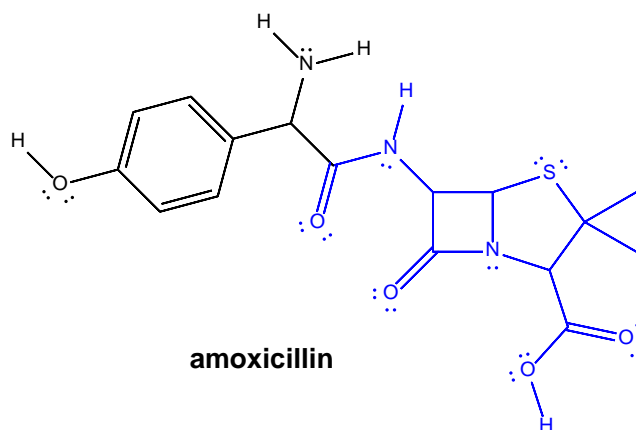
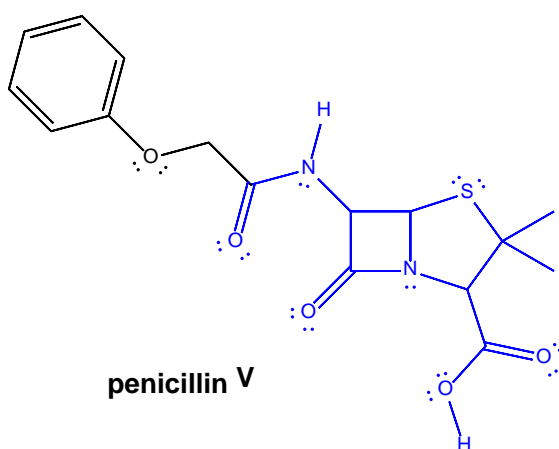


Practice Test Questions 10

Organic Molecules – Functional Groups and Stereochemistry

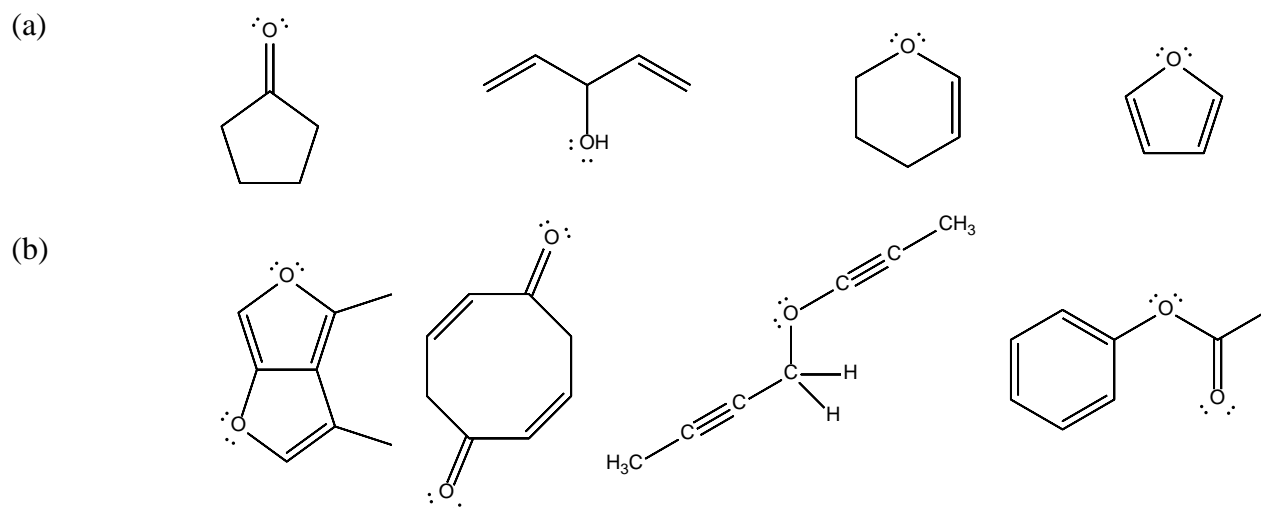
- Draw all three alkynes with the molecular formula C_5H_8 .
- Draw the structure of the aldehyde with a molecular formula of C_3H_6O .
 - Draw an isomer of this aldehyde that is an alcohol.
 - Draw an isomer of this aldehyde that is an ether.
 - Draw an isomer of this aldehyde that is a ketone.
- The penicillins are a series of antibiotics containing the same core structure (shown in blue):



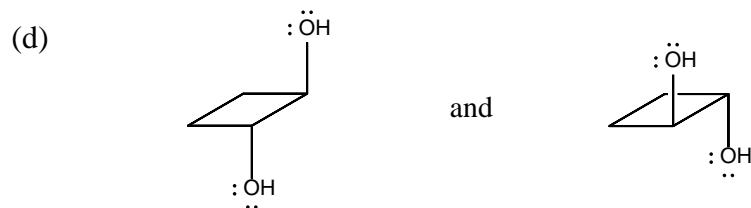
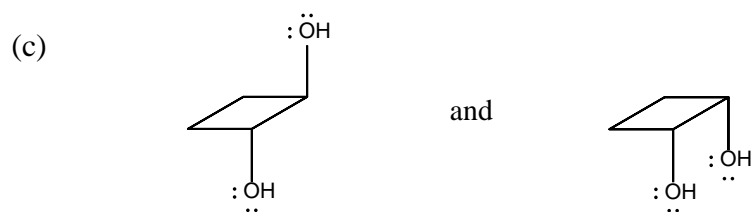
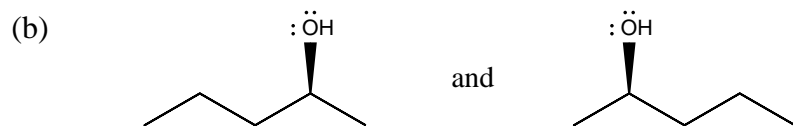
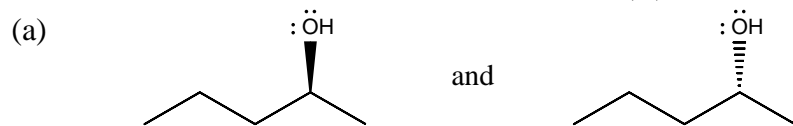
- Circle and name all of the functional groups in penicillin V and in amoxicillin. *You may ignore the sulfur atom.*
 - How many chirality centers are there in each of the antibiotics above? Identify each chirality center with an asterisk.
- Draw all of the structural isomers for each of the formulas below.
See the hint at the bottom of the page for how many isomers there should be for each formula.
 - C_3H_6BrCl
 - C_4H_8
 - C_7H_{16}

Hint: You should get five isomers each for (a) and (b), and nine isomers for (c).

5. In each of the following sets of molecules, circle all of the molecules which are isomers of each other:



6. Indicate whether each of the following pairs of molecules is (A) a pair of enantiomers, (B) two different views of the same molecule or (C) neither:

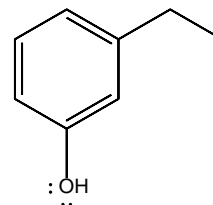


7.

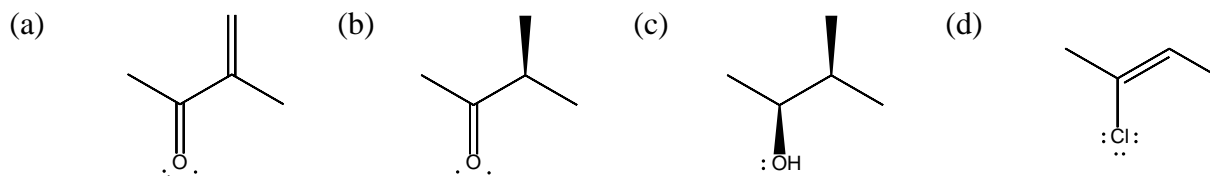
(a) Circle all of the chirality centers in the molecules in question 6.

(b) One of the molecules in question 6 is not chiral. Draw this achiral molecule and explain why it is not chiral.

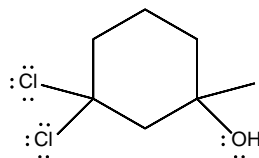
8. 3-Ethylphenol is drawn at the right.
- (a) Draw an isomer of 3-ethylphenol that is an aldehyde.
- (b) Draw an isomer of 3-ethylphenol that is a ketone.



9. For each of the molecules below, indicate whether or not it has a stereoisomer. If it does, draw the stereoisomer and describe the relationship between the two molecules (*using a word/phrase other than "stereoisomer"*).



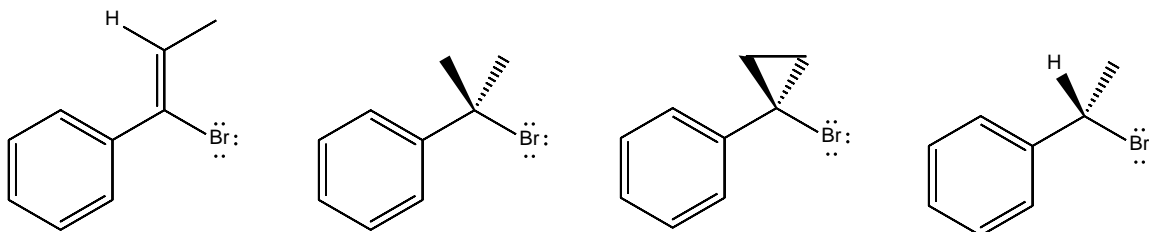
10. 3,3-Dichloro-1-methylcyclohexanol is drawn below. Stereochemistry is not shown.



- (a) Is there more than one stereoisomer that could correspond to the structure shown? *If so*, what kind of stereoisomers are they? *If not*, why not?
- (b) Draw an isomer of this molecule that is an ether.
- (c) Draw an isomer of this molecule that is an aldehyde.
11. Pentanal is an aldehyde with the formula $C_5H_{10}O$. It has a linear carbon chain with no branches.
- (a) Draw pentanal.
- (b) Draw all **structural isomers** of pentanal **that are also aldehydes**.
- (c) On the structures from part (b), mark all the *chirality centers* with an asterisk (*).
- (d) For each of the answers to part (b) that is chiral, draw the corresponding pair of enantiomers. Use "wedges" notation to clearly show the stereochemistry.
12. Ethanoic acid (more commonly known as acetic acid) is responsible for the flavor and acidity of vinegar. It is a carboxylic acid with the formula $C_2H_4O_2$.
- (a) Draw ethanoic acid. *For full credit, your structure must include all lone pairs.*
- (b) Draw all nine structural isomers of ethanoic acid. If more than nine structures are drawn, only the first nine will be marked. *For full credit, all structures must include the lone pairs.*

13. Draw a molecule meeting each of the following descriptions.
- A *cis* alkene.
 - An aldehyde with the molecular formula C_5H_8O .
 - A molecule that is both an alkyne and an amide.

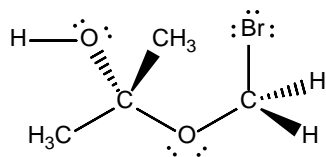
14. Circle each of the molecules below which is chiral.



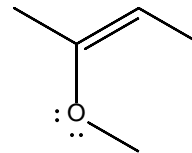
15. Draw all isomers of C_2H_3OF .
- Stereochemistry must be clear when drawing stereoisomers.*
- Marks will be deducted for drawing the same molecule multiple times.*

16. Consider the four molecules drawn below.

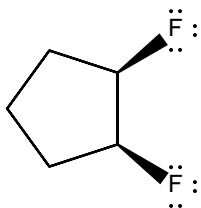
i.



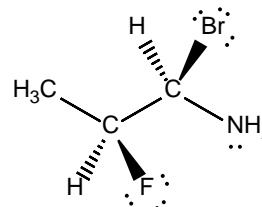
ii.



iii.



iv.



- For each of the following molecules, indicate whether or not it has at least one stereoisomer. If it does, draw the stereoisomer and describe the relationship between the two molecules (*using a word/phrase other than "stereoisomer"*).
- Clearly identify the functional groups present in these four molecules.
- For structure ii, indicate the hybridization for each of the carbon atoms.