

# KN-Sucrose Rocket Fuels

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Understanding rocket propellants and how they work is invaluable to pursuing rocketry at high levels. In this project four different ways of making the common KN-Sucrose rocket propellant were tested in Estes Air Walker model rockets. The first and second propellants consisted of 65.00% potassium nitrate and 35.00% sucrose; the third and fourth consisted of 64.35% potassium nitrate, 34.65% sucrose, and 1.00% iron (III) oxide. For the first and third fuels, sucrose was caramelized to form a candy-like mixture; for the second and fourth fuels, water was added to dissolve the ingredients. The ignition system employed a 12-volt battery, knife switch, and the wire from the Estes E Launch Controller. Igniters were made from bell wire and single strands from multi-strand extension cord wire. This end was dipped in a mixture of black powder, gunpowder, and acetone. Engine tubes were 70-millimeter pieces of swing pipe. Nozzles were created using water putty. The finished engine tubes were loaded into their respective rockets and tested. None escaped the launch pad; two of the fuels were still wet and the nozzles proved ineffective. In the second stage of testing, converging-diverging nozzles were made out of ABS using a 3D-printer; these rockets still did not escape the launch pad, but they did seem to build more thrust. The data was analyzed and the conclusion drawn that with more testing, stronger glue, and more time for the glue to dry, that these nozzles will succeed in launching a rocket off the ground.

**Awards Won:**

