



**CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY**

Name(s) Chester H. Charlton	Project Number J1708
Project Title Bio-Hydrogen Project CC-125	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals This project seeks to demonstrate a non-wasteful method to produce hydrogen using Chlamydomonas Reinhardtii, strain CC-125. I will be using an algae, also known as a photosynthetic bacteria, or hydrogenase, which when deprived of sulfur, stops photosynthesis and produces hydrogen instead.</p> <p>Methods/Materials Assemble photo bioreactors; Measure and add ingredients for culture media to Bottle A and Bottle B. Record daily growth, swirling daily to activate. Monitor temperature to achieve avg. 20-25 Celsius. Observe evidence of bubbles, ie. Oxygen and Hydrogen. Remove photo bioreactors. Close spout, swirl, Secure balloons to capture Oxygen from Bottle A and Hydrogen from Bottle B,</p> <p>Two 10 ml cultures CC-125, 25 ml complete salts solution, 25 ml sulfur free salts solution, 50 ml phosphate solution, 50 ml acetate solution, 5 ml trace elements solution, 5 ml sulfur free trace solution, Two pieces vinyl tubing, One piece latex tubing, Four 1 ml disposable pipettes, Five 5 ml disposable pipettes, One 50 ml plastic tube, Four balloons (to collect gas produced by cultures).</p> <p>Results The results of this project surprised me for this reason: The algae was touchy about its environmental needs. In my first experiment with CC-125, Bottle A produced a greater amount of oxygen than in my second experiment. Where as Bottle B produced a lesser amount of hydrogen in Trial 1 and a greater amount of hydrogen in Trial 2. In both trials the growth of CC-125 was observed over the course of 12 days and was ultimately successful, but was variable due to fluctuations in its temperature and growth medium.</p> <p>Conclusions/Discussion My hypothesis was correct. Bottle A produced oxygen and Bottle B produced hydrogen. I think further study is needed to improve biohydrogen production on a commercial level. Chlamydomonas reinhardtii grew quickly in both Bottle A and B before losing energy at Day 6 (see graph). Bottle A then slowly tapered its growth. Bottle B quickly plummeted to a non-energy, (or non hydrogen-producing) state. The hydrogen producing phase was only 3-4 days. The scientific principle in this study is photosynthesis. This is the process that plants use to convert sunlight into energy. CC-125 performed regular, or aerobic, oxygen producing, photosynthesis in Bottle A.</p>	
Summary Statement My project seeks to find a renewable way to create H ₂ .	
Help Received parent helped type the report	