



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

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Project Title Analysis of the Effects of Bioremediation Using Glycerin and Acetate on Perchlorate Contaminated Water	
Conclusions/Discussion <p style="text-align: center;">Abstract</p> <p>Ever since its contaminations were discovered in ground water in 1997, perchlorate (ClO₄⁻) has become a growing threat to inhabitants in the Western states of US. Most perchlorate contamination is found in ground water near industries which use explosives. If consumed at concentrations as low as 25ppb, perchlorate can be harmful to the thyroid and bone marrow. For this reason, immediate attention needs to be given to the remediation of perchlorate. But because perchlorate is highly soluble it travels quickly through the ground and remediation serves to be a challenge. Bioremediation which involves the use of naturally occurring microbes to reduce the perchlorate into chloride can be used to decontaminate perchlorate. With the use of acetate and glycerin as bioremediation promoting reducers, if favorable conditions consisting of a perchlorate degrading bacteria source and an anaerobic environment are given, the perchlorate concentration in the contaminated water will decrease. Acetate and glycerin are known to be effective reducers and are easily available and harmless. In order to test the hypothesis, two test groups were set up; three bottles containing contaminated water, soil, and acetate, and three other bottles containing contaminated water, soil, and glycerin. In order to determine the improvement in the results, two control groups were set up as well; three bottles with contaminated water and soil, and three bottles with contaminated water and acetate. The contaminated water was taken from groundwater near Beaumont and was known to have an initial concentration of 70 mg/L. The twelve samples were tested in an ion-chromatograph every two days after the fifth day of the experiment. The final sample was taken on the tenth day. The results proved the hypothesis true # with the favorable conditions, bioremediation took place, and acetate proved to be the more effective electron donor. After the seventh day of the experiment, no perchlorate was detected in the acetate bottles. The glycerin group experienced degradation, but at a slower rate, and the concentration did not reach zero, while the two control groups experienced no degradation. Bioremediation was most effective with the use of acetate because it proved to be the reducer with better reducing qualities.</p>	
Summary Statement Perchlorate is a dangerous water contaminant found in most Western states, and bioremediation is being tested as a possible method to get rid of the perchlorate from ground water.	
Help Received Used lab equipment at UCR under the supervision of Dr. Matsumoto. Dad helped print poster. Teacher helped revise the report.	