Testing the Effects of Mixture Ratio on Rocket Impulse

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Homemade sugar rockets are a simple, cost-effective way of making small-scale rocket motors. The most common way people go about making these rockets is by mixing potassium nitrate with powdered sugar to use as fuel. Because I have made these types of rockets before, I have become curious about how the mixture ratio of potassium nitrate to sugar affects the impulse of the rocket. To test this question, I made 5 different batches of potassium nitrate to sugar mixtures each with a different mixture ratio, 1:4, 2:3, 1:1, 3:2, and 4:1. I was able to make about 5 rockets with each batch (25 total). The mixture was packed into a PVC pipe and a small hole was drilled for a fuse. The rockets were then placed onto a scale and ignited. A camera recorded the scale reading as the rocket burned and the thrust x time data was recorded onto a Google Sheets graph. After seeing that only the 3:2 mixture produced any measurable thrust, I decided to narrow down the range of mixtures closer to 3:2. The new mixtures to be tested were 13:12, 14:11, 3:2, 16:9, and 17:8. The same procedure was repeated with the new mixtures and better data was collected, after reviewing the data, I could conclude that the mixture ratio that produced the most thrust was 16:9.

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