

John Cheslock

*Optimizing the Measurement Sensitivity of H<sub>2</sub>O<sub>2</sub> with FDA Blue #1 for the Detection of New Generation Explosives*

The project was about optimizing a reaction rate of Blue Dye #1 and H<sub>2</sub>O<sub>2</sub>. This project was chosen due to recent development in Hydrogen Peroxide explosives. I hypothesized that the best way to optimize the reaction was to raise the pH of the reaction. My hypothesis was tested in four stages. In the preliminary stage, I determined if the pH had any effect on the rate of reaction. I tested this by using bicarbonate and sodium hypochlorite individually with the blue dye and found the solution's pH affected the rate. I found sodium hypochlorite alone oxidizes the blue dye and switched to sodium hydroxide for pH adjustment in future stages. In stage one, I tested where in the spectrum of pHs the optimal maximum rate was by changing the molar concentration of both the H<sub>2</sub>O<sub>2</sub> and NaOH and timing rates at different pHs. In stage two, for more accuracy I used a lab spectrophotometer to test the range of pHs from stage I to see what was the most effective. In stage three, I tested for the order of reaction and if there was a maximum of NaOH that could be used. After all my testing, my data supported my hypothesis correct because the rate of reaction increased as I raised the pH. I would recommend testing all the stages in the same manner using the same equipment. The practical application of this project is new information to develop a detection device to be used in a public location.