



CALIFORNIA SCIENCE & ENGINEERING FAIR 2018 PROJECT SUMMARY

Name(s) Courtney L. Kelly	Project Number 38090
Project Title The Effects of Fabric Softener on the Flammability of Fabrics	
Abstract Objectives/Goals The purpose of my experiment was to determine whether the use of liquid fabric softener increases the flammability of fabrics, and if the degree of flammability becomes greater with repeated use. I hypothesized that fabrics washed with fabric softeners would burn more rapidly than those not treated with fabric softener. Methods/Materials I tested the flammability of 4 different fabrics. My Independent Variable is the amount of washes of the fabrics and the Dependent Variable is the burn duration. I washed all of the fabrics with no fabric softener and tested and recorded the data to see how long it took to burn the whole piece of fabric. I then washed the fabric with liquid fabric softener one, and then five times. I tested and recorded both of these. There were three trials for every type of fabric being burned. Finally, I calculated the burn rate of each fabric using the equation $R = 60\text{cm}^2/\text{seconds}$. Results After one wash with fabric softener, each of the four fabrics had an increase in burn rate. Cotton flannel burned 7.69% faster than the control, and 100% cotton and flame resistant poly came in close with 7.67% and 7.29% increases in burn rate. After 5 washes with fabric softener, the flame resistant and poly blend fabrics showed dramatic increases in burn rate burning 35.97% and 32.2% more quickly than the control. The 100% cotton and cotton flannel also burned faster, with 12.45% and 8.63% increases in burn rate. Conclusions/Discussion My results confirm my hypothesis that the use of liquid fabric softener does indeed increase the flammability of fabrics, and the increase is cumulative. While all fabrics tested increased in flammability after both 1 and 5 washes, it was surprising that the flame resistant child's nightgown had the greatest increase in burn rate after multiple washes with fabric softener.	
Summary Statement I showed that the use of liquid fabric softener increases the flammability of fabrics, and that the increase in flammability is cumulative with repeated use.	
Help Received I designed and conducted my experiment myself at home. I consulted Mikayla Barry, a Graduate Student in Materials Science at UCSB, via email for advice and guidance about experimental design and the science behind what makes fabrics more flammable.	