



**CALIFORNIA STATE SCIENCE FAIR  
2003 PROJECT SUMMARY**

<b>Name(s)</b> Curtis D. Lopez	<b>Project Number</b> <b>J0121</b>
<b>Project Title</b> <b>Could Dry Ice Rockets Be Helpful in Finding a Clean Power Source for the Future?</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The goals of this project is to see if the temperature of H<sub>2</sub>O (Water) combined with frozen CO<sub>2</sub> (Dry Ice) will affect the launced distance of a Corning test tube at a 45 degree angle.</p> <p><b>Methods/Materials</b> 1) Experiments were done 20 times per test sample. There were a total of 5 various temperature ranges: 10, 15.55, 21.11, 26.66, 32.22 degree Celsius. 2) All Test Samples consisted of 15 grams of frozen CO<sub>2</sub> and 12.5ml of H<sub>2</sub>O. 3) The one variable was the temperature of the H<sub>2</sub>O prior to combining it with the frozen CO<sub>2</sub>. I ran 2 experiments per each test sample per day (total of 100) over a 10 day period. Material List: metal 45 degree angle launch pad; Corning 50ml plastic test tube; safety goggles; protective chemical rubber gloves; frozen CO<sub>2</sub>; H<sub>2</sub>O; metric thermometer; metric balance; metric tape measure; tongs; clear open area.</p> <p><b>Results</b> My hypothesis was proven wrong with the farthest single flight being the H<sub>2</sub>O temperature of 15.55 degrees Celsius which went a distance of 46.421 meters. Then the furthest average flights overall went to 10 degrees Celsius with an overall average of 38.9934 meters. Temperature/Single Flight/Average Flights: 10-C/44.132/38.9934;15.55-C/46.421/35.5973;21.11-C/40.5384/35.3303;26.66-C/40.447/35.1006;32.22-C/39.9593/30.8346</p> <p><b>Conclusions/Discussion</b> I concluded that the reason the colder temperature went the furthest was due to the rate in which pressure builds up. The frozen CO<sub>2</sub> does not sublime as quickly in the colder temperature causing a slower pressure build up and thus allowing the test tube "rocket" to expand and hold more pressure before exploding. This extra pressure causes more power when the rocket launches out of the cylinder and in turn more distance. Whereas the hotter temperatures caused a fast rate of expansion and the plastic may not expand quick enough for the cap causing the cap to explode before the rocket reached a high pressure point and therefore providing less power to go as far.</p> <p>While doing this years project I realized that I can take pressure caused by sublimation and use this to build a clean environmentally friendly alternative power source to steam or maybe even fuel. Although I only have a "working theory" at this stage of my project, I hope to build this clean power source in the next few years of my "continuing" project.</p>	
<b>Summary Statement</b> My project is a series of experiments that will hopefully lead up to discovering a clean alternative power source using frozen CO <sub>2</sub> and H <sub>2</sub> O.	
<b>Help Received</b> Steve Moses, Environmental, Health & Safety supervision; BioMedica Scientist help answer questions; Father built launch pad; Mother help type report and put together backboard.	