



CALIFORNIA STATE SCIENCE FAIR  
2011 PROJECT SUMMARY

<b>Name(s)</b> Stephanie M. Vistnes	<b>Project Number</b>  31961
<b>Project Title</b> The Effects of Steric Hindrance on Non-SN2 Reactions	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> While researching the theory and mechanics of steric hindrance, I noticed that every example and description I saw for steric hindrance had to do with SN2 reactions. This led me to wonder: Does steric hindrance have an effect on non-SN2 reactions? I hypothesized that yes, it does.</p> <p><b>Methods/Materials</b> I would have loved to have used a lab and done extensive experiments to test my hypothesis, but with very limited resources available to me, I decided to use an online chemical database instead. Using this database and an online 3D molecule viewer, I searched through nearly 15,000 compounds and found 3 molecules that contained an inaccessible atom which was not a part of a polyatomic ion, and that had reactions listed for the compound. For each of the three compounds, I also found 2-4 similar compounds: compounds with the same core group of atoms, including the inaccessible atom, but with a different group of atoms bonded to the core. I also found at least one or more positive examples (controls): compounds with a base very similar to the original compound, but in which the inaccessible atom was exposed. For each category of compound, I found multiple reactions involving the compound.</p> <p><b>Results</b> In each compound, I found that in the positive example (control), the compound was involved in multiple reactions, SN2 and otherwise, in which the atom of interest took part in the reaction. In my compounds with inaccessible atoms, on the other hand, the inaccessible atoms did not take part in any reactions.</p> <p><b>Conclusions/Discussion</b> From my results, I was able to conclude that my hypothesis was correct and that steric hindrance does have an effect on non-SN2 reactions. Although this does not prove the theory of steric hindrance, I do believe that I have gone one step further by providing evidence in support of the steric hindrance theory.</p>	
<b>Summary Statement</b> I explored the effects of steric hindrance on non-SN2 reactions by finding sterically hindered compounds and examining the reactions in which they were involved, and concluded that steric hindrance does have an effect on non-SN2 reactions.	
<b>Help Received</b> Father introduced the topic, and pointed me at the online databases.	