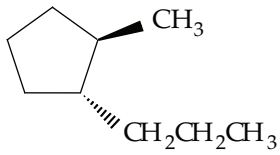
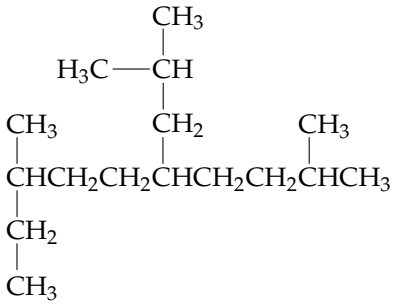
Self Test 1 (Units 3-5)

1. Provide the proper IUPAC name for each of the compounds below.

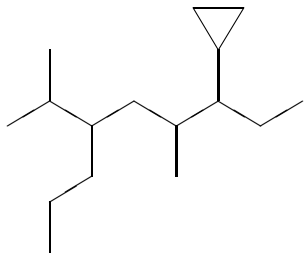
a.



b.



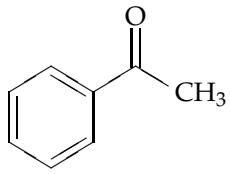
c.

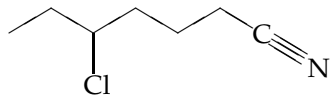


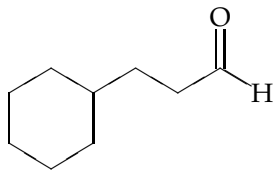
2. Use the given functional group descriptions (terms) to describe the organic compounds listed below. Several correct terms may be associated with each compound. Some of the terms may be used to describe more than one compound.

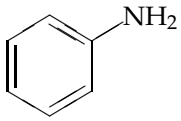
Terms

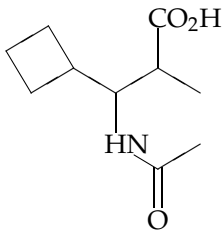
aldehyde	alkene	alkyne
alkyl halide	amide	amine
aromatic	carboxylic acid	ester
ketone	nitrile	thiol

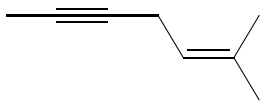
a. 

b. 

c. 

d. 

e. 

f. 

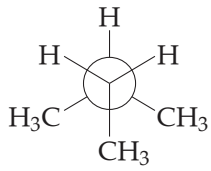
3. For each of the substances described below, draw the structure of an organic compound that satisfies the description.

   a. a cycloalkane with the formula C_5H_{10} possessing a single primary carbon atom

   b. a cycloalkane with the formula C_5H_{10} possessing only secondary carbon atoms

   c. a cycloalkane with the formula C_5H_{10} possessing a quaternary carbon atom

4. The figure below shows a Newman projection along the C2—C3 bond of an alkane.

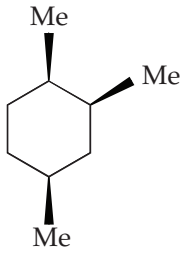


   a. Draw a line-bond structure for the given compound, and provide its IUPAC name.

   b. Draw the Newman projection (along the C2—C3 bond) corresponding to the two most stable staggered conformations.

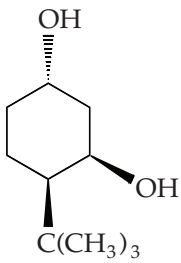
   c. Draw the Newman projection (along the C2—C3 bond) corresponding to the most stable eclipsed conformation.

5. Draw both chair conformations of the all-cis isomer of 1,2,4-trimethylcyclohexane (shown below), and circle the more stable one. Provide a brief explanation of your decision.

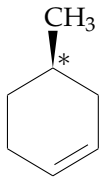


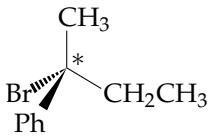
6. For the following structure, predict which of the two hydroxyl groups is most likely to be axial, and explain why this is so.

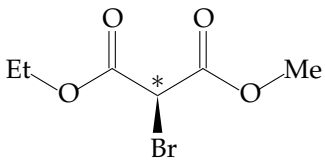
   Hint: Consider the two possible chair conformations available for the given structure.

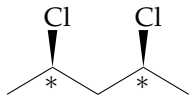


7. Assign *R* or *S* stereochemistry to the stereogenic centres indicated with asterisks below.

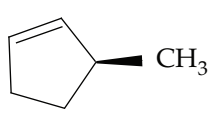
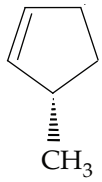
a. 

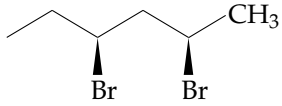
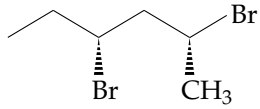
b. 

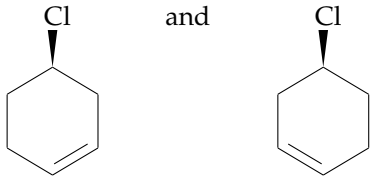
c. 

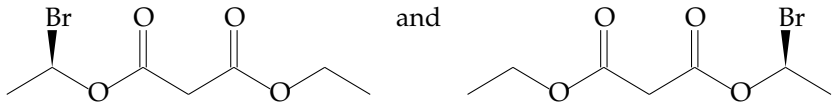
d. 

8. For each of the following pairs of molecules, indicate whether the two molecules are enantiomers, diastereomers, homomers (i.e., identical) or none of the above.

a.  and 

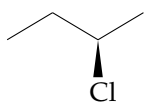
b.  and 

c. 

d. 

9. Identify the stereogenic carbon atoms (if any) in the following molecules, and label them with an asterisk. In each case, indicate whether the molecule is chiral or achiral.

a.



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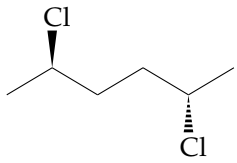

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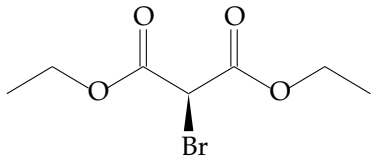

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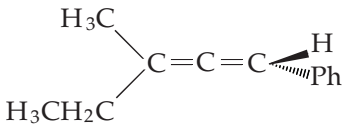

10. The structure of tetrodotoxin, a toxin isolated from several species of exotic fish, is given below. Use asterisks to label any stereogenic centres in tetrodotoxin. It is *not* necessary to assign *R* or *S* configurations to these stereogenic centres!