



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

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Project Title Into the Deep: Ion Propulsion Systems	
Objectives/Goals To find if it is possible to create an ion propulsion device in an aqueous medium using the principles of a capacitor. We believe it is possible to accomplish this if we use a capacitor to create a convection current of an ionic compound within the system resulting in a concentration difference within different regions of the system. Abstract Methods/Materials Materials: PVC piping, distilled H ₂ O, 10 gallon tank, galvanized wire mesh, fountain pump, hose, Ionic Solution (FeCl ₃ and ZnCl ₂), Volt meter, battery charger, and spectrometer. Procedure: We basically created a capacitor using a PVC rectangular frame and attaching the galvanized mesh to both sides then pumping our ionic solution (initially FeCl ₃) in hopes that the capacitor creates a convection current. We accumulated data by measuring the concentration of different regions of the system using the spectrometer. If there was a significant concentration difference we knew our hypothesis was correct. We later found this method unsuccessful so we conducted the experiment again only this time we used a different ionic solution and placed a solenoid in the middle of the capacitor to achieve the desired results. Results Our first trial proved inconclusive showing a constant concentration difference throughout the system. After implementing a few modifications (adding a solenoid and changing the ionic solution to ZnCl ₂) we had a concentration difference throughout the system proving our initial hypothesis correct. Conclusions/Discussion We found that it is possible to create an ionic propulsion device using a capacitor however a device is needed to neutralize charges as they exit the source so that a propulsion can be achieved, in our case we used a solenoid.	
Summary Statement Using the principles of a capacitor and electron negativity principles we were able to construct an ion propulsion device in an aqueous medium.	
Help Received Used lab equipment from Centennial High School under supervision of Mr. Phil Beach	