



**CALIFORNIA SCIENCE & ENGINEERING FAIR  
2019 PROJECT SUMMARY**

<b>Name(s)</b> <b>Dimple Amitha Garuadapuri</b>	<b>Project Number</b> <b>S1108</b>
<b>Project Title</b> <b>Na/Ca/K Pollution Scrub: A Domestic Approach to Chemical Carbon Capture</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives</b> Every day you charge your phone and drive your car, but have you ever wondered about the amount of CO<sub>2</sub> you release into the air by doing those actions? Atmospheric levels of CO<sub>2</sub> have never been higher than today during the time humans have lived on Earth. Many processes and methods have been developed to capture CO<sub>2</sub> from the air, and some industrial power plants have been made. I want to find a way to redesign those processes to be used in a domestic (home) setting. My goals were to prove that a chemical process could capture CO<sub>2</sub> and find the best concentration/chemical/material to be used as an absorbent in a prototype.</p> <p><b>Methods</b> The chemical process outlined by Prof. Lackner and Prof. Zeman is made of multiple steps/processes to capture CO<sub>2</sub> from the air, which I broke down into phases. To experiment with the first Phase, I created a closed environment in which I exposed different concentrations of different chemicals to the ambient air within it. A CO<sub>2</sub> monitor recorded the CO<sub>2</sub> PPM and computer software allowed me to analyze changes that were caused by the solutions. The same environment was used when testing with a cheese cloth as well. I am currently testing the second step which allows us to separate the CO<sub>2</sub> from the solutions used above to eventually sequester the CO<sub>2</sub>.</p> <p><b>Results</b> NaOH may be used to capture CO<sub>2</sub> and higher concentrations yield better results. The solutions also have maximum capacities, which differ based on the concentration. KOH can also be used and seems to be better than NaOH, when one compares maximum capacities. Carbonate can be found in the resulting chemicals, which is a foundation to continue to eventually sequester CO<sub>2</sub>. Using cotton cheese cloth that is saturated with KOH can be used as an effective air filter.</p> <p><b>Conclusions</b> Though initially there was minimal data to support this study, tweaking and altering protocol led to positive results. Domestic carbon capture is possible, and separating the CO<sub>2</sub> is the next phase of this process. With that study, and information already gathered, a prototype can be developed in the near future.</p>	
<b>Summary Statement</b> Repurposing a chemical process developed to capture carbon dioxide from the ambient air to function in a domestic setting had many steps and so far, this study has shown results that support the development of a domestic pollution scrub.	
<b>Help Received</b> I was supervised by Mrs. Bowles when dealing with raw chemicals in school and my parents when performing trials at home. I was also advised by Prof. Lackner and Prof. Zeman, who shared journals and gave me some additional insight on the chemical process.	