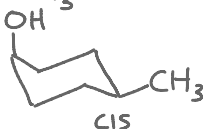
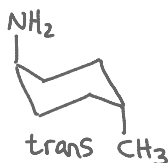
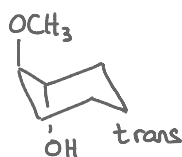
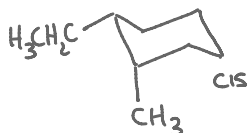
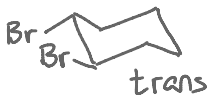
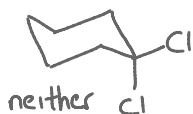


ACTIVITY #7 - ANSWERS to SELECTED PROBLEMS & CHALLENGES

Q#3

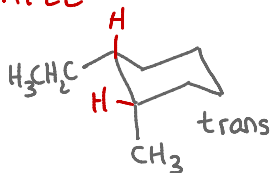


Q#6



TIP: Always draw the "missing" H at substituted ring C. Adding these gives a more accurate picture of "UP" & "DOWN" relationships.

EXAMPLE:



w/ 2 groups drawn on each ring C, you can see which ones are "UP" (H) and which are "DOWN" (Me & Et)

Q#7

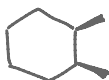
cis : 4, 5, 6, 8, 9, 14

trans : 1, 2, 3

neither : 7, 10

Q#8

Relationship to



cis-1,2-dimethylcyclohexane

Cf : 8, 9

CI : 4, 5, 6, 7, 10, 14

CS : 1, 2, 3

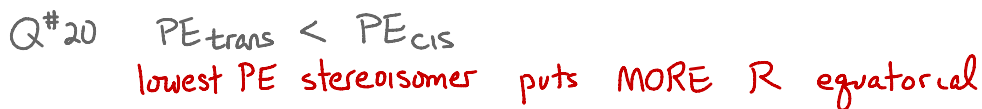
ACTIVITY #7 - ANSWERS cont'd (p.2)



- a. trans
c. trans



lowest PE conformer puts LARGER R equatorial

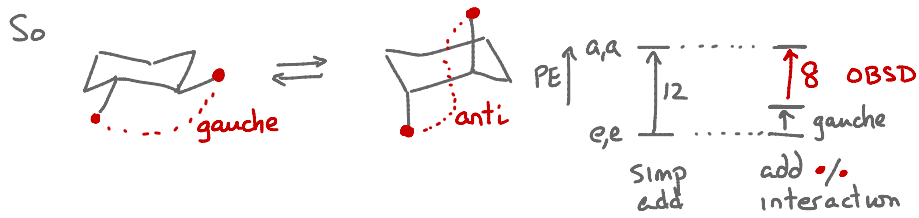


CHALLENGES

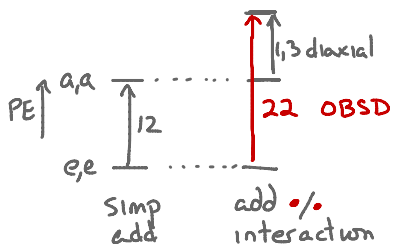
#1 Simple additivity reasoning suggests that if ONE Me goes eq \rightarrow ax raises PE by 6 kJ/mol, then TWO " going " " " " " " 12 " .

So all "est. ΔPE " should be +12 kJ/mol

Additivity will break down if the Me groups do not operate independently, e.g., if there is more Me...Me steric repulsion in one conformer than the other.



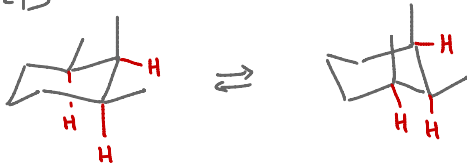
ACTIVITY #7 - ANSWERS cont'd (p.3)



#2 (a) all cis-1,2,3-trimethylcyclohexane
 " " 1,2,4 " "

NOTE: this isn't "legal"; correct names label the R/S configuration of each C (see Activity 9)

(b) 1,2,3



LOWER PE



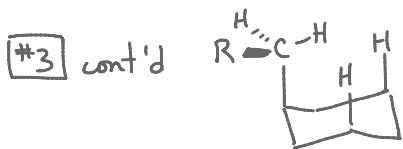
LOWER PE

(c) both molecules contain Me groups in 1,3 relationships but ΔPE between conformers should be < 22 (the ΔPE for 1,3-dimethylcyclohexane) because the "third" Me moves in a direction that lowers PE.



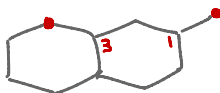
$Z = H$ for CH_3 & $Z = CH_3$ for $t-Bu$.
 So $t-Bu$ creates larger 1,3-diaxial repulsion w/ axial H.

ACTIVITY #7 - ANSWERS cont'd (p.4)



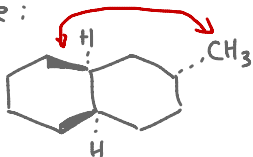
CH_2R substituents can always reduce 1,3-diaxial repulsion by orienting R away from the axial H

#4 Models show this most clearly but you might get some help from these sketches. First, notice the 1,3 relationship between the CH_3 group and another "substituent"

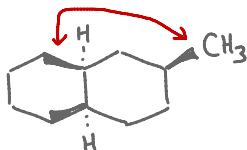


We've seen in previous problems that 1,3-diaxial interactions between cis alkyl groups greatly destabilize the ax,ax conformer

Looking at our 2 configurational isomers we see:



trans 1,3 R groups
1,3 diaxial cannot
occur



cis 1,3 R groups
1,3 diaxial occurs
in one conformer

$\Rightarrow \Delta PE$ LARGE