



# CALIFORNIA STATE SCIENCE FAIR 2013 PROJECT SUMMARY

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<b>Project Title</b> <b>Acid Waves</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> How will rising carbon dioxide levels in the ocean caused by rising fossil fuel emissions affect calcium carbonate shells of marine animals? Higher carbon dioxide in the ocean make the oceans more acidic and might dissolve shells of animals. Although the animals may live, thinner shells may make them more vulnerable to predators.</p> <p><b>Methods/Materials</b> We collected shells of chitons and limpets (marine mollusks) and soaked them in seawater with different levels of carbon dioxide. We dried and weighed them before being placed in tanks with different pH levels (7.8, 7.5, 7.0, 6.5; lower pH means more carbon dioxide). After 1 week we rinsed them in fresh water, dried them and weighed them. Then we repeated this process the next week. We analyzed the data by comparing the changes in weight over time among tanks with different pH levels.</p> <p><b>Results</b> The shells in the tank with the lowest pH (most acidic) lost the most weight and were quite corroded. Shells soaked in the control tank (normal ocean pH) had lost no weight. In the two tanks with intermediate pH levels, shells also lost weight, but not as much as in the most acidic tank.</p> <p><b>Conclusions/Discussion</b> Our hypothesis that calcium carbonate shells of marine animals will dissolve under ocean waters with lower pH (higher carbon dioxide) was supported by our data. We tested two marine mollusks that make calcium carbonate shells, but many marine animals use calcium carbonate to make shells or skeletons. Our lowest pH level was much lower than expected in the future. However, the intermediate pH levels used are similar to those expected due to future ocean ocean acidification. Therefore, our results suggest that shells of marine animals may be corroded or even destroyed by decreasing ocean pH caused by fossil fuel emissions. Thinner shells or skeletons for many marine animals may reduce their chances of survival.</p>	
<b>Summary Statement</b> Our project tests how increasing carbon dioxide in the ocean affects the shells and skeletons of marine animals	
<b>Help Received</b> Dr. James Barry at MBARI for equipment use and acting as scientific advisor.	