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**NO NOT STAPLE - ONLY WRITE NOTES INSIDE THE SQUARE BELOW**

• Last time: intro to stereochemistry

- Enantiomers: non-superimposable mirror images

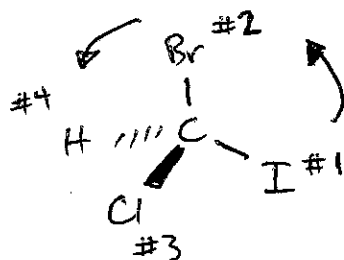
• R/S nomenclature: specific configuration at  $sp^3$  carbon

1) Assign priorities to 4 substituents

2) Orient molecule so lowest priority points away from you

3) Assign R/S based on whether a clockwise/counterclockwise arrow is drawn from highest to lowest priority.

Ex:



• assign priorities in same way as done for E/Z alkenes

• arrow is ~~clockwise~~ counter-clockwise

#1 → #2 → #3

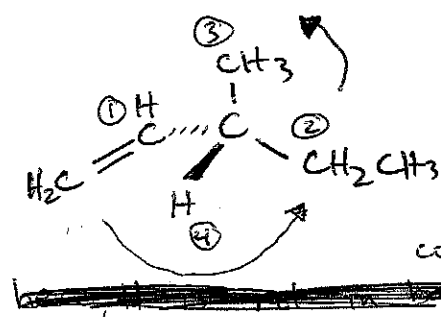
~~clockwise~~ ∴ S stereocenter

Clockwise = R

Counter-clockwise = S

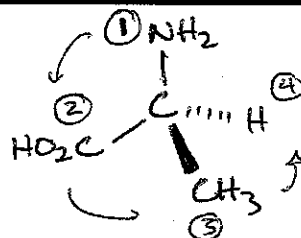
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• Other examples: Amino acid



• here, H is in front

• To account for this, assign the opposite configuration to what you would normally do

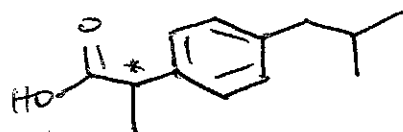


~~clockwise~~  
counter clockwise



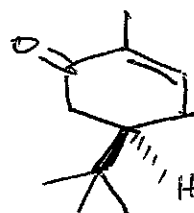
• counterclockwise → invert → (R)

• Recall - life examples:

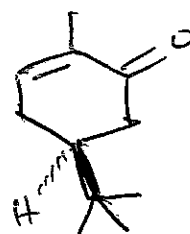


S enantiomer:  
ibuprofen

R = no effect



R-carvone  
(spearmint)



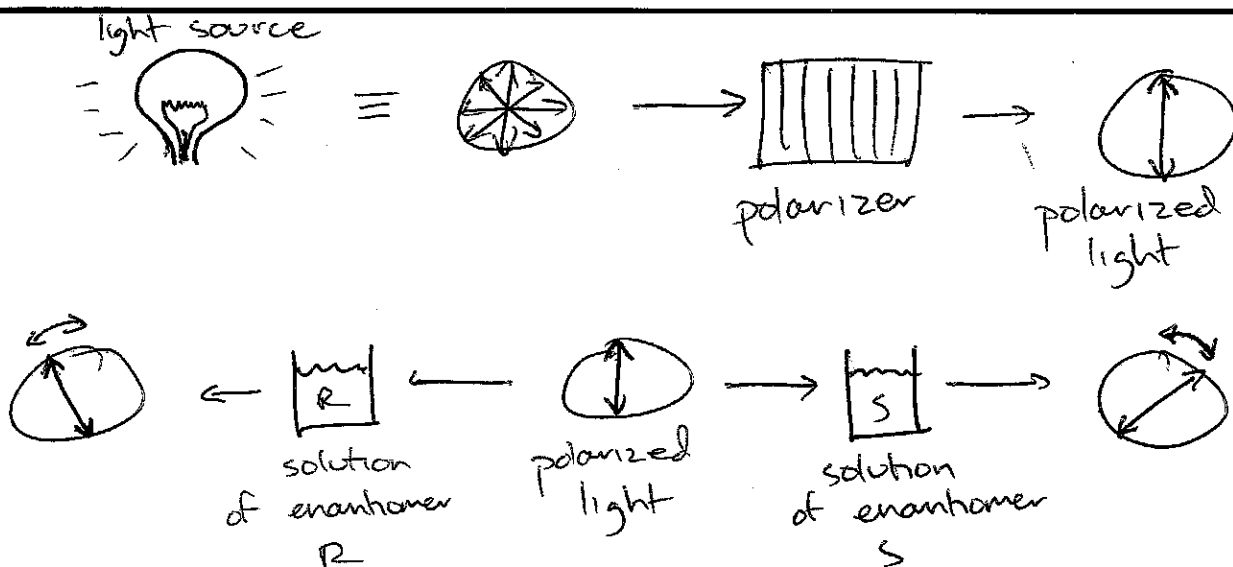
S-carvone  
(caraway seeds)

• Physical properties of enantiomers:

- almost all are identical (melting pt, boiling pt, etc)

- Different: ~~rotation~~ rotation of polarized light (ie, optical activity)

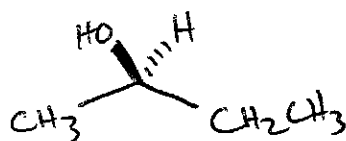
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- clockwise rotation =  $> 0 = +, d$
- counter-clockwise " =  $< 0 = -, l$

◦ There is no correlation between  $d/l$  and  $R/S$

Ex:



(R)-2-butanol

$$[\alpha]_D^{20} = -13.9$$

$[\alpha]$  = specific rotation (normalized for concentration and path length of sample)

$20 = \text{temp } ^\circ\text{C}$

$D = \text{wavelength of light}$   
(sodium vapor D line)

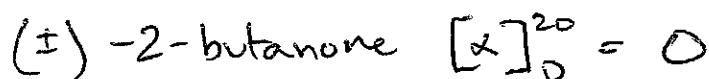
589.3 nm

\*  $[\alpha]_D^{20}$  for S enantiomer  
is +13.9

\* R/S do not correlate to +/- !

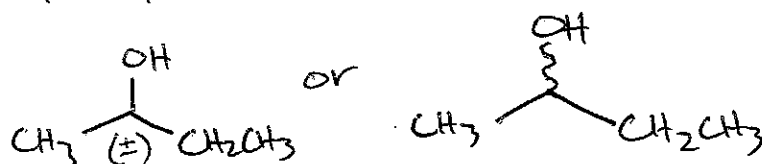
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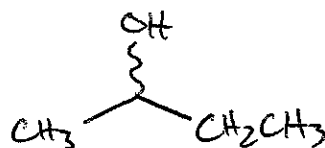
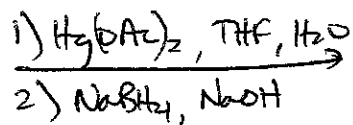
racemic mixture

to indicate a racemic mixture:



racemic mixture = 1:1 mixture of R/S enantiomers

Example of stereochem applied to chemical rxns



racemic mixture of 2-butanol

Any reaction in which chiral products are formed from achiral compounds/reagents must generate a racemic mixture

i.e., achiral environment gives racemic mixture