



**CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY**

Name(s) Alexander Y. Stone	Project Number J0620
Project Title The Mighty Sugar Rocket	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose of my experiment was to see if I could make a functioning rocket using table sugar as fuel and to see which of three commonly available sugars, Sucrose, Fructose and Sucralose (Splenda) would work best at a fixed grain size.</p> <p>Methods/Materials Sucrose, Fructose, Sucralose (Splenda), Potassium Nitrate, Plain Paper, Bentonite Clay (Cat Litter), One 1/2 inch diameter Dowel, Scissors, Ruler, Tape, Fireworks Fuse, Drill (and one 9/64 inch drill bit), Hammer, Pasco Force Sensor, Force Sensor Apparatus and Software, Glue gun, Digital scale. First prepare the fuel mix, the ratio is 20 grams of KNO₃ to 11 grams of sugar. Combine the Potassium Nitrate and sugar and then grind them into a pretty fine powder using a coffee grinder for 5 seconds. Then grind your cat litter or clay into a powder. Now make a tube by cutting three strips of paper 1.5 inches wide and 11.5 inches long and wrap them into a tube with your dowel. Secure it with tape. Next hammer a Bentonite plug (take the clay powder and hammer it) in one side of the tube until you have a plug a little less than 1/2 inch long. Then fill with our KNO₃ mixture and ram repeatedly until a bit less than 1/2 inch from top. Ram the rest with some more clay. And use your glue gun to secure it even more. Then take your drill and drill about 3/4 of the way through from the side you rammed with clay first. Secure the fuse. Next tape a cone to the other side. Then hook up to the force sensor apparatus, light the rocket. The data collected was analyzed using the DataStudio software to graph force/time.</p> <p>Results At the chosen grain size, the Sucrose rockets gave the most thrust but had a very short burn time; Fructose had a low thrust and medium burn time. Lastly, the artificial sweetener, Sucralose, had a very long burn time with extremely little thrust.</p> <p>Conclusions/Discussion My conclusion is that the type of sugar plays an important role in affecting the thrust of a Potassium Nitrate/Sugar rocket. The 'true' sugars (Sucrose and Fructose) in the presence of an oxidizer (KNO₃) burned faster and were more suitable for rocket propulsion, while Sucralose (an artificial chlorinated sugar substitute) burned slowly and produced very little thrust. Rockets that use Sucrose seem to work better than those with Fructose or Sucralose.</p>	
Summary Statement What commonly available sugar is the best fuel for a homemade sugar rocket.	
Help Received Mother and Father helped with the report and acquiring materials, PCS Physics teacher lent the Force sensor and apparatus, and Youtube for general instructions on how to build a sugar rocket.	