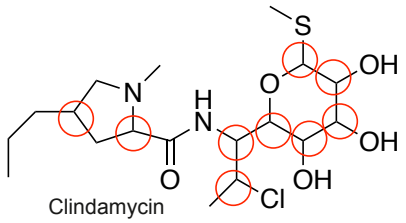
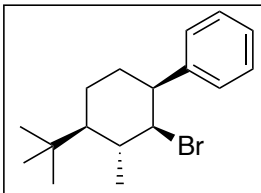
Tough Stereochemistry questions

How many strereoisomers are possible



Clindamycin

$2^9 = 512$



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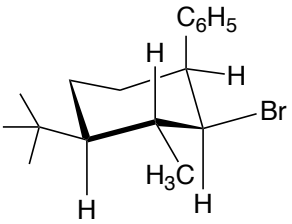
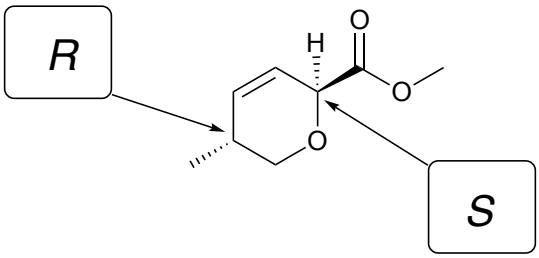
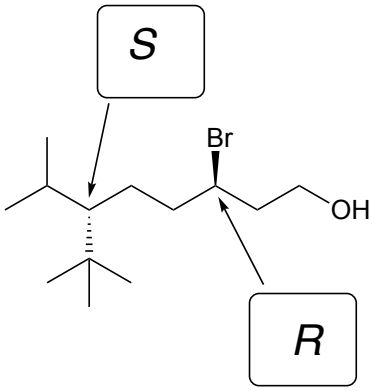


(1*S*,2*S*,3*R*,4*S*)-2-bromo-4-*tert*-butyl-3-methyl-1-phenylcyclohexane in its lowest energy chair conformation

Give the absolute stereochemical configuration (*R* or *S*) for each of the indicated stereogenic centers.

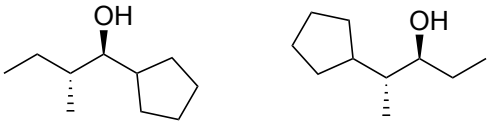




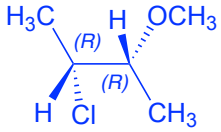
For each pair of compounds, label the pair as:

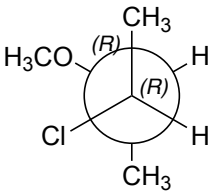
constitutional isomers
enantiomers
diastereomers
identical molecules (also sometimes called conformational isomers)

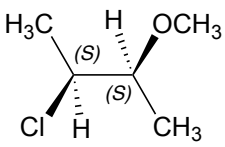
identical



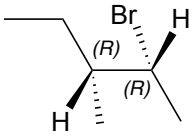
constitutional isomers

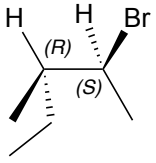






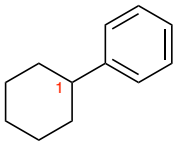
enantiomers



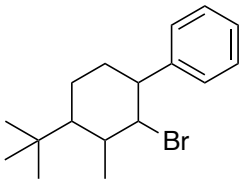


diastereomers

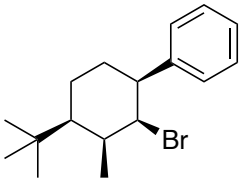
(1*S*,2*S*,3*R*,4*S*)-2-bromo-4-*tert*-butyl-3-methyl-1-phenylcyclohexane
in its lowest energy chair conformation



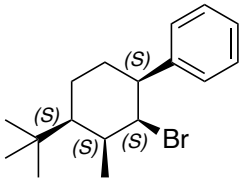
1st group



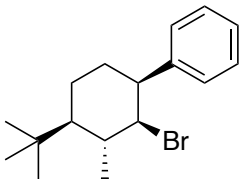
all groups



Guess
Stereochemistry

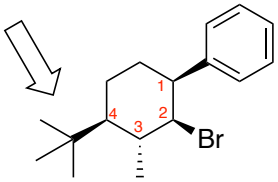


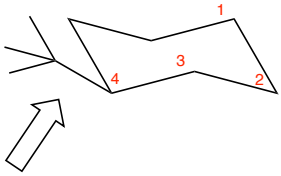
Assign
Stereochemistry



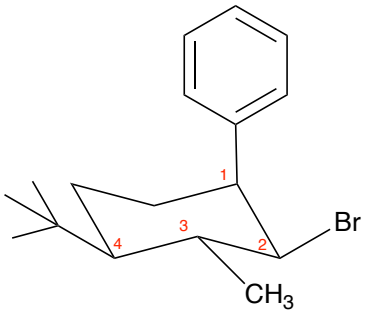
Correct
Stereochemistry

Largest Group (A values)





Make sure this is in an “up” equatorial position. Everything else just falls where it falls.



Add other groups
Note: largest+2 other groups equatorial is very good!

Here are the steps
Draw a cyclohexane
Add a phenyl ring to a position and number that as 1
Number the rest of the carbons (I would go in a clockwise manner)
Add a methyl at the 3 position
Add an *tert*-butyl to 4
Add a bromo group to 2
Guess at the stereochemistry of each of the centers (hydrogen in the back)
Fix any bad ones
Draw a Chair cyclohexane.
Examine all groups for an obvious large one (t-butyl, Ph, i-propyl, alkyl,…see A-Values)
Put the largest group on the ring in an equatorial position—maintain its absolute configuration!
Put the other groups where they are supposed to be keeping their stereochemistry correct
-use the groups cis/trans relationship to the first group (or last group) you drew
Hope that the most groups are in equatorial position—if they are then you are done.
If not, you MAY need to do a ring flip.