



**CALIFORNIA SCIENCE & ENGINEERING FAIR
2018 PROJECT SUMMARY**

Name(s) Angela Y. Ling	Project Number 38791
Project Title The Effects of Sulfates on Hair Tensile Strength	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of this study is to determine if the use of sulfate containing or sulfate-free shampoo better affects hair strength. Sulfates can sometimes have a harsh treatment on hair by dehydrating it, leading people to use sulfate-free shampoo; the experiment's goal was to determine if which actually affects hair strength better.</p> <p>Methods/Materials Several strands of human hair, 2 sulfate containing shampoos, 2 sulfate-free shampoos, kitchen scale, uncooked rice, duct tape, plastic bag. The hair strand was secured to the plastic bag with tape. The bag was slowly filled with uncooked rice grains until the hair broke. Then, the weight of the bag was measured on the kitchen scale.</p> <p>Results The sulfate-free shampoo had a worse effect on hair than sulfate containing shampoo. The control group held an average of 78.3 grams. The two sulfate-free groups together held an average of 82.3 grams. The sulfate containing groups together held an average of 93.1 grams, both holding more than the control group and the sulfate-free group. One of the sulfate-free shampoos held less than the control group.</p> <p>Conclusions/Discussion Hair tensile strength is better affected by sulfate containing shampoo than sulfate-free shampoo. Both of the sulfate containing shampoos held a higher average than the control group, while one of the sulfate-free shampoos held less than the control. However, some uncontrolled variables could have affected the results, such as the source of the hair, previous hair treatments, or the hair's thickness.</p>	
Summary Statement I found that sulfate containing shampoo, rather than sulfate-free shampoo, has better effects on hair tensile strength.	
Help Received None. I conducted the experiment myself.	