



**CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY**

Name(s) Armine I. Dingilian	Project Number 34881
Project Title The Effect of Potassium Persulfate-induced Hydrogen Peroxide Use in Hair Bleaching Product on Human Hair Properties	
Objectives/Goals The objective of this project was to determine the effect of Potassium Persulfate induced Hydrogen Peroxide in Human Hair Properties. Abstract Methods/Materials Tensile Tester, Differential Scanning Calorimeter, LOreal Feria Bleaching Kit Extreme Platinum, my own Human Hair. 10 different samples of hair, consisting of 10 hair strands each, were prepared. 5 different environments were identified, and 2 sets of hair samples were used for each environment. The samples were exposed to distilled rinsing water for 10 minutes, exposed to a heat-drying temperature of 60 degrees Celsius for 10 minutes, exposed to the bleaching treatment for 30 minutes followed by 10 minute rinse, and exposed to bleaching treatment followed by rinsing in water and drying at 60 degrees Celsius. The control samples were not exposed to any of the above environments. The samples were taken to the Quantum Technologies lab and tensile tested at a rate of 100 millimeter per minute. The samples were then cut into millimeter-long pieces and placed in separate standard pans, and each of the standard pans was individually tested in a Differential Scanning Calorimeter. The DSC samples were heated to 400 degrees Celsius, with a ramp of 5 degrees Celsius per minute. Results The results gathered from experimentation indicated that the hair samples exposed to both the bleaching treatment and heat-drying were affected the most in terms of physical properties by becoming more brittle and weaker, and therefore snapping at a lower percent strain. Conclusions/Discussion The results gathered supported the hypothesis. The samples exposed to the bleaching treatment and heat environment were most affected by becoming weaker and more brittle. This was likely because the hydrogen peroxide from the potassium persulfate in the hair bleaching treatment attacked the keratin in the hair fiber in addition to oxidizing the melanin and breaking it down, which further weakened the overall physical structure of the hair. It was also found that hair samples exposed to bleach and heat had, on average, an endothermic DSC peak value 3-10 degrees Celsius less than the unexposed samples, further indicating thermal and chemical breakdown. This project helps provide a better understanding of the effects of bleaching human hair on human hair properties, and further illustrates the potential health and economic consequences.	
Summary Statement This project focuses on the effect of Potassium Persulfate-induced Hydrogen Peroxide from Hair Bleaching Product on human hair physical, chemical, and thermal properties.	
Help Received Used Lab Equipment at Quantum Technologies under the supervision of Senior Polymer Scientist Jacob Dingilian	