



California Science Center  
**CALIFORNIA STATE SCIENCE FAIR**  
**2001 PROJECT SUMMARY**

<b>Your Name</b> (List all student names if multiple authors.) <b>Bartell J. Cope</b>	<b>Science Fair Use Only</b>
<b>Project Title</b> (Limit: 120 characters. Those beyond 120 will be ignored. See pg. 9) <b>What is the Effect of Temperature on the Solubility of CO<sub>2</sub> in H<sub>2</sub>O?</b>	<b>J0405</b>
<b>Preferred Category</b> (See page 5 for descriptions.) <b>4 - Chemistry</b>	<b>Division</b> <b><u>J</u> Junior (6-8) <u>J</u> Senior (9-12)</b>
<b>Abstract</b> (Include Objective, Methods, Results, Conclusion. See samples on page 14.) Use no attachments. Only text inside these boxes will be used for category assignment or given to your judges.	
<p><b>Objective:</b> My project's objective is to prove that carbon dioxide is soluble in water, and to see how temperature affects it.</p> <p><b>Hypothesis:</b> I believe that carbon dioxide is soluble in water and that increasing temperature will decrease its solubility.</p> <p><b>Results:</b> At room temperature I was able to show that carbon dioxide was in the water because, I was able to separate the white solid (calcium carbonate) from the liquid by continuously decanting and using a siphon (actually a baster). Then I allowed the little remaining water to evaporate and the calcium carbonate to dry as a nice powder. The amount of calcium carbonate was so small I had to go to a pharmacy to use their scale to measure my results. I was able to tell before being able to use the scale at the pharmacy, the differences of the amount of calcium carbonate by comparing their relative volume in the small vials I had put them in. Using this technique I was able to determine that there was approximately twice as much CO<sub>2</sub> dissolved at 40 F than at 70 F. Although it was very small, there still was some carbon dioxide in the water heated to 165 F, which came as a surprise to me because I didn't expect to see any. This fits with my hypotheses, but not at the amounts I had expected.</p> <p><b>Conclusion:</b> My conclusion is that yes, carbon dioxide is soluble in water and the amount depends on the temperature of the water. The maximum amount of solubility is found close to the freezing temperature of water. The solubility decreases as the temperature rises. I found that at the maximum temperature used in my experiment, 165 degrees of Fahrenheit, that there was very little carbon dioxide left in the water. If carbon dioxide causes global warming, then the problem will continue to get worse as the earth heats up, because the rise in temperature causes more carbon dioxide to be released from the earth's water.</p>	
<b>Summary Statement</b> (In one sentence, state what your project is about.) My project's objective is to prove that carbon dioxide is soluble in water, and to see how temperature affects it.	
<b>Help Received in Doing Project</b> (e.g. Mother helped type report; Neighbor helped wire board; Used lab equipment at university X under the supervision of Dr. Y; Participant in NSF Young Scholars Program) See Display Regulation #8 on page 4. A friend helped with the graphs. Mom helped to line up things on the display board. Kamian's Pharmacy helped me weigh the small amounts of calcium carbonate formed. Dad helped with background information. (see bibliography)	