



**CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY**

Name(s) Elizabeth V. Clemmons	Project Number S0702
Project Title Extracting Oxygen from Lunar and Martian Regolith Simulant	
Abstract Objectives/Goals As we look to colonize the Moon and Mars, my experiment objective was to extract oxygen from Lunar and Martian regolith simulant via solutions of simple alkaloids and household substances. Methods/Materials Lunar soil is over 42% oxygen by composition, and Martian soil is rich in oxides. Regolith simulant, manufactured for NASA by Orbitec, was acquired from Planet LLC. After I acquired the simulant, my school limited our budget to \$40.00, so instead of experiments involving heat and electricity, I created solutions of the two types of regolith with water, ZEP, yeast, sugar, baking soda and beer. Instead of flasks and test tubes, masons jars were used. The oxygen levels were measured with a borrowed gas flue analyzer. Results In every instance, the solutions consumed oxygen, rather than liberating oxygen. A simple alkaloid, baking soda, actually consumed the most oxygen in both experiments. My original hypothesis was disproved, however, during the course of the experiment I made some extremely interesting observations and discoveries. A vibrant yeast culture developed in both the sealed jars of the Lunar and Martian regolith simulant solutions, and the beer and Lunar regolith kept bubbling for three weeks after the experiment. Conclusions/Discussion First off, we are going to need a lot more than \$40.00 in funding to get to either the Moon or Mars. Simple solutions created from oxygen-rich regolith are ineffective in liberating oxygen for rocket fuel or breathable air. The sealed jars which developed a respirating culture of yeast are drawing oxygen from what source? Is the yeast drawing oxygen from Lunar and Martian soil? The beer and Lunar soil solution continues to bubble, as does the sugar and Lunar soil. Interesting.	
Summary Statement This project explores liberating oxygen from Lunar and Martian regolith simulant with simple solutions and the resulting surprising observations.	
Help Received Don Wolf loaned me a gas flue analyzer, my mother bought my materials, and my brother lent me his camera.	