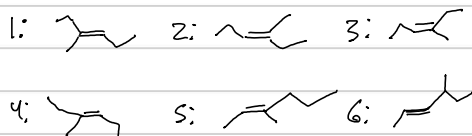
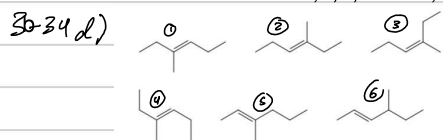
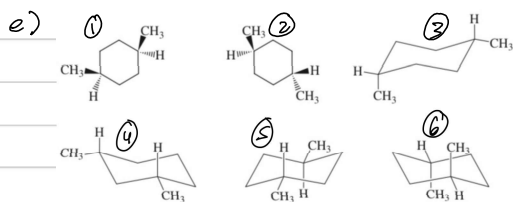


Ch3 HW - 3-34 d,e, f; 3-36 b, d, i, k; 3-40; 3-42; 3-44; 3-45; 3-46 c, f; 3-48 b, i; 3-49; 3-50, 3-52 a,

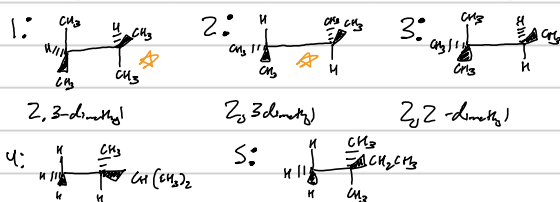
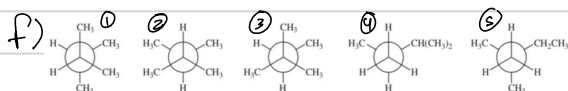


1, 2, and 4 are all identical. 3 is a cis-structure so it's a geometric isomer of 1, 2, and 4. 5 and 6 are constitutional isomers having same formula but different arrangement.



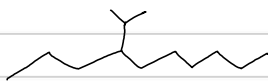
Methyl groups stand point is one direction!

1 and 3 are identical compounds.
2, 5, and 6 are identical. They are trans, or geometric isomers of 1 and 3.
4 is a constitutional isomer. Methyls moved

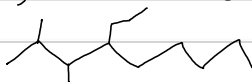


1 and 2 are conformers. 1, 2, and 4 are the same compound.
3 and 5 are the only non-identical

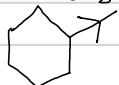
3-36 b) 4-isopropyldecane



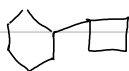
d) 3,3-dimethyl-4-propylnonane



i) tert-butylcyclohexane

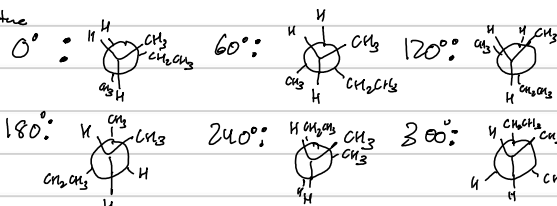
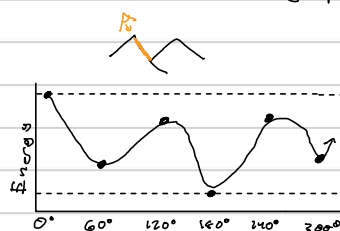


k) cyclobutylcyclohexane



This is not bicyclic

3-40) 3-methyl pentane



Rotation repeats from 0° to 360°: omitted

3-42 comparing boiling points

a) octane or 2,2,3-trimethyl pentane

Both have same formula look at surface area. Octane has more surface area and is less branched. This results in stronger London forces leading to increased boiling point.

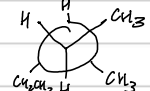
b) nonane or 2-methyl heptane

Nonane is a larger molecule and it has more surface area so it has stronger LDFs. Higher boiling point. An use molecular weight here.

c) 2,2,3-trimethyl heptane or nonane

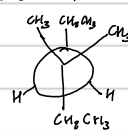
Same formula so look at surface area. Nonane is less branched → higher surface area → stronger LDFs → higher bp.

3-44 a) 3-methyl pentane on C2-C3 bond



Most stable because low torsional strain as a result of staggered conformation. Bulky groups are furthest apart so lower steric hindrance from bulky overlap.

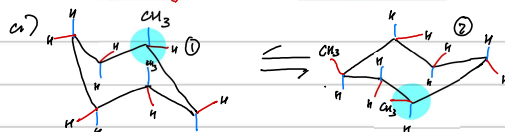
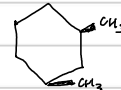
b) 3,3-dimethyl heptane on C3-C4 bond



This is the most stable because the bulky methyl groups are furthest apart so there is low steric hindrance. Also, the conformation is staggered which reduces torsional strain.

3-45) cis-1,3-dimethylcyclohexane

1 = equatorial, 2 = axial Carbon 1



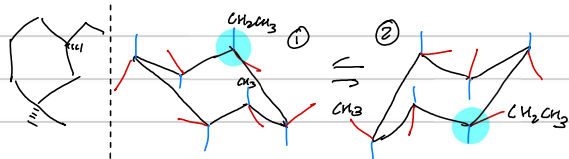
b) Higher energy (less stable)

Lower energy (more stable)

c) Gauche is a result of torsional or angular strain. A lot of energy difference is mostly due to these interactions.

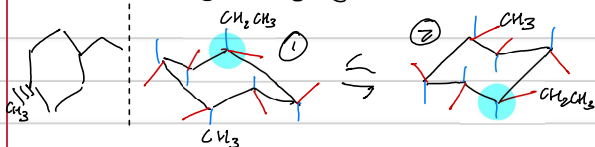
d) There is also most likely a large difference due to steric strain as the CH₃ groups are interacting. CH₃ isn't too bulky though, so its contribution is most likely not as large as torsional.

3-46 c) cis-1-ethyl-3-methylcyclohexane

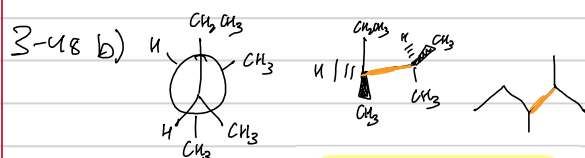


Structure 2 is more stable as the bulky groups are on the equatorial position, greatly reducing steric strain.

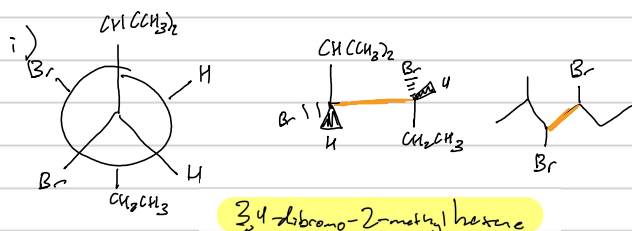
p) trans-1-ethyl-4-methylcyclohexane



Structure 2 is more stable as both bulky groups are in the equatorial position, reducing steric strain/torsion.

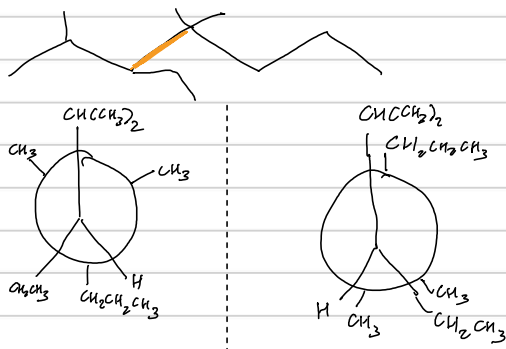


2,3-dimethylpentane



3,4-dibromo-2-methylhexane

3-49) 3-ethyl-2,4,4-trimethylheptane on C3-C4



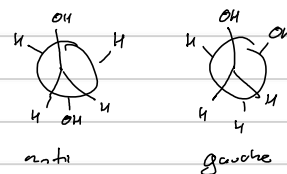
Most Stable

Least Stable

Staggered with bulky groups being anti reduces torsional and steric strain to a minimum. That makes it the most stable. Totally eclipsed places bulky groups very close to each other increasing torsional strain and steric hindrance.

3-50) ethane-1,2-diol $\text{HO}-\text{CH}_2-\text{CH}_2-\text{OH}$

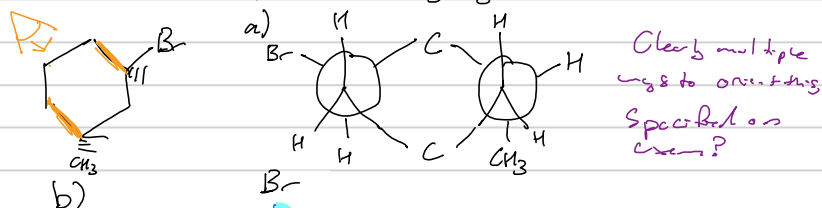
Gauche is a special type of staggered where the groups are close to each other.



The gauche conformation is more stable because of the strong H-bond formed between the two -OH groups. This cannot happen in the stable anti conformation, but is allowed, and overcomes repulsion, in the gauche conformation.

1 changed this to bulky groups

3-52 Draw the (a) Newman projection and (b) chair conformation, along with cyclo-depiction (c) for: trans-1-bromo-3-methylcyclohexane



Clearly multiple ways to orienting specified on exam?

