



**CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY**

Name(s) Amit S. Talreja	Project Number S0621
Project Title Mobile Spectrometer for Environmental and Health Monitoring	
Abstract Objectives/Goals The goal of the project is to create a spectrometer-based chemical analyzer that is portable and comparable in accuracy to lab quality equipment, while minimizing cost. To be considered successful, the spectrometer must have a minimum eighty percent accuracy in identifying differences in known chemicals and concentration of the detected chemicals. It must also be able to identify unknown chemicals by comparing compounds to a database. Methods/Materials After multiple prototypes, a final spectrometer device was constructed using laboratory-grade components and a smartphone to measure and analyze the data. Measurements of water with and without contaminants were taken and then compared to find the differences between the two samples. These differences were then recorded and compared to a publicly available database to identify the contaminants present in the water sample. Results With testing on known chemicals, the device was able to accurately identify the chemical present in the water with a 84.37% accuracy. It was also able to detect the concentration of these chemicals with a 55.4% accuracy. When trying to identify unknown compounds in solution the device achieved an 80.2% accuracy Conclusions/Discussion Current lab-quality spectrometers cost more than \$50,000, and the cheapest water testing machines can be \$100 per sample analyzed. By combining the principles of spectrometry with the need for cheap water testing, a device has been created that could revolutionize how water is tested around the world. The general principle of the device can also be applied to finding explosive chemicals at airports or finding hemoglobin content in human blood. I created a low-cost chemical analyzer that is able to identify contaminants in water with close to 85% accuracy.	
Summary Statement Developed a smart-phone based spectrometer that analyzes contaminants in water with 85% accuracy	
Help Received Ran my ideas by my high school teacher to get his feedback.	