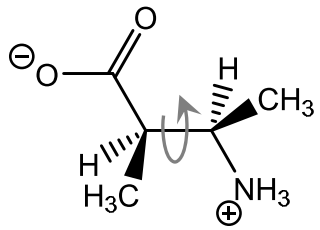
Chemistry 2301

Workshop 7
Newman Projections and Potential Energy Diagrams

In class, we used Newman projections to analyze the conformational preferences of molecules that experienced only repulsive interactions. But what if different parts of a molecule *attract* one another? How does that affect a molecule's preferred conformation? In the 3-amino-2-carboxy-butane molecule drawn at right, the carboxylate (COO^-) and ammonium (NH_3^+) groups attract each other.

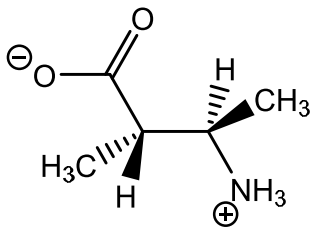


1. The central bond of 3-amino-2-carboxy-butane is free to rotate, as shown. Draw six Newman projections that illustrate the different conformations that would be encountered by twisting the central C-C bond in 60° steps.

2. Which conformation is most stable? Which is least stable? Assume that eclipsed conformations are still less stable than staggered ones, even when they put opposite charges closer together.

3. Draw a potential energy diagram that reflects the relative energies of each conformation.

4. In the 3-amino-2-carboxy-butane I've drawn above, both -CH_3 groups are drawn with wedges (pointed towards you). There are other *stereoisomers* of 3-amino-2-carboxy-butane in which those -CH_3 groups are pointed in different directions. For example, I've drawn another 3-amino-2-carboxy-butane at right.

   Overall, is this stereoisomer more or less stable than the one above? Why?