Master Organic Chemistry

Stereochemistry Exam Preparation Pack

24 Key Problem Types - Beginner / Intermediate

Section A: Assigning relationships

Link to answer
http://bit.ly/Stereochem-EI-MOC-1

Decide if these molecules are enantiomers or diastereomers **based on the name alone.**

1) (*R*)-Butan-2-ol and (*S*)-Butan-2-ol

2) (*2R,3R*)-2-Bromo-3-chlorobutane and (*2S,3S*)-2-Bromo-3-chlorobutane

3) (*R,R*)-Tartaric acid and (*R,S*)-Tartaric acid

4) (*2R,4R*)-2,3,4-Pentanetriol and *(2S,4S)*-2,3,4-Pentanetriol

5) (*R,R,R,R,R*)-BigComplicatedMoleculicine and (*R,R,R,R,S*)-BigComplicatedMoleculicine

6) (*E*)-Hex-3-ene and (*Z*)-Hex-3-ene

7) (*R,E*)-4-Hexen-2-ol and (*S,Z*)-4-Hexen-2-ol

8) (*R,E*)-4-Hexen-2-ol and (*R,Z*)-4-Hexen-2-ol

9) (*R,E*)-4-Hexen-2-ol and (*S,E*)-4-Hexen-2-ol

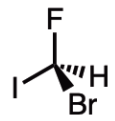
10) *(1R,2S)*-1,2-Dimethylcyclohexane and *(1S, 2R)*-1,2-Dimethylcyclohexane

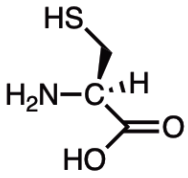
11) *cis*-1,2-Dimethylcyclohexane and *trans*-1,3-Dimethylcyclohexane

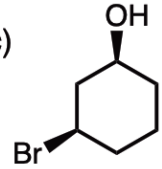
12) (*R,S*)-2,3-Dichlorobutane and (*S,R*)-2,3-Dichlorobutane

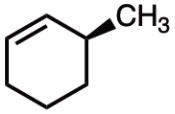
Section B: Assigning R/S

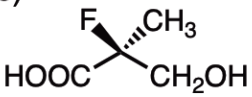
B-1 Assign all chiral centers as R or S http://bit.ly/Stereochem-EI-MOC-2

a) 

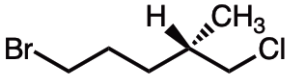
b) 

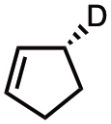
c) 

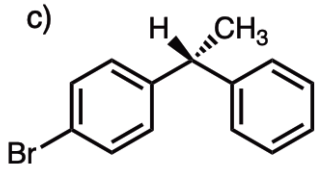
d) 

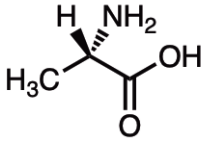
e) 

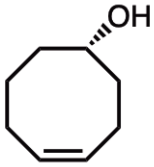
B-2 Assign all chiral centers as R or S http://bit.ly/Stereochem-EI-MOC-3

a) 

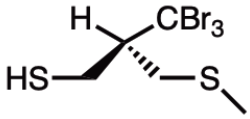
b) 

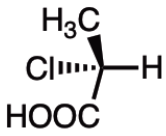
c) 

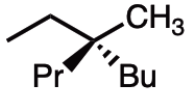
d) 

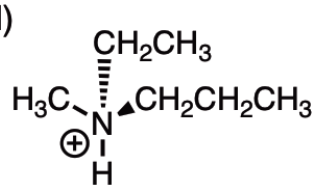
e) 

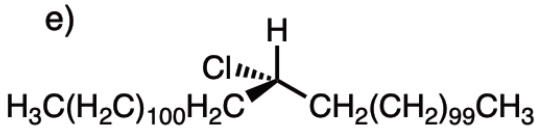
B-3 Assign R or S to all chiral centers http://bit.ly/Stereochem-EI-MOC-4

a) 

b) 

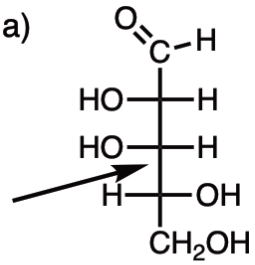
c) 

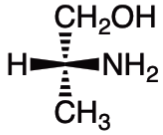
d) 

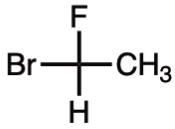
e) 

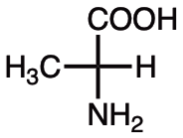
B-4 Assign R or S to the indicated chiral center in these Fischer projections

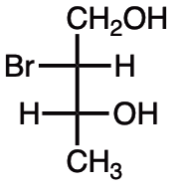
http://bit.ly/Stereochem-EI-MOC-5

a) 

b) 

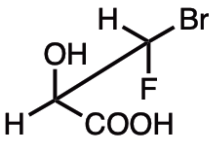
c) 

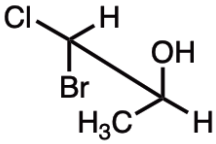
d) 

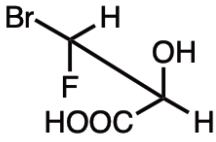
e) 

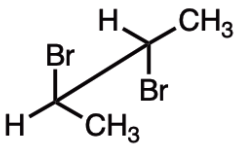
B-5 Assign R or S to the chiral centers in these Sawhorse projections

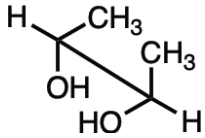
http://bit.ly/Stereochem-EI-MOC-6

a) 

b) 

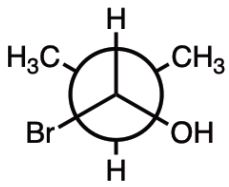
c) 

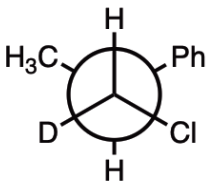
d) 

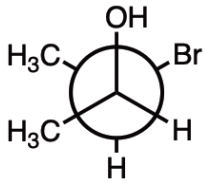
e) 

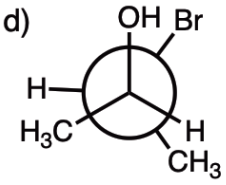
B-6 Assign R or S to the chiral centers in these Newman projections

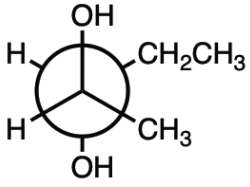
http://bit.ly/Stereochem-EI-MOC-7

a) 

b) 

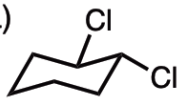
c) 

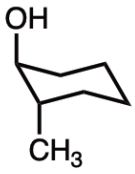
d) 

e) 

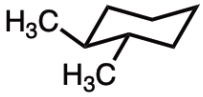
B-7 Assign R or S to the chiral centers in these cyclohexane chairs

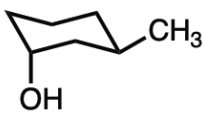
http://bit.ly/Stereochem-EI-MOC-8

a) 

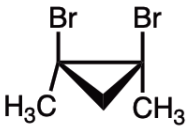
b) 

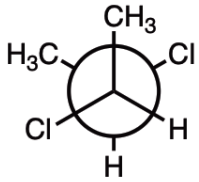
c) 

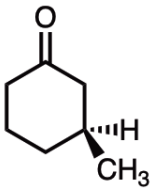
d) 

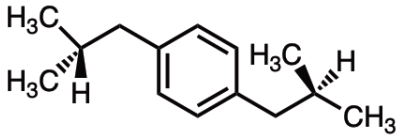
e) 

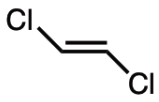
C-1 Are these chiral or achiral molecules? http://bit.ly/Stereochem-EI-MOC-9

a) 

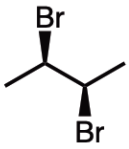
b) 

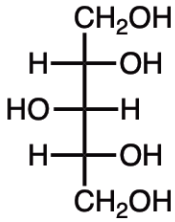
c) 

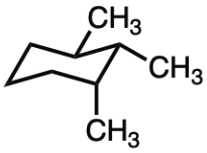
d) 

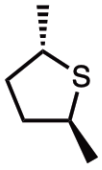
e) 

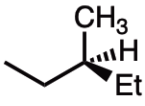
C-2 Another set. Chiral or achiral molecules? http://bit.ly/Stereochem-EI-MOC-10

a) 

b) 

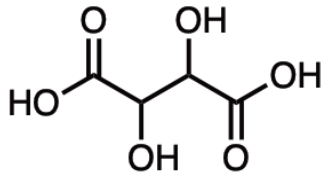
c) 

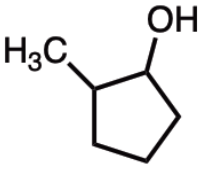
d) 

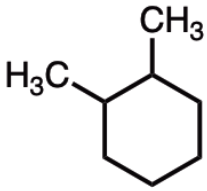
e) 

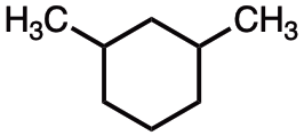
D-1 Decide if a molecule has chiral centers and if so, how many stereoisomers each has. If there is a meso compound, draw the structure using wedge/dash

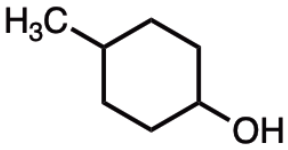
http://bit.ly/Stereochem-El-MOC-11

a) 

b) 

c) 

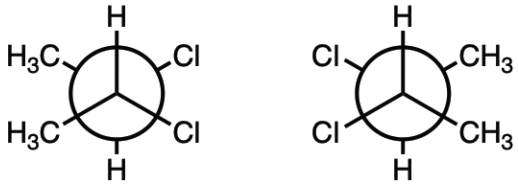
d) 

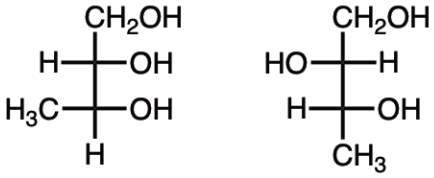
e) 

E-1 Decide if these molecules are enantiomers, diastereomers, the same, or constitutional isomers [*pssst - this is a very common class of exam problem!*]

http://bit.ly/Stereochem-El-MOC-12

a) 

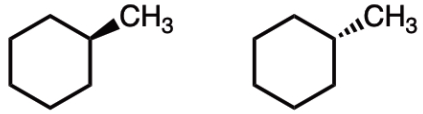
b) 

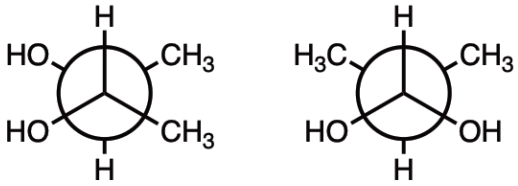
c) 

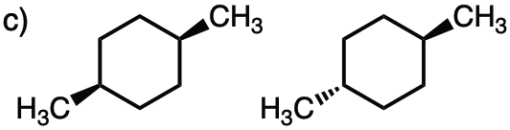
d) 

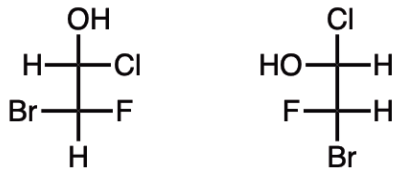
E-2 Enantiomers, diastereomers, the same, or constitutional isomers?

http://bit.ly/Stereochem-EI-MOC-13

a) 

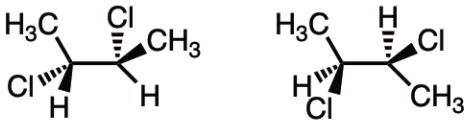
b) 

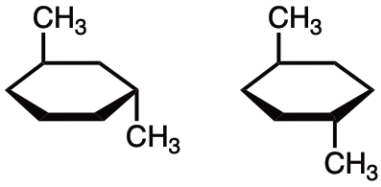
c) 

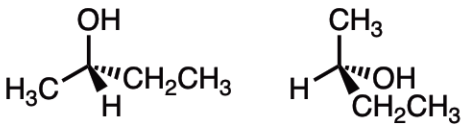
d) 

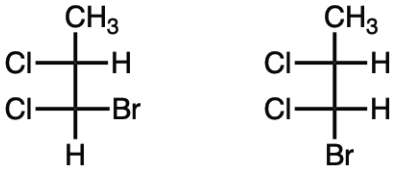
E-3 Enantiomers, diastereomers, the same, or constitutional isomers?

http://bit.ly/Stereochem-EI-MOC-14

a) 

b) 

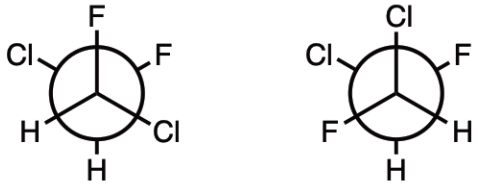
c) 

d) 

E-4 Enantiomers, diastereomers, the same, or constitutional isomers?

http://bit.ly/Stereochem-EI-MOC-15

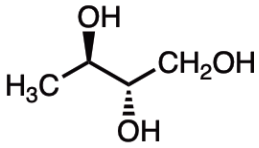
a) 

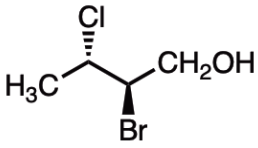
b) 

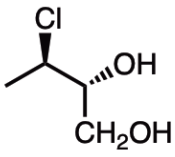
c) 

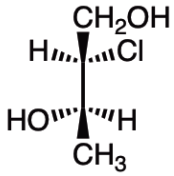
d) 

F-1 Convert each of these line drawings ("perspective" drawings) to a Fischer projection. http://bit.ly/Stereochem-EI-MOC-16

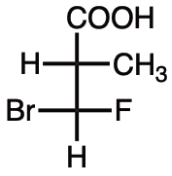


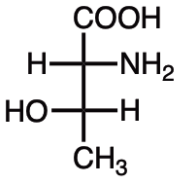


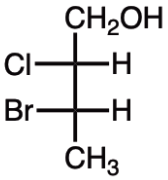


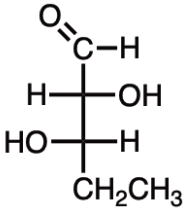


G-1 Convert each of these Fischer projections to line drawings (use the template below) http://bit.ly/Stereochem-EI-MOC-17



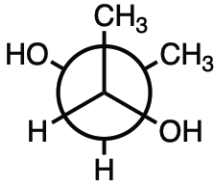


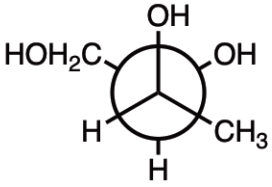


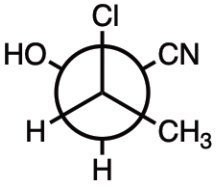


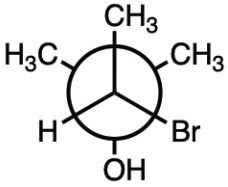
H-1 Convert each of these Newman projections to a Fischer projection.

http://bit.ly/Stereochem-EI-MOC-18









I-1 Given these names, draw the following molecules:

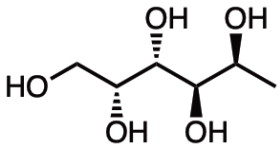
- *(S)*-2-Chlorobutane
- *(2R,3R)*-3-Chloropentan-2-ol
- *(1R,2S)*-2-Amino-1-phenylpropan-1-ol

http://bit.ly/Stereochem-EI-MOC-19

J-1 The structure below is one enantiomer of the molecule Fucitol.

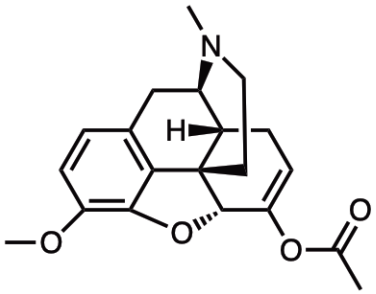
Draw the enantiomer of this molecule, which also goes by the name D-Fuc-ol.

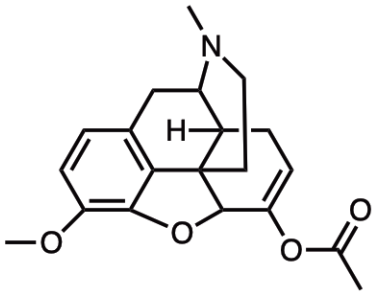
http://bit.ly/Stereochem-EI-MOC-20



J-2 The structure below goes by the name Thebacon. How many chiral centers does Thebacon have? For bonus points draw the enantiomer using the template on the right.

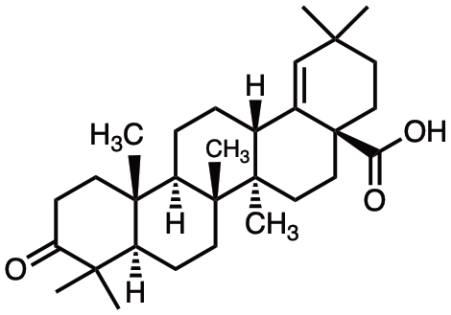
http://bit.ly/Stereochem-EI-MOC-21

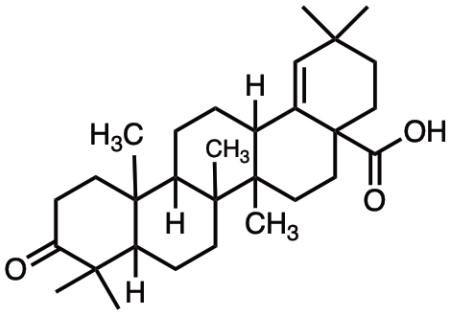




J-3 The molecule below is known as Moronic acid. How many chiral centers does it have? Try drawing the enantiomer using the template on the right.

http://bit.ly/Stereochem-EI-MOC-22





K-1 Optical rotation questions.

http://bit.ly/Stereochem-EI-MOC-23

a) If the specific rotation of (+)-Fucitol is +50°, and the rotation of a sample of Fucitol is measured to be –10°, what is the per-cent composition of (+)-Fucitol and (–)-Fucitol in the sample?

b) A 5.0 mg sample of Thebacon is dissolved in 1.0 mL of methanol and the solution placed in a cell with a 2.0 cm path length. The observed rotation was +0.105°.
What is the $[\alpha]_D$ for Thebacon?

L-1 [Assumes you have covered free-radical reactions of alkanes]

How many different monochlorinated isomers (including stereoisomers) are possible for each of these molecules?

http://bit.ly/Stereochem-EI-MOC-24