Chemistry Stereochemistry Exam Preparation Pack

Answer Key - Beginner / Intermediate note - all problems can also be found <u>here (link)</u>

Section A: Assigning relationships

Link to answer

https://bit.lv/390r4N7

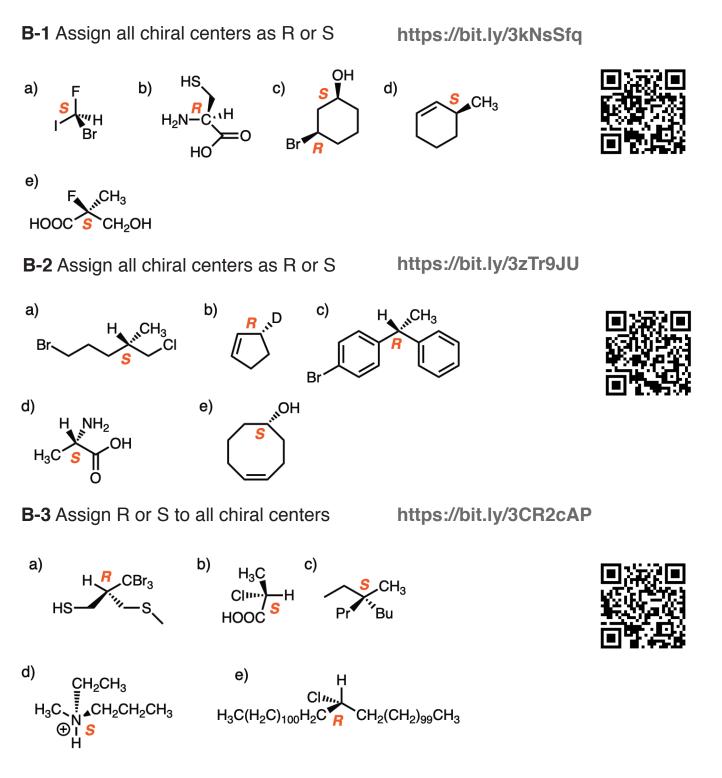
Decide if these molecules are enantiomers or diastereomers based on the name alone.

- 1) (*R*)-Butan-2-ol and (*S*)-Butan-2-ol enantiomers
- 2) (2R,3R)-2-Bromo-3-chlorobutane and (2S,3S)-2-Bromo-3-chlorobutane enantiomers
- 3) (*R*,*R*)-Tartaric acid and (*R*,*S*)-Tartaric acid diastereomers
- 4) (2R,4R)-2,3,4-Pentanetriol and (2S,4S)-2,3,4-Pentanetriol enantiomers
- 5) (*R*,*R*,*R*,*R*,*R*)-BigComplicatedMoleculicine and diastereomers (R,R,R,R,S)-BigComplicatedMoleculicine
- diastereomers 6) (*E*)-Hex-3-ene and (*Z*)-Hex-3-ene
- 7) (*R*,*E*)-4-Hexen-2-ol and (*S*,*Z*)-4-Hexen-2-ol diastereomers
- 8) (*R*,*E*)-4-Hexen-2-ol and (*R*,*Z*)-4-Hexen-2-ol diastereomers
- enantiomers 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 diastereomers
- 11) cis-1,2-Dimethylcyclohexane and trans-1,3-Dimethylcyclohexane constitutional isomers
- 12) (R.S)-2.3-Dichlorobutane and (S.R)-2.3-Dichlorobutane same (meso)



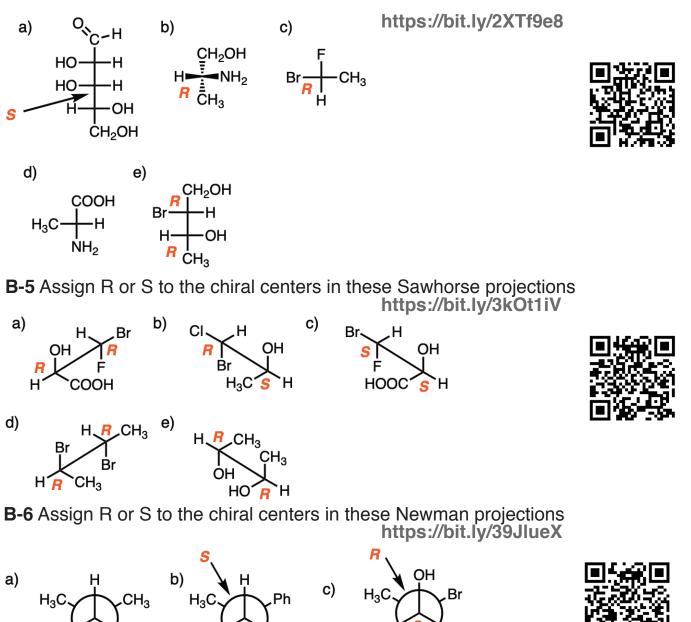
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Section B: Assigning R/S



2

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



 H_3C

CI

3

CH₂CH₃

 CH_3

Stereochemistry Answer Key - Beginner / Medium

Br

OH Br

CH₃

S

d)

Н

H₃C

OH

e)

R

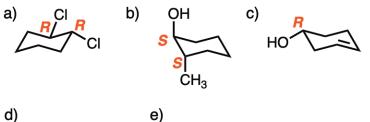
н

Η

OH

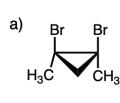
ĠН

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





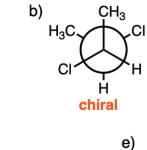
C-1 Are these chiral or achiral molecules?



achiral

d)

a)



 CH_3

c) O CH₃ chiral

CI

https://bit.ly/2XZQhSx

https://bit.ly/3kQEZIA



H₃C H₃C^{VI}H

achiral

achiral

c)

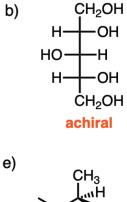
4

C-2 Another set. Chiral or achiral molecules? https://bit.ly/39Ltigk

CI

chiral

Br







CH₃

CH₃

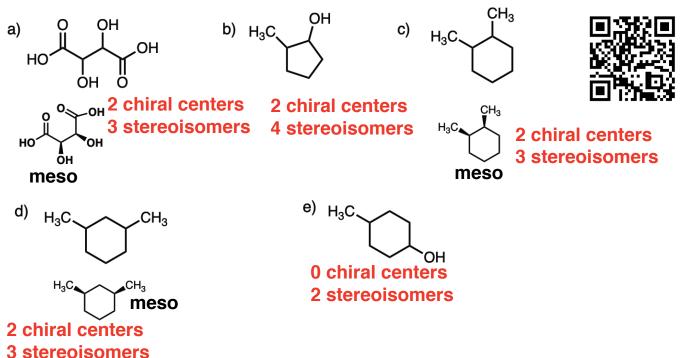
chiral



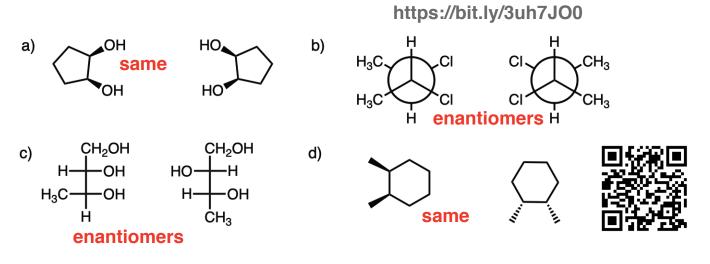
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chiral

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 https://bit.ly/2WiLk6e



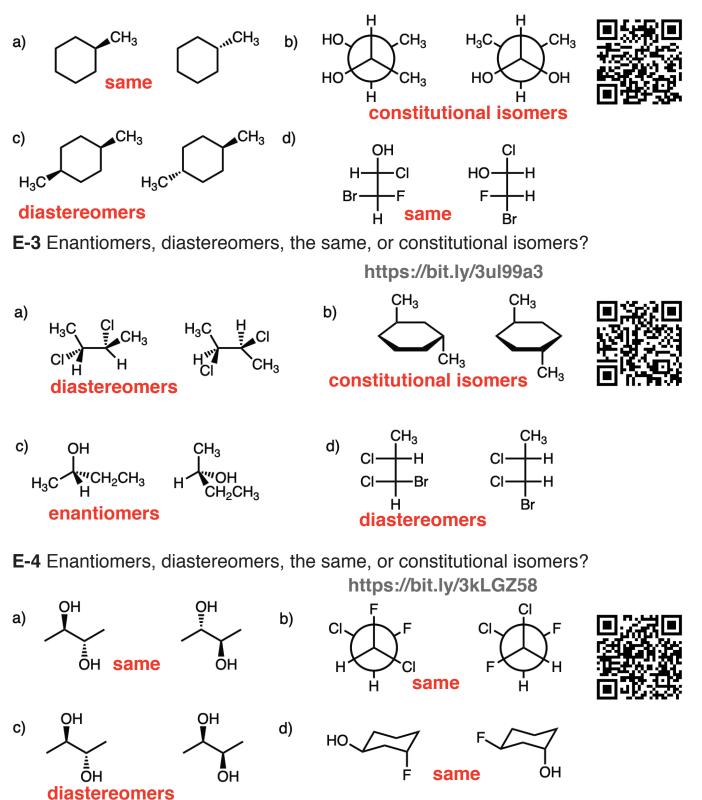
E-1 Decide if these molecules are enantiomers, diastereomers, the same, or constitutional isomers [*pssst - this is a very common class of exam problem*]



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

https://bit.ly/3kMNggF

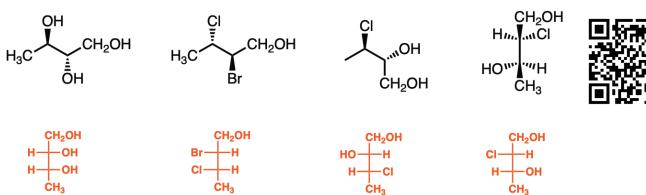


6

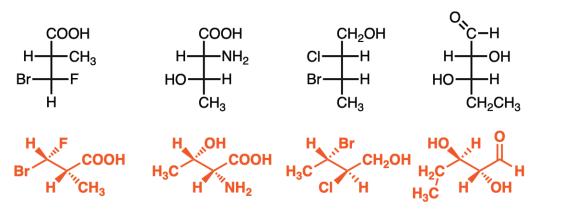
Stereochemistry Answer Key - Beginner / Medium

https://www.masterorganicchemistry.com

F-1 Convert each of these line drawings ("perspective" drawings) to a Fischer projection.
https://bit.ly/39IOaoe

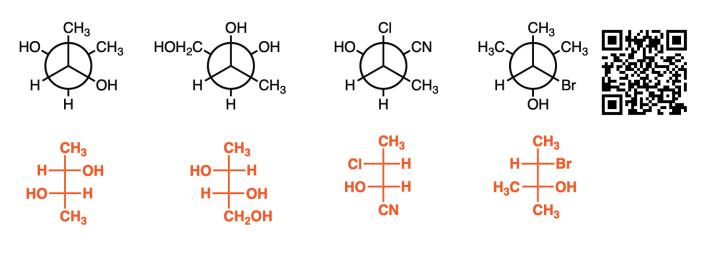


G-1 Convert each of these Fischer projections to line drawings (use the template below) https://bit.ly/3m0tEol



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

https://bit.ly/2YbJlw1



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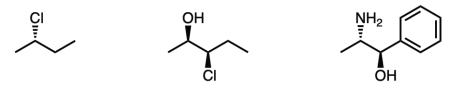
https://www.masterorganicchemistry.com

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

• (S)-2-Chlorobutane

https://bit.ly/3kM1Ox8

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



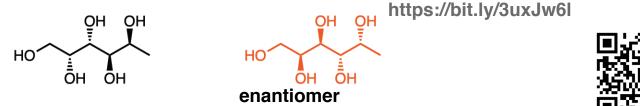


(S)-2-Chlorobutane (2R,3R)-3-Chloropentan-2-ol

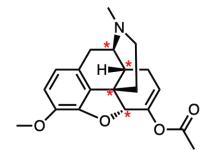
(1R, 2S)-2-amino-1-phenylpropan-1-ol

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

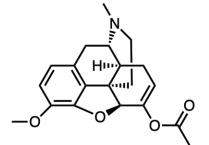
Draw the enantiomer of this molecule, which also goes by the name D-Fuc-ol.



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. https://bit.ly/3ukz5CJ



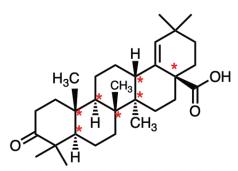
4 chiral centers



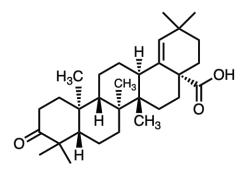
enantiomer



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. https://bit.ly/3zTtu7E



K-1 Optical rotation questions.



enantiomer



6 chiral centers

https://bit.ly/3ohsqbl

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? 60% (-)-Fucitol, 40% (+)-Fucitol



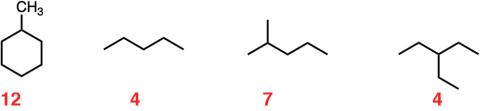
b) A 5.0 mg sample of Thebacon is dissolved in 1.0 mL of methanol and the solution placed in a cell with a 2.0 cm path length. The observed rotation was $+0.105^{\circ}$.

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What is the [\alpha]_D for Thebacon? +105°
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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?

https://bit.ly/3zQaZBd



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