



**CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY**

Name(s) Amanda T. Roberts	Project Number J2110
Project Title Is Do-It-Yourself Detergent As Good at Cleaning Laundry As a Store Bought Brand?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My objective was to determine if Do-It-Yourself Detergent (DIYD) could remove stains from white 100% cotton fabric as well as a store brought brand of detergent (Kirkland Signature Ultra HE detergent (Kirkland)). I also wanted to determine if longer pretreatment times with OxiClean could further remove stains.</p> <p>Methods/Materials Do-It-Yourself Detergent (DIYD) and Economy DIYD (EDIYD) were created from Dawn dishwashing detergent, Arm & Hammer Super Washing Soda (sodium carbonate, Na₂CO₃) and Borax (sodium borate decahydrate, Na₂B₄O₇*10H₂O). I used varying concentrations of each of these ingredients in dose ranging trials to determine the optimal dose of each ingredient. I created a Stain Intensity Index (SII) to determine the ability of different detergent concentrations to remove stains from white cotton fabric after laundering. The final DIYD and EDIYD solutions were compared to Kirkland Signature Ultra HE detergent (Kirkland) for stain removal using SII ratings on white cotton fabric. Grass, mustard, dirt and butter were the stains that were measured for removal from the white cotton fabric.</p> <p>Results All treatments including no detergent removed butter from fabric swatches. DIYD removed grass and dirt as well as Kirkland and DIYD removed mustard significantly better than Kirkland (P<0.001). The cost of DIYD was 25.26% of the cost of Kirkland. EDIYD was created and compared to Kirkland and had similar ability to remove grass, mustard and dirt stains as Kirkland, but was only 12.57% of the price of Kirkland detergent. Pretreatment with OxiClean for 1 hour, 1 day and 2 days and then washing with DIYD had significantly greater stain removal than DIYD alone.</p> <p>Conclusions/Discussion For effective stain removal and reduced cost, EDIYD had good results and OxiClean pretreatment caused even greater stain removal. If someone has allergies to commercial laundry detergents, EDIYD is proven to be as effective as Kirkland in cleaning at a cost of only \$6 per year. As well, EDIYD is environmentally friendly as Borax and washing soda boxes are recyclable and the water to make EDIYD came out of a faucet from my house. Compared to some commercial detergents, less fuel is consumed as large liquid plastic containers don't have to be transported by truck and you don't have as many large plastic bottles to recycle or throw away.</p>	
Summary Statement I compared the stain removal ability of Do-It-Yourself Detergent to Kirkland Ultra HE detergent and I also tested the ability of different durations of OxiClean pretreatment to further remove stains.	
Help Received My mother bought materials for the project and helped me glue down items on the posterboard. My father taught me how to use Excel to create graphs and do statistics.	