



**CALIFORNIA STATE SCIENCE FAIR  
2006 PROJECT SUMMARY**

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| <b>Name(s)</b><br><b>Robert A. Ray</b>  | <b>Project Number</b><br><b>S0517</b> |
| <b>Project Title</b><br><b>The Effect of Temperature on the Affinity of Carbon Dioxide to Molecular Sieve 4A</b>  |                                       |
| <b>Abstract</b>   |                                       |
| <b>Objectives/Goals</b><br>The purpose of my experiment is to find the optimum temperature for absorbing CO <sub>2</sub> in molecular sieve 4A.   |                                       |
| <b>Methods/Materials</b><br>I first heat up my column to the test temperature. Then, I take a sample of 10% CO <sub>2</sub> and 90% air with my input gas syringe. I then push this air through my column until there is no space left in the syringe. I simultaneously fill up the output syringe, #syringe 2,# to the same level that syringe 1 was at after filling it with air. I then heat up my oven to the maximum temperature and take a gas chromatograph sample of syringe 2. I then open the valves leading to the peristaltic pump and pump the gas in the column into syringe 3. I then take a sample of this gas and run it three times through my gas chromatograph. |                                       |
| <b>Results</b><br>The data for sample 1 showed that the average percent in relation to the amount of air desorbed is 69.7% CO <sub>2</sub> at 50°C. The data for sample 2 showed that the average percent of CO <sub>2</sub> in the desorbed air is 74.6% CO <sub>2</sub> at 100°C. The data for sample 3 showed that the average percent of CO <sub>2</sub> in the desorbed air is 62.1% CO <sub>2</sub> at 150°C. The data for sample 4 showed that the average percent of CO <sub>2</sub> in the desorbed air is 64.4% CO <sub>2</sub> at 200°C.   |                                       |
| <b>Conclusions/Discussion</b><br>I can conclude that the optimum temperature for carbon dioxide absorption into molecular sieve 4A with minimal absorption of air is around 100°C. My Student's t-Tests show that there is a significant difference between the data of each sample.  |                                       |
| <b>Summary Statement</b><br>My project is about helping the problem of global warming by filtering CO <sub>2</sub> from the atmosphere.   |                                       |
| <b>Help Received</b><br>My dad supervised my setting up of a high pressure helium system and gas chromatograph use.   |                                       |