

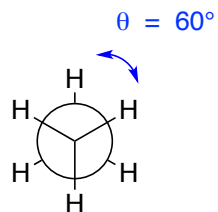
# Saturated Acyclic Hydrocarbons

---

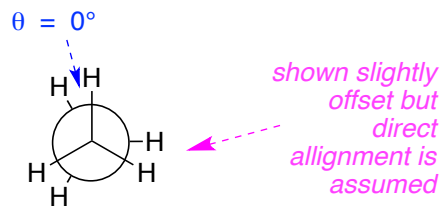
## A. Intro-duck-shun

## B. Conformations Of Acyclic Hydrocarbons

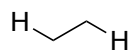
### Ethane



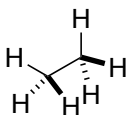
staggered



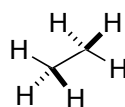
eclipsed



staggered



eclipsed

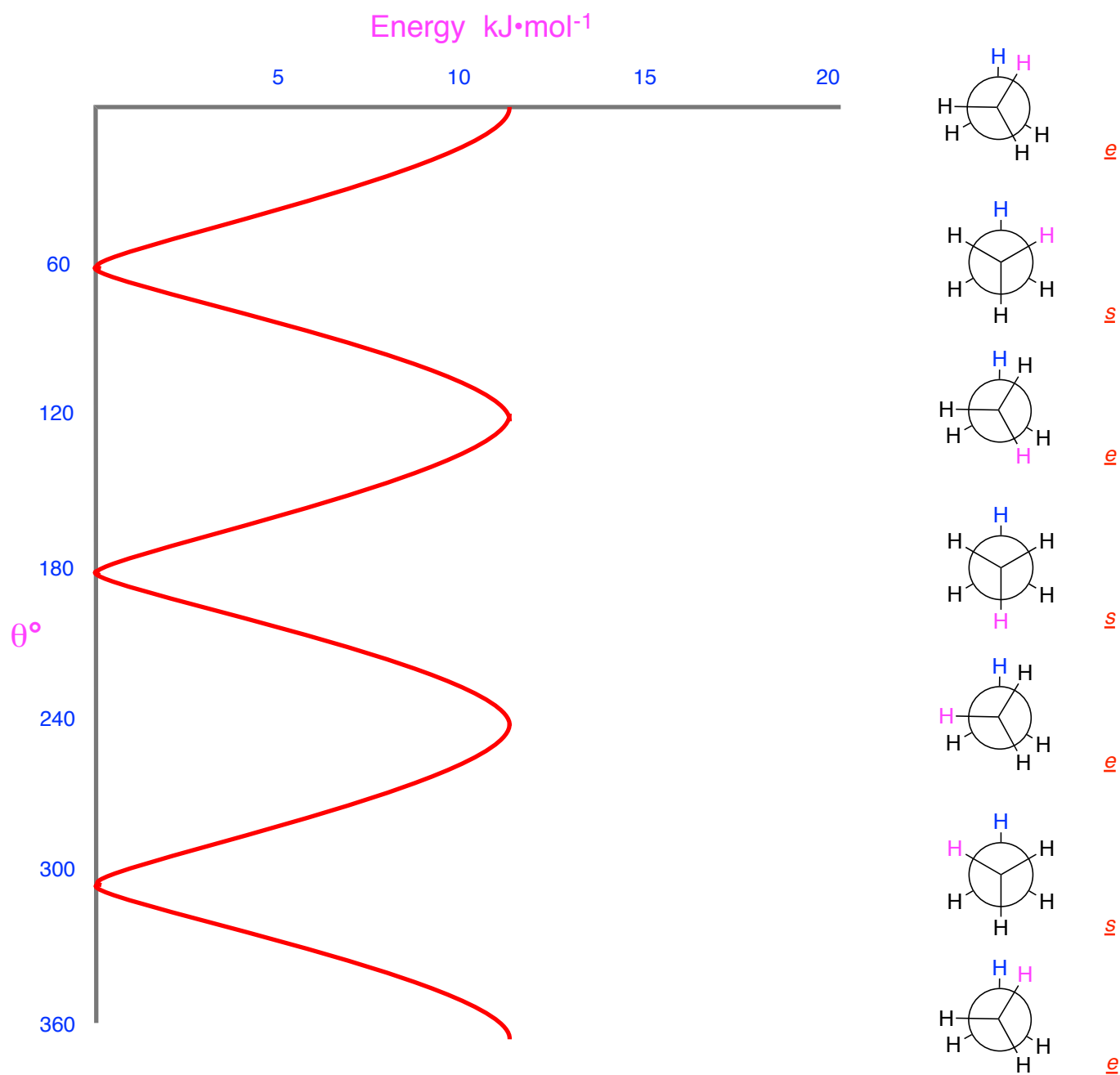


staggered



eclipsed

The staggered ethane conformer is more stable



called torsional strain.

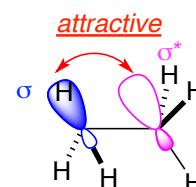
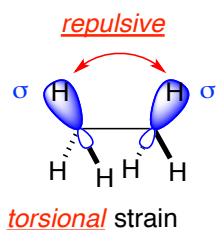
indicate destabilizing interactions

stabilizing interactions between empty and filled orbitals in staggered conformations.

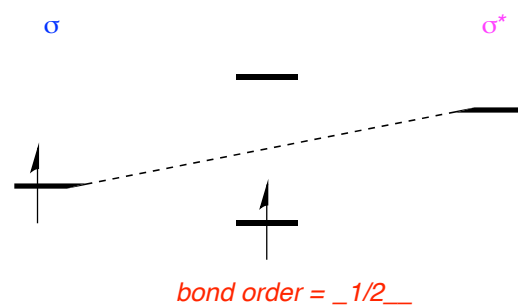
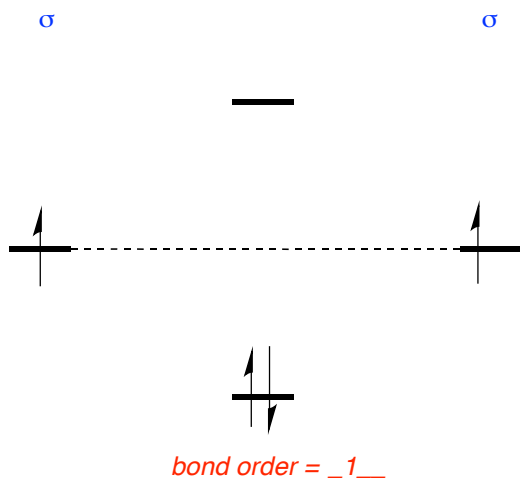
if both the highest occupied molecular orbital (HOMO) and lowest unoccupied molecular orbital are filled, this is slightly destabilizing.

contributes 2 e

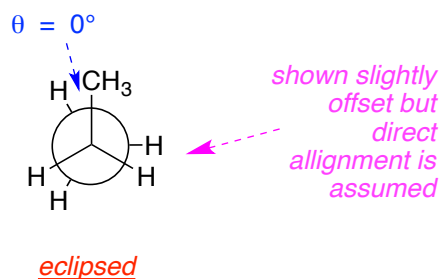
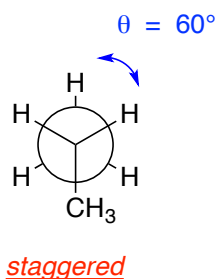
empty one donates 0 e.

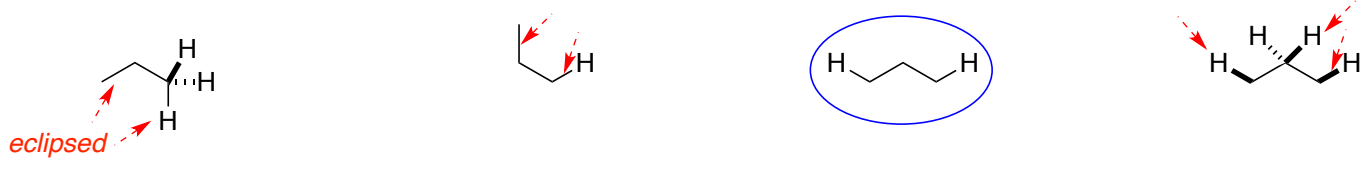
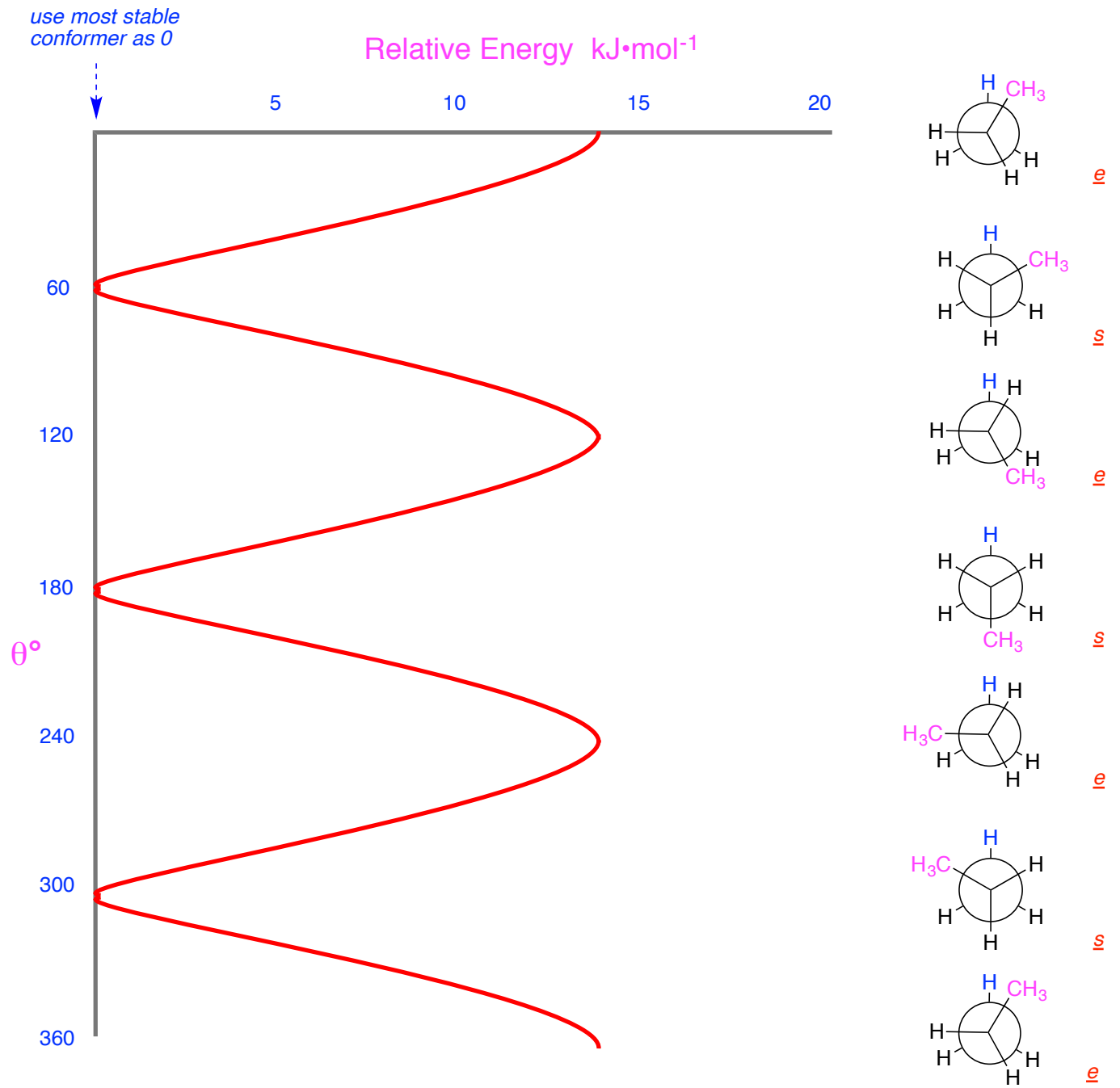


add electrons to the diagrams below and indicate bond orders:

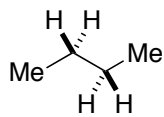


## Propane



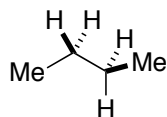


## Butane



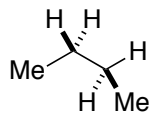
very low

---



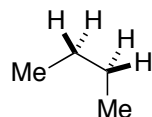
high

---



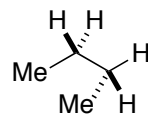
low

---



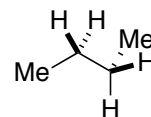
very high

---



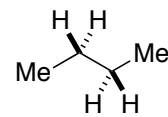
low

---



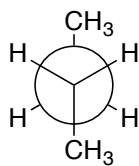
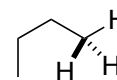
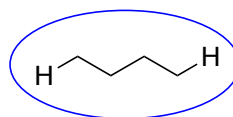
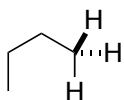
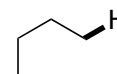
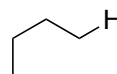
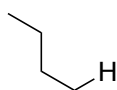
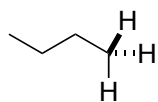
high

---



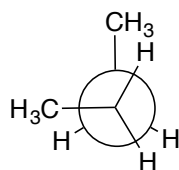
very low

---



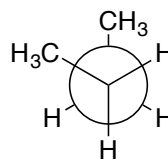
a

---



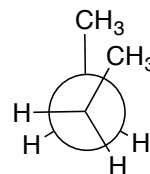
pe

---



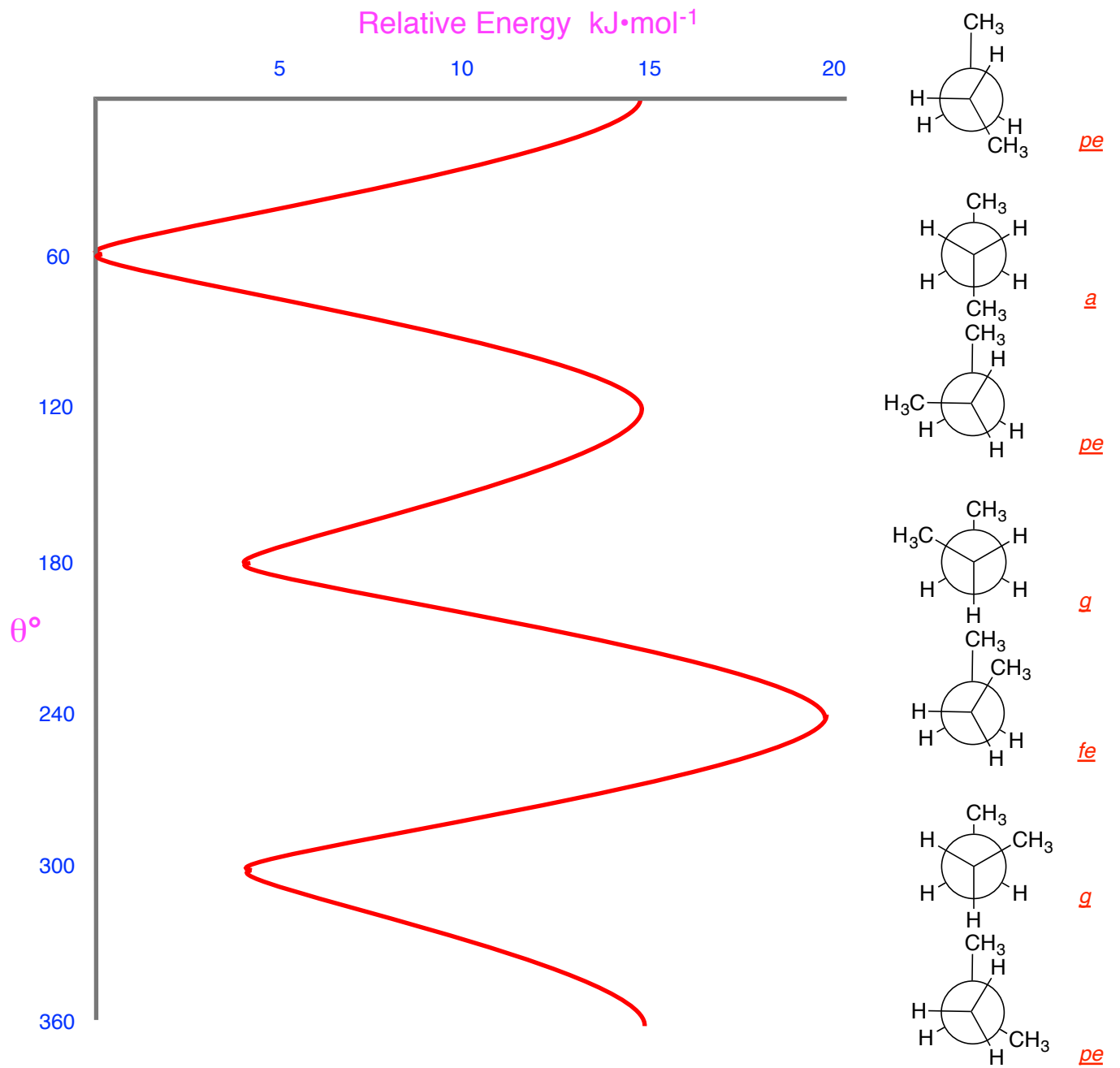
g

---



fe

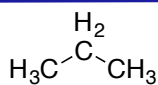
---



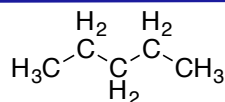
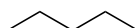
## C. Art In Organic Chemistry

represents  $\underline{CH}_3$ , two bonds to an apex means it is a  $\underline{CH}_2$ , and three bonds to a branch point represent  $\underline{CH}$ . If there are four bonds to a central point, this means there are  $\underline{0}$  hydrogen atoms on that carbon.

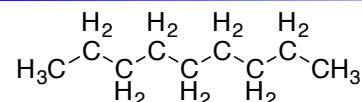
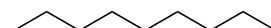
propane



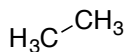
pentane



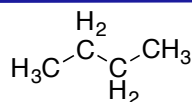
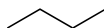
nonane



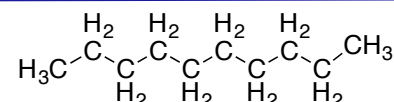
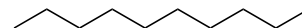
ethane



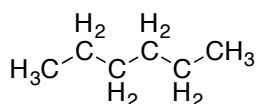
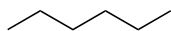
butane



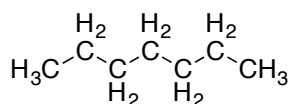
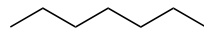
decane



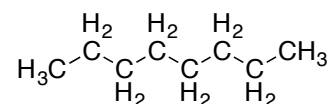
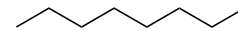
hexane



heptane



octane

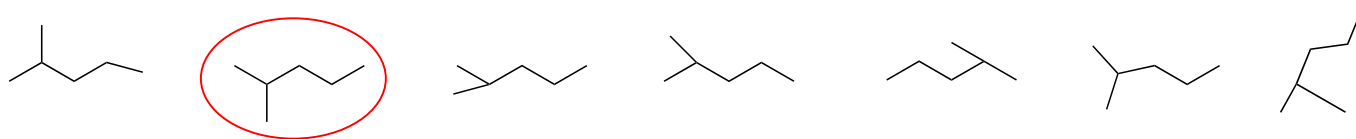




$sp^3$  hybridized carbons are 109°.  
has 4 bonds to other atoms.  
structures always have this number

never have five or more atoms attached to them.  
sp<sup>3</sup> because they have 4 atoms attached.

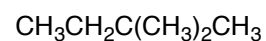
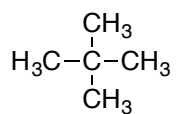
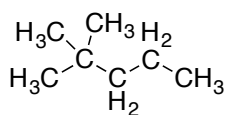
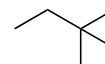
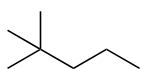
tetrahedral shape  
about 109°

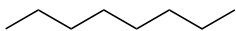


2,2-dimethylpentane

2,2-dimethylpropane

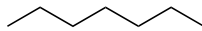
2,2-dimethylbutane





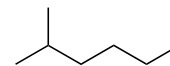

---

*octane*




---

*heptane*



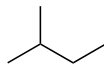

---

*2-methylhexane*



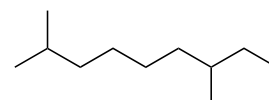

---

*methylpropane*



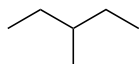

---

*2-methylbutane*



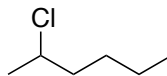

---

*2,7-dimethylnonane*



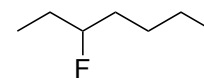

---

*3-methylpentane*



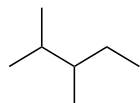

---

*2-chlorohexane*



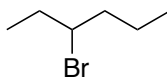

---

*3-fluoroheptane*



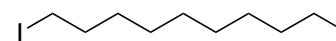

---

*2,3-dimethylpentane*



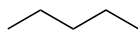

---

*3-bromohexane*



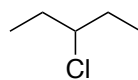

---

*1-iododecane*



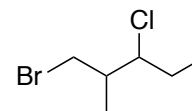

---

*CH<sub>3</sub>CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>CH<sub>3</sub>*



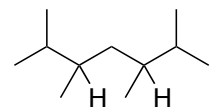
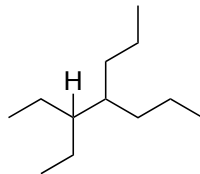
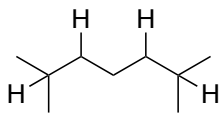
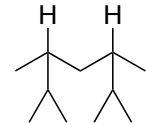
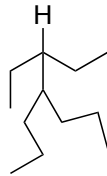
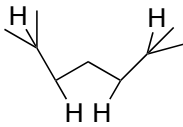
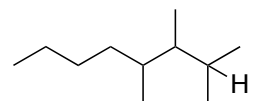
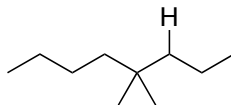
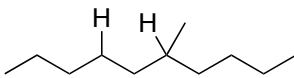
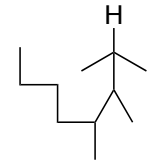
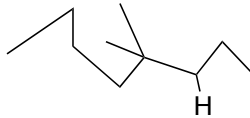
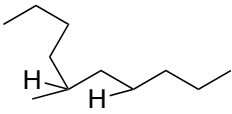
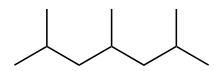
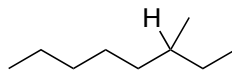
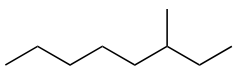
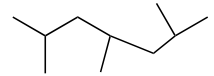
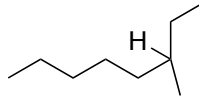
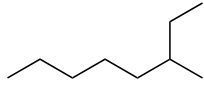
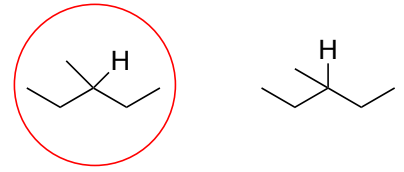
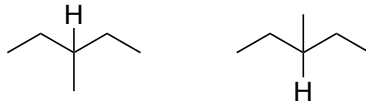

---

*CH<sub>3</sub>CH<sub>2</sub>CHClCH<sub>2</sub>CH<sub>3</sub>*

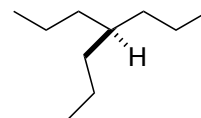
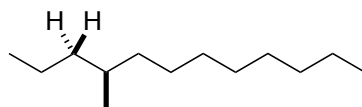
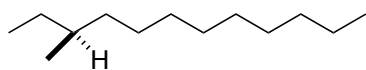
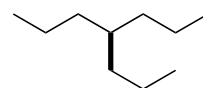
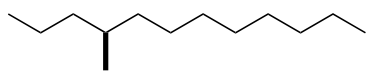
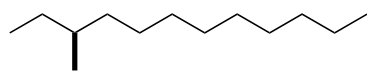
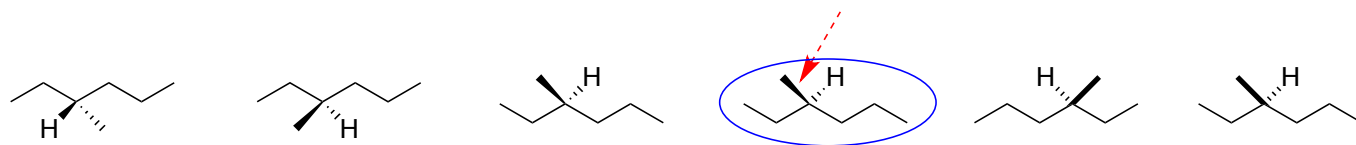
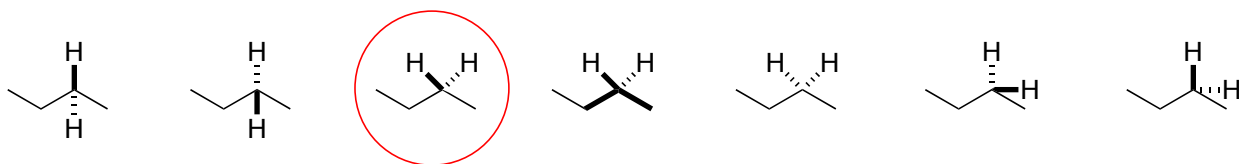



---

*BrCH<sub>2</sub>CH(CH<sub>3</sub>)CHClCH<sub>2</sub>CH<sub>3</sub>*



## Three Dimensional Diagrams Of Organic Molecules




---

.... the C<sup>3</sup> hydrogen

---

.... both hydrogens on C<sup>3</sup>

---

.... the H on unique C

## Alkyl Fragments

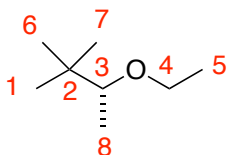
is called a methyl.

that have CH<sub>2</sub> connected to

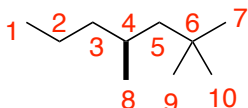
Methine is the name given to CH fragments.

is called a methyl.

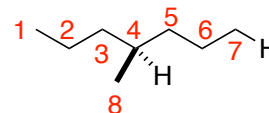
A quaternary C has 0 hydrogen atoms attached.



C1, C5, C6, C7, C8 methyl  
C2 quaternary  
C3 methine  
C4 methylene



C1, C7, C8, C9, C10 methyl  
C2, C3, C5 methylene  
C4 = methine  
C6 = quaternary



C1, C7 methyl  
C2, C3, C6 methylene  
C4 = methine

ie substituted

CH<sub>3</sub>, Me

CH<sub>3</sub>CH<sub>2</sub>, Et (circle all correct).

cannot be isolated

is not a discrete compound,

is a molecular fragment.

2 types of hydrogen atoms

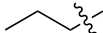
different outcomes.

MeCH<sub>2</sub>CH<sub>2</sub>, EtCH<sub>2</sub>, <sup>n</sup>Pr (circle all correct).

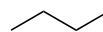
as <sup>i</sup>Pr, (CH<sub>3</sub>)<sub>2</sub>CH (circle all correct)



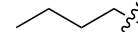
propane



n-propyl



butane



n-butyl

3 types of hydrogen atoms

gives a normal butyl group

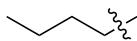
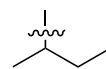
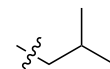
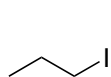
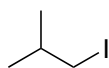
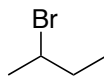
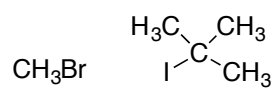
as MeCH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>, <sup>n</sup>PrCH<sub>2</sub>, CH<sub>3</sub>CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>

a iso- butyl group that can be represented as <sup>i</sup>PrCH<sub>2</sub>, (CH<sub>3</sub>)<sub>2</sub>CH (

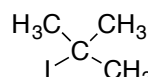
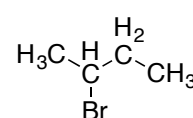
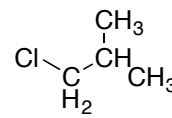
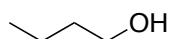
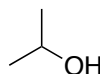
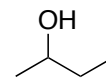
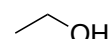
isomer of butane: it has 2

an <sup>i</sup>Bu group.

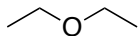
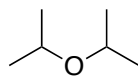
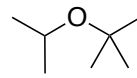
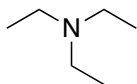
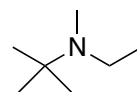
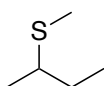
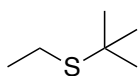
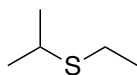
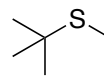
something, ie a <sup>t</sup>Bu group.

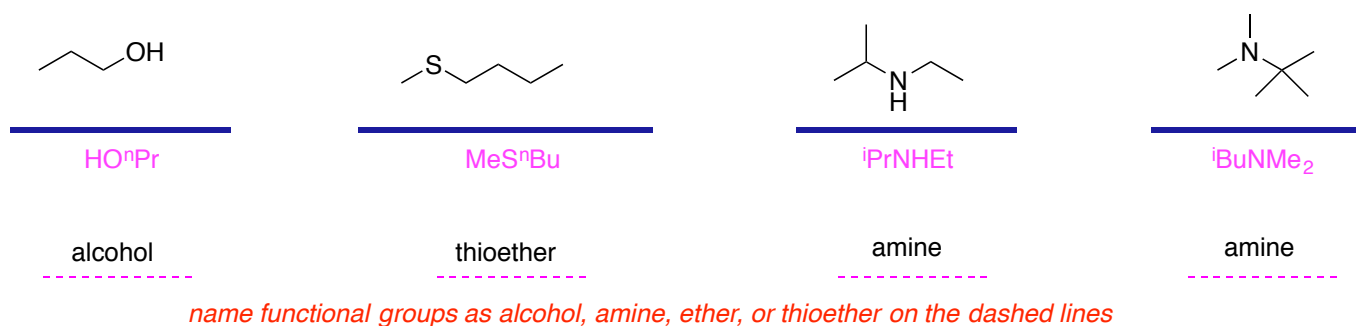
*n-butyl**tert-butyl**sec-butyl**iso-butyl**n*PrI*i*BuI*i*PrCl*t*BuBr

MeBr

*t*BuI*s*BuBr*i*BuCl*t*BuOH*n*BuOH*i*PrOH*s*BuOH

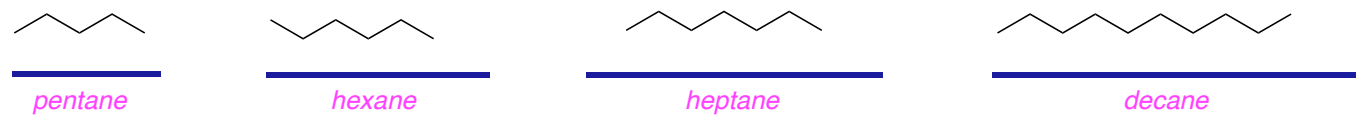
EtOH

**<sup>t</sup>BuOMe****EtOEt**  
*an anesthetic***<sup>i</sup>PrO<sup>i</sup>Pr****<sup>t</sup>BuO<sup>i</sup>Pr****MeOMe****<sup>t</sup>BuNHMe****Et<sub>3</sub>N****<sup>i</sup>PrNH<sub>2</sub>****<sup>t</sup>BuNMeEt****MeNH<sub>2</sub>****<sup>t</sup>BuSMe****EtS<sup>t</sup>Bu****<sup>i</sup>PrSEt****<sup>t</sup>BuSMe<sub>2</sub>****Me<sub>2</sub>S**



## D. Conclusion

These are zig-zag conformations.



can be