



CALIFORNIA SCIENCE & ENGINEERING FAIR 2019 PROJECT SUMMARY

Name(s) Hannah Hsiao	Project Number J1308
Project Title Investigating Different Fabrics on Water Absorption, Drying Time, and Drying Cost	
<p style="text-align: center;">Abstract</p> <p>Objectives Sometimes when I pull the clothes out of the dryer, some are dry, while others are still a little wet. I became curious as to why this could be. Moreover, as global warming is becoming a bigger problem, it has become important to find new ways to slow down the process to help decrease pollution and greenhouse gas emission. In line with these ideas, the goal of this project was to investigate ways to save energy during laundry by exploring how different fabrics affected the water absorption, drying time, and drying cost.</p> <p>Methods The materials included washing machine, dryer, infrared gun, big bowl, weighing scale, twelve different fabrics of pants, baskets, timers, pen and paper. The independent variable was the fabrics with different percentages of cotton, polyester, acrylic, rayon, elastane, and spandex. There were three dependent variables: (1) water absorption-measured by water gain (the weight of actual amount of water pick-up compared to the original weight) and water absorption rate (calculated by dividing the water gained by the original weight); (2) drying time-measured by the time spent from wet to the original weight of dry fabric; and (3) drying cost-measured by the dollar amount for the energy used to dry each piece of fabric.</p> <p>Results This study supported the hypotheses that (1) hydrophilic fabric would absorb the most water and (2) hydrophobic fabric would dry the fastest and thus save the most money. The more cotton was in the fabric, the greater the water absorption percentage and longer drying time. By comparing to nearly 100% cotton, 49% polyester with 49% acrylic and 2% spandex absorbed the least water, used less than 1/3 of energy and drying time and cut down 70% of the drying cost. This research suggested that the addition of acrylic to polyester resulted in lower water absorption and reduced dry time/energy/cost. It would help reduce the carbon footprint.</p> <p>Conclusions This study suggested that fabrics with higher water absorption would take more time to dry and cost more energy and money. Cotton is a hydrophilic fiber. The increase in the amount of fiber content in cotton can lead to higher water uptake and take more time to dry. On the other hand, both acrylic and polyester are hydrophobic and tend to repel water, creating droplets. Both acrylic and polyester do not absorb as much water as hydrophilic fabrics like cotton.</p>	
Summary Statement This study examined that (1) hydrophilic fabric would absorb the most water and (2) hydrophobic fabric would dry the fastest and thus save the most money.	
Help Received I conducted this whole experiment by myself.	