



**CALIFORNIA STATE SCIENCE FAIR  
2007 PROJECT SUMMARY**

<b>Name(s)</b> <b>Jacob S. Gilbert</b>	<b>Project Number</b> <b>S0505</b>
<b>Project Title</b> <b>Molar Volume of Pentaamminecobalt(III) Amine Complexes: Effect of Increasing the Number of Carbons on the Amine Ligand</b>	
<b>Abstract</b> <b>Objectives/Goals</b> The goal of this project was to determine the relationship between increasing the length of amine chains in aminopentaamine cobalt(III) complex ions and the molar volume of those substances. <b>Methods/Materials</b> Five compounds, each with a different length of amine chain, were dissolved in water. Five to six solutions of varying concentrations were prepared for each compound. Each solution's density was then measured using a density meter. Then the molar volume was calculated for each solution. This is a function of the molar masses of water and the solute divided by the density of the solution. <b>Results</b> The molar volume of the complexes proportionately increased as the number of carbons in the amine chain ( $\text{CH}_3 - (\text{CH}_2)_n \text{NH}_2$ ) increased. <b>Conclusions/Discussion</b> Adding more carbons has no apparent effect on the molar volume other than causing a proportionate increase.	
<b>Summary Statement</b> The focus of my project was to determine the effect that increasing the number of carbons in the amine chain in specific cobalt complexes had on the density and therefore the molar volume of those aforementioned complexes.	
<b>Help Received</b> Mother helped assemble poster; used lab equipment at the Joint Science Department of the Claremont Colleges; Dr. Robert Pinnell helped synthesize some compounds; Dr. Tony Fucaloro for beginning research on these topics; Dr. Andrew Zanella for direct guidance and help throughout.	