Model Questions

Stereochemistry

For Semester I and Semester II

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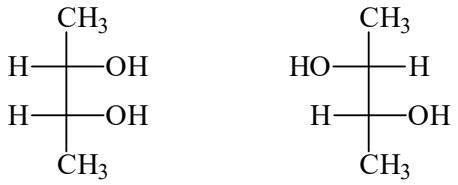
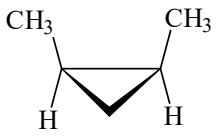
Model Questions
Organic Stereochemistry

1. Indicate the relationship between the following two structures as Identical or enantiomers or diastereomers? And indicate the chiral centers as 'R' or 'S'.

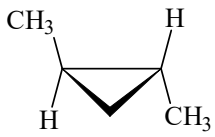


2. The specific rotation of pure (R)-2-butanol is -13.5°. What % of a mixture of the two enantiomeric forms is (S)-2-butanol if the specific rotation of this mixture is -5.4^0 ?

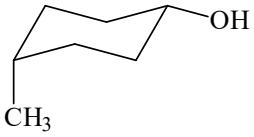
3. Which of the following molecules is chiral? Assign (D) and (E) as 'E' or 'Z.



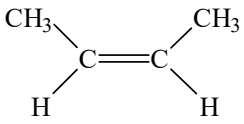
(A)



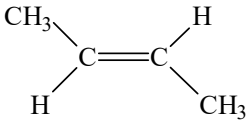
(B)



(C)



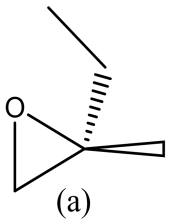
(D)



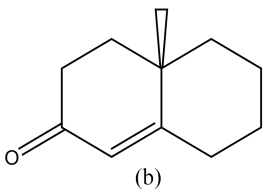
(E)

4. Write all the possible conformational structures for n-butane and draw the energy profile diagram showing the rotation between C_2 - C_3 bond in Newman Projection structures.

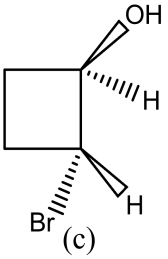
5. Determine the configuration (R or S) around the asymmetric center(s) in each of the following compounds.



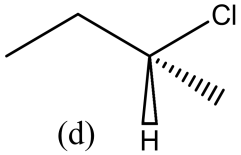
(a)



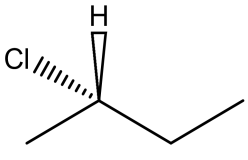
(b)



(c)

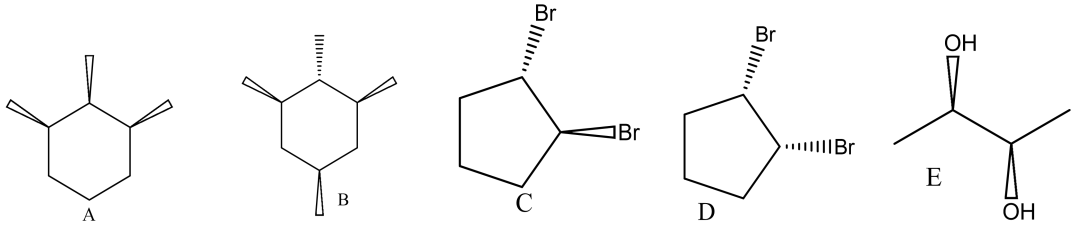


(d)

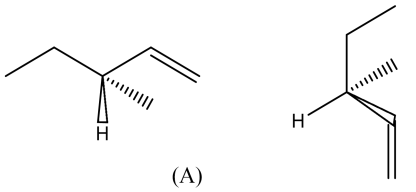


(e)

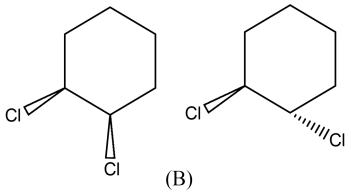
6. Identify the meso compounds and show the plane of symmetry.



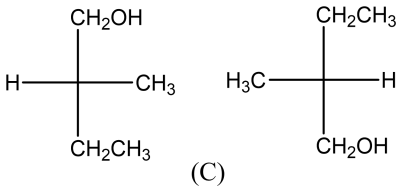
7. Draw all stereoisomers of 1,2,3,4,5-pentanepentol.
8. Identify if the following pairs of compounds are identical, enantiomers, diastereomers or constitutional isomers.



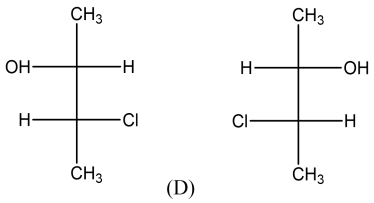
(A)



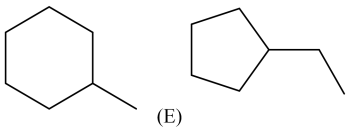
(B)



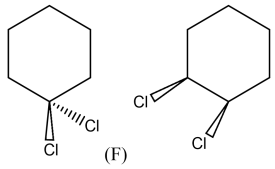
(C)



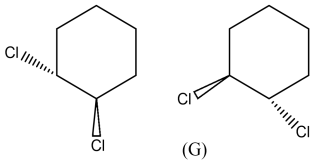
(D)



(E)

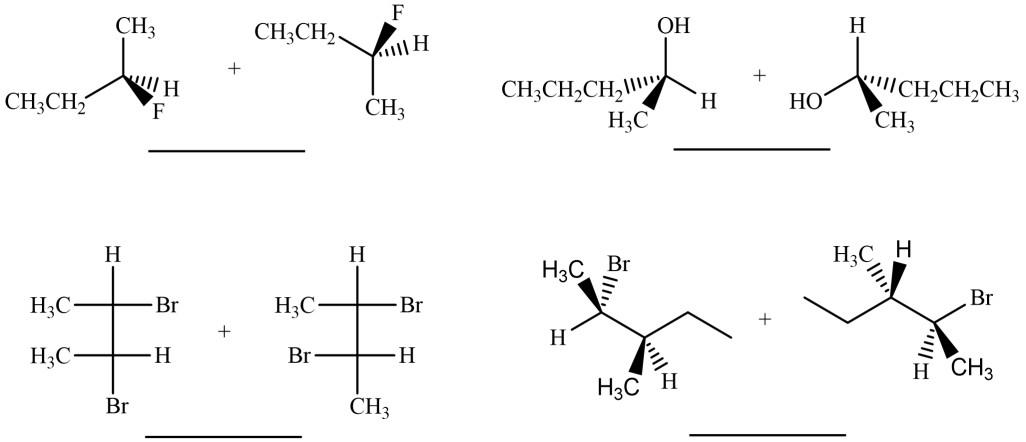


(F)



(G)

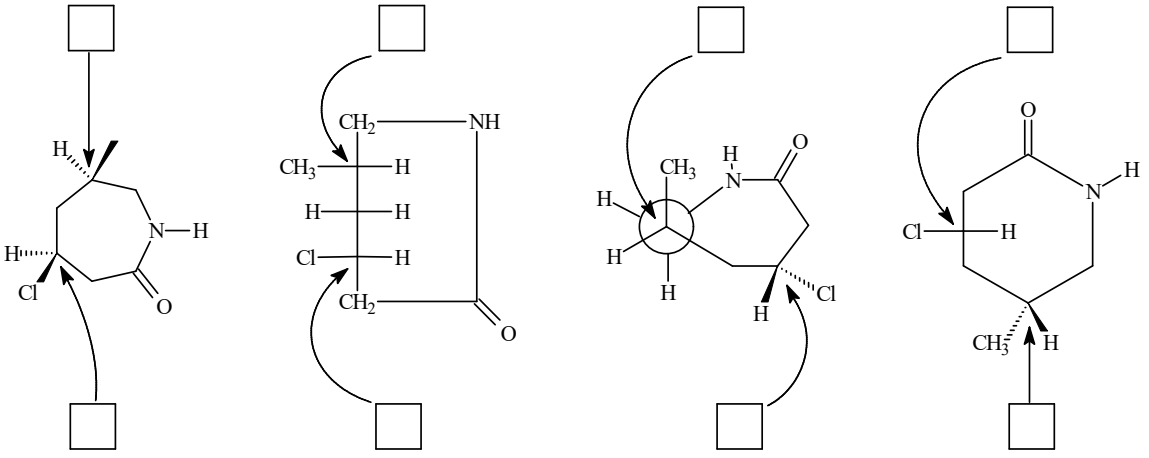
9. Using Newman projections, draw the three staggered conformations of 1-bromobutane and 3-ethylheptane formed from rotation along the C1-C2 bond and the C3-C4 bond respectively. Mention the most stable conformation in each case.
10. Indicate whether the following pairs of molecules are identical, enantiomers, diastereomers or stereochemically unrelated. Mention any meso compounds.



11. Draw the indicated stereoisomer, clearly showing the stereochemistry
    (a) *cis*-4-chlorocycloheptanol,
    (b) (*Z*)-3-hexen-3-amine,
    (c) (*S*)-3-methylpent-1-ene
    (d) (*E*)-1-bromo-3-chloro-2-methoxy-2-pentene
    (e) (2*S*,3*R*)-3-methylpentan-2-ol

12. Draw the Fischer and Newmann projection structures in their most stable conformation of (2*R*, 3*R*)-2,3-dibromopentane.

13. Consider the molecules below and answer the following questions.



A B C D

i) In the boxes provided, assign the configuration R or S to each chiral atom above.

ii) Identify the relationship between the following pairs using one of: enantiomers, diastereomers, mesomer, same compound or no relationship.

(A,B); (A,C); (B,C); (B,D)