



**CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY**

Name(s) Katherine S. Anderson	Project Number S0601
Project Title The Effect of Surfactant Head Charge and Water Composition on the Degradation of Oil	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My objective was to identify the effect surfactant head charge on the breakdown of oil in freshwater and bay water.</p> <p>Methods/Materials Three cleaning products were obtained, one with an active anionic surfactant, one with a cationic surfactant, and one with a nonionic surfactant. Each of these were added to standard motor oil in samples of fresh and bay water. After being mixed, the resulting suspensions were observed tested for light transmittance with a colorimeter/spectrophotometer.</p> <p>Results The cationic surfactant showed consistently higher transmittance than both the anionic or nonionic surfactants in both types of water, demonstrating a more efficient degradation of oil. The bay water samples also showed greater transmittance by a margin of at least 5% for all surfactant types.</p> <p>Conclusions/Discussion The results indicate that cationic surfactants are most effective in breaking down oil, and that all surfactants are more efficient in bay water than in freshwater. This conclusion is supported by the fact that anionic surfactants in particular are sensitive to water hardness, unlike cationic surfactants, and suggests that the abundance of minerals present in bay water versus inland freshwater increases the efficiency of surfactants.</p>	
Summary Statement This project explored the effect of anionic, cationic, and nonionic surfactants on the breakdown oil in fresh and bay water.	
Help Received Used basic lab equipment from my high school science department; was accompanied by my mom to pick up some materials.	