



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Aurora L. Ostrom	Project Number J0527
Project Title How Fast Do Hydrogen Ions Diffuse through Water?	
Abstract Objectives/Goals The rate at which hydrogen ions diffuse through water was determined by measuring the time it takes hydrogen ions to travel a known distance. Methods/Materials A concentrated acid was added to one end of a PVC pipe filled with deionized water and cut to a known length. The arrival of the hydrogen ions on the other end of the pipe was detected by a pH electrode. Three experiments for each of three different lengths of PVC pipe (0.9144, 1.219, and 1.524 meters) were conducted using (35%) nitric acid and then with (35%) hydrochloric acid. Results The hydrogen ions were found to diffuse quickly through water as stated in the hypothesis. However, a plot of the results showed that the rate was exponentially dependent upon the length of the pipe. Furthermore, a comparison of the results from each acid showed that the rates were not the same as the hypothesis predicted. Conclusions/Discussion The difference in diffusion rates between the nitric acid and the hydrochloric acid is probably due to interactions between the hydrogen ion and the anion in each acid.	
Summary Statement This project will determine the rate at which hydrogen ions diffuse through water by measuring the time it takes concentrated acids to diffuse through water in known lengths of PVC pipe using a pH electrode as the detector.	
Help Received For safety reasons, Father handled concentrated acids during experiments. Borrowed chemistry supplies from Navy research lab and received training on pH meter.	