



**CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY**

Name(s) Parker G. Addison	Project Number 35342
Project Title The Effect of Gases on the Efficiency of a Solar Cell	
Objectives/Goals This experiment is related to the growing quantities of greenhouse gases in our atmosphere. The experiment was designed to see if the greenhouse gases, or any other common gases, between a solar cell and its light source effect the output of the solar cell. Abstract This experiment is related to the growing quantities of greenhouse gases in our atmosphere. The experiment was designed to see if the greenhouse gases, or any other common gases, between a solar cell and its light source effect the output of the solar cell. Methods/Materials Assemble a cube vacuum chamber with six acrylic squares. Obtain tubing, valves, drills, etc. Connect pressure gauges to the chamber. Secure a solar cell and thermostat within the sealed vacuum chamber and output the solar cell to a multimeter outside the chamber. Obtain cartridges of Helium, Nitrous Oxide, and Carbon Dioxide. Have a steady light source a constant distance from the solar cell, and keep the temperature within the chamber 75°F. First, with the gas valve closed, turn on the vacuum pump and let all air be evacuated from the chamber. Then turn off the pump, close the pump valve, and open the gas valve until the pressure within the chamber is 14.7 PSI (atmospheric pressure). Record the output of the solar cell. Repeat process of evacuating and filling chamber with all gases and also without filling a gas. Results Averages -- Air: 8.05 Volts; Helium: 8.153 Volts; a Vacuum: 8.157 Volts; Carbon Dioxide: 8.18 Volts; Nitrous Oxide was unable to be tested. StDv Air: 0.1003; StDv Helium: 0.0694; StDv Vacuum: 0.0478; StDv Carbon Dioxide: 0.01 F(stat): 2.6977; F(crit): 3.5874; P-Value: 0.0971 Conclusions/Discussion The results of this experiment were unable to reliably contribute to the purpose. The expected results were based on the refractive index and absorption bands of gases, but the results may support a positive correlation between gas density and solar cell output. While it is possible that helium in our atmosphere can lead to more efficient solar panels due to its lower density, the carbon dioxide test was flawed due to temperature change, and the nitrous oxide test was defective. It is challenging to attempt to support or disprove the hypothesis due to the unreliability of the data. The project design needs to be amended in order to provide more accurate results. In conclusion, the null hypothesis may have been supported in that gases have very little to no effect on the output of solar panels.	
Summary Statement To determine if different gases between a solar cell and its light source have any impact on the output of the solar cell.	
Help Received Father helped assemble the vacuum chamber; Father helped open and close valves	