



**CALIFORNIA STATE SCIENCE FAIR  
2011 PROJECT SUMMARY**

<b>Name(s)</b> <b>Anush Ginosyan; Shaunt Kevork</b>	<b>Project Number</b>  <div>31862</div>				
<b>Project Title</b> <b>Removing Nitrates from Water using Redox Reactions</b>					
<table border="1"><thead><tr><th><b>Objectives/Goals</b></th><th><b>Abstract</b></th></tr></thead><tbody><tr><td><b>Objectives/Goals</b> The purpose of our investigation was to remove nitrate ions from water. Nitrate ions are common pollutants found in water bodies and wastewater due to the use of inorganic fertilizers and discharge of animal waste. In doing so, we also hoped to generate electricity to make the process environmentally sustainable. Using a redox reaction in a galvanic cell, we were able to reduce nitrates in a potassium nitrate solution to dinitrogen tetroxide gas. The release of this gas caused the volume of the solution to decrease, obeying the law of conservation of mass. Another byproduct of this redox reaction was the formation of hydroxide ions, causing the solution to turn basic. After days of observing, the voltmeters read an average voltage of nearly 1.0 V, further proving that nitrate was being reduced. Such results proved that the reaction took place. The results of the test using a nitrate testing kit eliminated any possible doubt remaining. Ultimately, the success of the experiment shed light onto a brand new method of removing nitrates from fresh water. The generation of electricity was a bonus, which will allow for a sustainable method of water pollution remediation. This method will prove to be vital in the coming years as more and more water sources will become polluted due to human activities.</td><td><b>Abstract</b></td></tr></tbody></table>		<b>Objectives/Goals</b>	<b>Abstract</b>	<b>Objectives/Goals</b> The purpose of our investigation was to remove nitrate ions from water. Nitrate ions are common pollutants found in water bodies and wastewater due to the use of inorganic fertilizers and discharge of animal waste. In doing so, we also hoped to generate electricity to make the process environmentally sustainable. Using a redox reaction in a galvanic cell, we were able to reduce nitrates in a potassium nitrate solution to dinitrogen tetroxide gas. The release of this gas caused the volume of the solution to decrease, obeying the law of conservation of mass. Another byproduct of this redox reaction was the formation of hydroxide ions, causing the solution to turn basic. After days of observing, the voltmeters read an average voltage of nearly 1.0 V, further proving that nitrate was being reduced. Such results proved that the reaction took place. The results of the test using a nitrate testing kit eliminated any possible doubt remaining. Ultimately, the success of the experiment shed light onto a brand new method of removing nitrates from fresh water. The generation of electricity was a bonus, which will allow for a sustainable method of water pollution remediation. This method will prove to be vital in the coming years as more and more water sources will become polluted due to human activities.	<b>Abstract</b>
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<b>Summary Statement</b> The purpose of our project was to discover a self sustaining, viable technique of removing nitrates from polluted water, while at the same time generating a voltage with the potential to produce electricity when used on a large scale.					
<b>Help Received</b> Teacher supervised experiment in school laboratory					