

8.  Aromatic due to close loop of $6\pi e^-$ in the left ring.

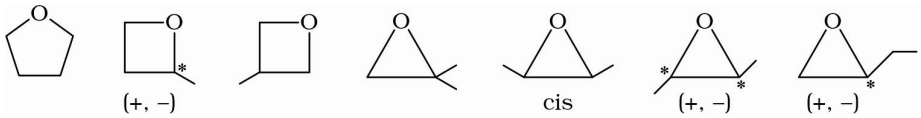
9.  Aromatic due to close loop of $14\pi e^-$

Number of aromatic compounds is five i. e. 3, 5, 7, 8 and 9.

80.(7.00)


optically inactive
optically active
optically active
optically active
optically active
optically active

81.(10)


(+, –)
cis
(+, –)
(+, –)