



**CALIFORNIA STATE SCIENCE FAIR  
2016 PROJECT SUMMARY**

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<b>Project Title</b> <b>The Reduction of Hexavalent Chromium through the Use of Steel Wool and Ferrous Sulfate</b>	
<b>Abstract</b> <b>Objectives/Goals</b> To explore methods to reduce/remove the presence of hexavalent chromium in drinking water through use of steel wool filtration and chemical precipitation using ferrous sulfate. Further determine the optimum pH, effective dosage, temperature, reaction times, and other optimal conditions to achieve this. <b>Methods/Materials</b> Water from Hinkley tested at 3.1 micrograms per liter was ran through a spectrophotometer to find initial presence of hexavalent chromium. The water was then treated in a steel wool and in a carbon filter. The water was further treated with ferrous sulfate and 5% acetic acid. The water was tested for pH, alkalinity, and hardness level. The resulting water was also run through the spectrophotometer to determine effectiveness of hexavalent chromium reduction. <b>Results</b> The presence of iron rusted the steel wool extremely quickly. Sediment formed in all three trials, but there was a lot of chromium left in the sample. The water also turned a yellowish tint which would make it unappealing for consumption. The vinegar and steel wool also turned the water yellow. There was less hexavalent chromium than the iron and steel wool, and the steel wool did not rust. There was some sediment. Both trials with the carbon filter ended up with some of the carbon in the water. The trial with the vinegar had a lower amount of hexavalent chromium than the steel wool, The carbon filter and iron does not seem to be a viable option; there was a lot of iron sediment left in the filter. The vinegar and carbon filter combination seemed to work better than the iron and carbon filter. There was the most transmittance, indicating least hexavalent chromium. The most sediment formed. <b>Conclusions/Discussion</b> The best method of reducing the hexavalent chromium was the vinegar and the steel wool filter. Although the vinegar made the water very acidic, it left the least sediment in the water. It also had the best transmittance rate, which means the lowest levels of hexavalent chromium. Since the purpose of this experiment was to find the most cost effective way of treating hexavalent chromium, the use of household items was helpful. However, this method would not be helpful for large scale or for human consumption because the water is extremely acidic. This could be used potentially for growing plant life. It does seem likely that in the future a treatment method can be developed using a better carbon filter.	
<b>Summary Statement</b> Finding the optimum conditions for reducing the known carcinogen hexavalent chromium in drinking water through the use of steel wool and ferrous sulfate.	
<b>Help Received</b> The spectrophotometer used belonged to Apple Valley High School.	