



# CALIFORNIA STATE SCIENCE FAIR 2015 PROJECT SUMMARY

<b>Name(s)</b> <b>Milan Y. Sanghvi</b>	<b>Project Number</b> <b>J1021</b>
<b>Project Title</b> <b>Investigating the Novel Use of Carbon Aerogel for Water Treatment</b>	
<b>Objectives/Goals</b> I recently read an article about researchers trying a new method of water purification using carbon aerogel. Carbon aerogel is an amorphous form of carbon which is extremely lightweight because of its high porosity. The carbon aerogel I used was derived from cellulose, which has a very high carbon content. The cellulose aerogel was heated at 800°C to reach 98% carbon content to produce carbon aerogel. The objective of this project was to determine if using carbon aerogel might actually be a safe and effective method for removing heavy metals, dyes, and oils from contaminated water, and if so, would activated carbon and charcoal be able to remove the same contaminants at the same rate. My hypothesis stated that carbon aerogel would show a significantly higher percentage of absorption of dyes, heavy metal copper (Cu) and iron (Fe), and oil (gasoline, motor oil and peanut oil) than the activated carbon.	
<b>Abstract</b> I performed a total of 140 tests. I used a UV spectrophotometer to take readings during my experiments with the dyes and I used a centrifuge to mix all my solutions. I used the ratio of 25mg of carbon aerogel, activated carbon, or charcoal in 1ml water contaminated with dye, heavy metal (copper and iron) and oil (gasoline, motor oil and peanut oils). I took readings in two minute intervals up to ten minutes.	
<b>Methods/Materials</b> I performed a total of 140 tests. I used a UV spectrophotometer to take readings during my experiments with the dyes and I used a centrifuge to mix all my solutions. I used the ratio of 25mg of carbon aerogel, activated carbon, or charcoal in 1ml water contaminated with dye, heavy metal (copper and iron) and oil (gasoline, motor oil and peanut oils). I took readings in two minute intervals up to ten minutes.	
<b>Results</b> My findings showed that both carbon aerogel and activated carbon were effective at removing heavy metals, dyes, and oils. After only two minutes the carbon aerogel was able to remove 90% of both heavy metals (Cu and Fe). After ten minutes the carbon aerogel was able to remove 100% of the oils, metals, and dyes. Activated carbon was able to remove 100% of the dye and 95% of the copper and iron in 10 minutes. Activated carbon was only able to absorb an average of 30% of peanut oil and gasoline and 85% of motor oil in ten minutes. Charcoal was able to absorb only negligible amounts of oil and dye, but it was able to remove 50% of the heavy metals in 10 minutes.	
<b>Conclusions/Discussion</b> I would recommend carbon aerogel as an effective means of sewage treatment as it is able to rapidly absorb a wide variety of contaminants.	
<b>Summary Statement</b> The purpose of my project was to determine if using carbon aerogel could remove dyes, heavy metals and oils from contaminated water.	
<b>Help Received</b> Used lab equipment at AM Chemicals, LLC	