

Name: _____

Date: _____

- [10 pt] 1. List what is the same and different about each of the following types of isomers. Discuss (a) chemical formula (b) structure, (c) geometry (d) chemical properties, (e) physical properties (f) biological properties and (g) optical rotation. Provide one example (draw a picture) **NOT** taken from the book or your notes illustrating each.

(a) Structural Isomers

Same	Different	Example

(b) Geometric Isomers

Same	Different	Example

(c) Enantiomers

Same	Different	Example

(d) Diastereomers

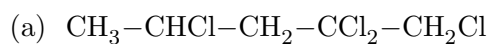
Same	Different	Example

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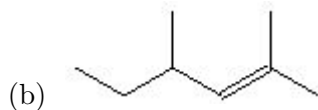
[2 pt] 2. Define the term: Asymmetric (or Chiral) Carbon Atom. What are the requirements (2) for a carbon atom to be considered chiral? Include a picture (**NOT** from your book or notes) illustrating the concept.

[2 pt] 3. Define the term: Chiral Molecule. What are the requirements (2) for a molecule to be considered chiral?

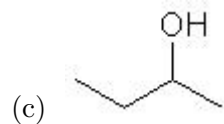
[5 pt] 4. Circle the chiral atoms in each molecule. If no chiral atoms exist, place the word "NONE" in the answer blank.



4(a) _____



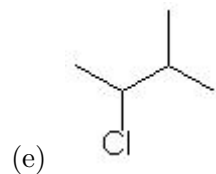
4(b) _____



4(c) _____



4(d) _____



4(e) _____

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[5 pt] 5. Draw the structure for the following molecules. If the molecule would be optically active circle the chiral carbon and write "YES" in the answer blank. If no chiral atoms exist, place the word "NONE" in the answer blank.

(a) 3-chloropentane 5(a) _____

(b) 2-chloro-2-methylpentane 5(b) _____

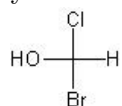
(c) 2-chloro-4-methylpentane 5(c) _____

(d) 2,3,4-trihydroxybutanal 5(d) _____

(e) 2-methylbutyl 3-chloroheptanoate 5(e) _____

[2 pt] 6. What is a Fischer Projection? Draw an example of one (**NOT** found in your book or notes using an actual molecule). In a Fischer projection, how atoms on the left/right are different from the top/bottom?

[4 pt] 7. Are the following molecules the (S)ame or (D)ifferent from the molecule shown at the top. Explain your answers and/or show work in the space provided to support your answer.



(a)
$$\begin{array}{c} \text{Br} \\ | \\ \text{HO} - \text{C} - \text{H} \\ | \\ \text{Cl} \end{array}$$
 7(a) _____

(b)
$$\begin{array}{c} \text{Br} \\ | \\ \text{H} - \text{C} - \text{OH} \\ | \\ \text{Cl} \end{array}$$
 7(b) _____

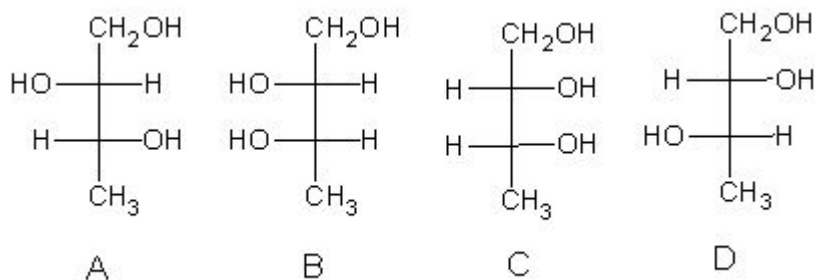
(c)
$$\begin{array}{c} \text{Cl} \\ | \\ \text{Br} - \text{C} - \text{H} \\ | \\ \text{OH} \end{array}$$
 7(c) _____

(d)
$$\begin{array}{c} \text{Br} \\ | \\ \text{Cl} - \text{C} - \text{OH} \\ | \\ \text{H} \end{array}$$
 7(d) _____

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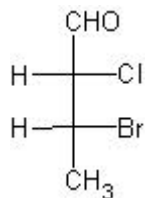
- [5 pt] 8. Define the term: Meso Compound. What are the requirements (2) for a molecule to be considered meso? Why are meso compounds optically inactive? Draw an example of a Meso compound (**NOT** found in your book or lecture notes).

- [5 pt] 9. Indicate which pairs of molecules below are:

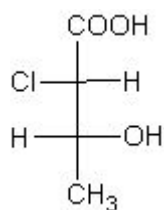


- (a) Enantiomers:
 (b) Diastereoisomers:
 (c) Meso Compounds:

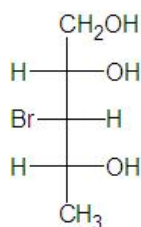
- [4 pt] 10. Draw all of the stereoisomers of the molecule below.



- [2 pt] 11. Draw all the diastereomers of:



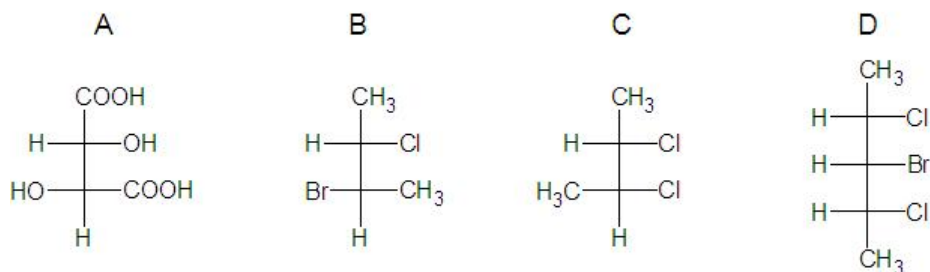
- [2 pt] 12. Draw all of the enantiomers of the molecule below.



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- [4 pt] 13. Draw projection formulas for all the stereoisomers of 1,2,3,4-tetrahydroxybutane. Label each, and list all of the Enantiomers, Diastereomers, and Meso compounds where present.

- [4 pt] 14. Circle the following molecules that are Meso compounds. If a molecule is a Meso compound draw the plane of symmetry in the molecule. Explain why each compound you circled is Meso.



- [2 pt] 15. Why is it not possible to separate enantiomers by ordinary chemical and physical means?

- [2 pt] 16. When biological interaction of a drug involves optical isomers, drug design becomes complicated. Why?

The remainder of this worksheet **WILL NOT** be graded. I am just including some hints as to what would be good to study for the exam that was not included on the previous worksheets.

17. For additional practice on drawing Stereoisomers, Enantiomers, Diastereomers, and Meso Compounds it is recommended to practice on the even numbered problems in your book. (16, 18, 20, 22, 24, 26, 28, 32, 34, 36)

18. For additional practice on identifying chiral carbons it is recommended to practice on the even numbered problems in your book. (6, 8, 10, 12)

19. It is difficult to differentiate between the same molecule and a stereoisomer. Additional practice can be found in the book. (14)