



**CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY**

Name(s) Christopher B. Simpson	Project Number S0109
Project Title Generating and Calculating Water Density's Effect on Hydro-Rocket Flight	
Abstract Objectives/Goals The purpose of this project was to determine if varying the density of water in a hydro-rocket would affect the rocket's altitude. Spacecraft use the type of motor in a hydro-rocket (reaction motor) to maneuver in space. The project would demonstrate if spacecraft and other reaction motors would benefit from the use of denser fuels. Methods/Materials Research began in January after a previous project was determined inconclusive. A two-liter bottle was used as the rocket body. Fins and a nose cone were constructed and added for stability and aerodynamics. The rocket was launched with 800mL of tap water for the control altitude. The density of tap water was .986g/mL. Adding 50g, 100g, 200g, and 300g of sugar varied the density of the tap water. The resulting densities (g/mL) were 1.056, 1.135, 1.254, and 1.344 respectively. The altitude of the rocket was measured using an Astrolabe. Results After 34 total launches, the rocket's average altitude with tap water for fuel was 49m; the rocket's average altitudes with the denser fuel consisting of 50g, 100g, 200g, and 300g of sugar were 48m, 48m, 36m, and 33m respectively. Conclusions/Discussion Overall, the data show that denser fuel does not increase the altitude of a hydro-rocket. Rather, the denser fuel decreases the altitude due to its increased mass. Therefore, the use of denser fuels would not be beneficial to spacecraft and other reaction motors as they only weigh down the system.	
Summary Statement The project was designed to determine if the altitude of a hydro-rocket would be affected by variations in the fuel's (water's) density.	
Help Received The student's younger sibling was used to pull the string that would launch the rockets. This was because the student was 30m away measuring the altitude of the rocket.	