



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) Ryan M. Fox	Project Number J0808
Project Title Filtration of Toxic Water Using Natural Materials	
Objectives/Goals To see if toxins such as Malathion can be filtered from water using natural waste products such as Almond, Pistachio and Walnut shells.	
Abstract Methods/Materials Gather Almond, Pistachio and Walnut shells, Activated Carbon, Malathion, crickets, pH strips, chlorine and total chlorine test strips. Mix Malathion at 100%, 50% and 10% strength. Test the pH of the Malathion and plain water. Spray the crickets with the solutions and time their deaths. Create filters from ground up Almond, Pistachio, Walnut shells and Activated Carbon. Filter the solutions, measure the pH and time of death of crickets, compare to unfiltered solutions. Make various total chlorine solutions and run through filters. Increase concentrations until total chlorine can be measured in the filtered water. Compare concentrations.	
Results The pH of the malathion was 4.5. The pH of plain water was 7.5. Only the pH of the Almond shell filter went back up to 7.5. The rest stayed below 7.0. When the filtered solutions were sprayed on the crickets-none died. The Malathion must be gone. Why didn't all of the pHs change??? Could Tanins in the shells be adding pH??? Maybe pH is not a reliable way to check if the filters were working. In my research I discovered that these filters also took out chlorine. I filtered various concentrations of chlorine through the filters and found the the shells took out extensive amounts of chlorine. Up to 5,000 ppm. The shells in all cases worked better than Activated Carbon.	
Conclusions/Discussion Natural waste products such as Almond, Pistachio and Walnut shells can take out toxins in water. Changes in pH was measurable in Almond shells but not Pistachio and Walnut shells. When the filtered solutions were sprayed on the crickets they did not die. This must mean that pH is not always an accurate way to measure how well a filter works. A different way to measure how well a filter is to measure the contaminat directly. I used increasing strengths of chlorine concentrations and measured it with a pool test kit. All the shell filters worked better than the Activated Carbon (chlorine was found using 400 ppm solutions) with Walnut shells still removing chlorine from solutions of 5,000 ppm.	
Summary Statement My project is about the filtertion of toxic water using an argicultural waste product such as Almond, Walnut, and Pistachio shells	
Help Received Dad helped me do the board, get materials, and helped look over my papers.	