CHE 171
Fall, 2005
QUIZ 4

Name: _____
Section: **101** **102** **103**
(*circle one*)

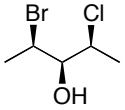
1. The observed rotation (α) of a 3 g sample of synthetic carvone in 30 mL of methanol in a 1 dm polarimeter tube is -2°.
   (a) Calculate the specific rotation ([α]) of this sample. Show your work. (5 pts)
   (b) If the specific rotation of pure (*R*)-carvone is –62°, what is the ee (optical purity) of the synthetic sample? Show your work. (5 pts)
   (c) What percentage of the synthetic sample is *(R)*-carvone and what percentage is (*S*)-carvone? Show your work. (5 pts)

   (a) $[\alpha] = [(-2°)/ (1\ dm)(3\ g/30\ mL)] = -20°$

   (b) -20°/-62° x 100 = 32%

   (c) if the mixture is 32% optically pure, it's 32% R and 68% racemic mix. Of the racemic mixture, half (34%) is R and half (34%) is S. So the synthetic mixture contains 66% R enantiomer (32 + 34) and 34% S enantiomer

2. Draw all possible stereoisomers for 2-bromo-4-chloro-3-pentanol (shown below). Label pairs of enantiomers and diastereomers. Label any meso compounds. Which, if any, of the stereoisomers are optically active? (15 pts)

1


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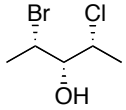

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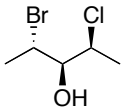

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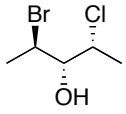

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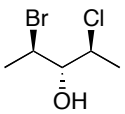

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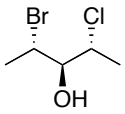

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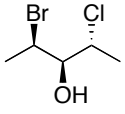

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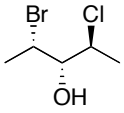


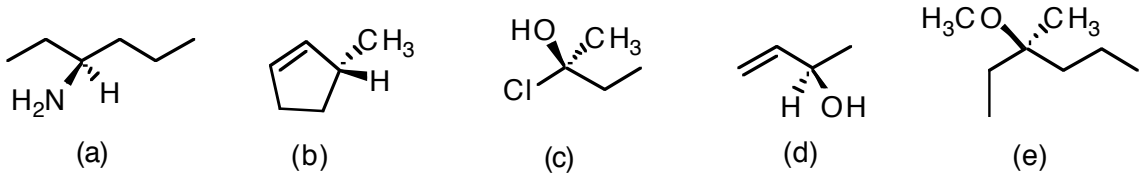
Pairs of enantiomers: 1 and 2, 3 and 4, 5 and 6, 7 and 8.

All other possible pairs are diastereomers.

All of these compounds are chiral and all are optically active

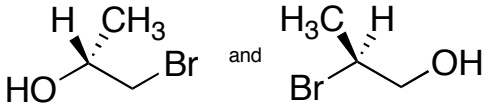
3. Assign configurations (R or S) to the chiral compounds below. (10 pts)

(a) ***S*** (b) ***R*** (c) ***R*** (d) ***R*** (e) ***R***

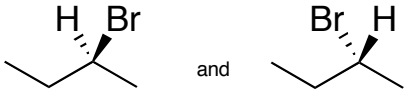


(a) (b) (c) (d) (e)

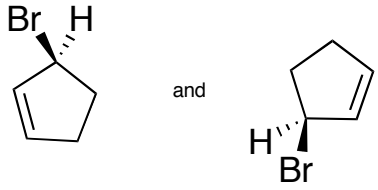
4. Classify the following pairs of compounds as enantiomers, diastereomers, constitutional isomers, or the same compound. (10 pts)

(a) 

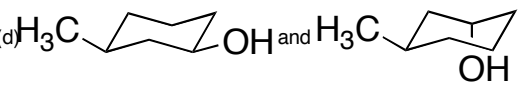
constitutional isomers

(b) 

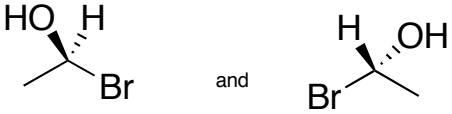
enantiomers

(c) 

same compound

(d) 

cis/trans diastereomers

(e) 

same compound