



CALIFORNIA STATE SCIENCE FAIR 2015 PROJECT SUMMARY

Name(s) Logan E. Prock	Project Number S0617										
Project Title The Effect of Storage Temperature on the Decomposition of Sodium Hypochlorite in Household Bleach											
<table border="0"><thead><tr><th>Objectives/Goals</th><th>Abstract</th></tr></thead><tbody><tr><td><p>The purpose of this project was to determine the effect of storage temperature (3° Celsius, 20° Celsius, and 40° Celsius) on the decomposition of sodium hypochlorite.</p><p>It was hypothesized that with each increase in temperature, there would be an increased rate of decomposition of sodium hypochlorite resulting in a lower percentage of NaOCl remaining in the bleach.</p></td><td></td></tr><tr><td><p>Methods/Materials</p><p>Three 350 mL samples of bleach were stored for a week in the manipulated storage temperatures, one at 3° Celsius in a refrigerator, 20° Celsius at room conditions, and 40° Celsius in a Model 10 Quincy Lab Oven. For each bleach sample, 5.00 mL of concentrated bleach was pipetted into an 100 mL volumetric flask and was diluted with distilled water. For four trials per bleach sample, 2 grams of potassium iodide, 25.00 mL diluted bleach, 2.00 mL 3 M hydrochloric acid, and 25.00 mL distilled water were combined in an Erlenmeyer flask. This solution was titrated with .100 M sodium thiosulfate solution until it was clear, as determined by a starch indicator. By recording the volume of .100 M sodium thiosulfate solution used in order to make the solution clear, calculations were completed to determine the remaining percent sodium hypochlorite in each trial.</p></td><td></td></tr><tr><td><p>Results</p><p>The mean of the bleach samples stored at 3°Celsius was 8.26 percent sodium hypochlorite. The mean deviation was 0.07 percent sodium hypochlorite. The percent deviation was 0.85 percent. The mean of the samples stored at 20°Celsius was 8.04 percent sodium hypochlorite. The average deviation from the mean was 0.08 percent. The percent deviation was 0.99 percent. The mean of the samples stored at 40°Celsius was 2.90 percent sodium hypochlorite. The results deviated from the mean an average of 0.11 percent sodium hypochlorite. The percent deviation was 3.79 percent.</p></td><td></td></tr><tr><td><p>Conclusions/Discussion</p><p>The hypothesis was conclusively supported by the data collected from experimentation. With each increase in temperature, the percentage of remaining sodium hypochlorite decreased. The results were conclusive due to the high precision of the data, as determined by a T-test and deviation calculations. The data reflection exponential decomposition. The results of this experiment can be applied to both the industrial and domestic storage of bleach.</p></td><td></td></tr></tbody></table>		Objectives/Goals	Abstract	<p>The purpose of this project was to determine the effect of storage temperature (3° Celsius, 20° Celsius, and 40° Celsius) on the decomposition of sodium hypochlorite.</p> <p>It was hypothesized that with each increase in temperature, there would be an increased rate of decomposition of sodium hypochlorite resulting in a lower percentage of NaOCl remaining in the bleach.</p>		<p>Methods/Materials</p> <p>Three 350 mL samples of bleach were stored for a week in the manipulated storage temperatures, one at 3° Celsius in a refrigerator, 20° Celsius at room conditions, and 40° Celsius in a Model 10 Quincy Lab Oven. For each bleach sample, 5.00 mL of concentrated bleach was pipetted into an 100 mL volumetric flask and was diluted with distilled water. For four trials per bleach sample, 2 grams of potassium iodide, 25.00 mL diluted bleach, 2.00 mL 3 M hydrochloric acid, and 25.00 mL distilled water were combined in an Erlenmeyer flask. This solution was titrated with .100 M sodium thiosulfate solution until it was clear, as determined by a starch indicator. By recording the volume of .100 M sodium thiosulfate solution used in order to make the solution clear, calculations were completed to determine the remaining percent sodium hypochlorite in each trial.</p>		<p>Results</p> <p>The mean of the bleach samples stored at 3°Celsius was 8.26 percent sodium hypochlorite. The mean deviation was 0.07 percent sodium hypochlorite. The percent deviation was 0.85 percent. The mean of the samples stored at 20°Celsius was 8.04 percent sodium hypochlorite. The average deviation from the mean was 0.08 percent. The percent deviation was 0.99 percent. The mean of the samples stored at 40°Celsius was 2.90 percent sodium hypochlorite. The results deviated from the mean an average of 0.11 percent sodium hypochlorite. The percent deviation was 3.79 percent.</p>		<p>Conclusions/Discussion</p> <p>The hypothesis was conclusively supported by the data collected from experimentation. With each increase in temperature, the percentage of remaining sodium hypochlorite decreased. The results were conclusive due to the high precision of the data, as determined by a T-test and deviation calculations. The data reflection exponential decomposition. The results of this experiment can be applied to both the industrial and domestic storage of bleach.</p>	
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Summary Statement The purpose of this project was to determine the effect of prolonged storage temperature on the decomposition of sodium hypochlorite.											
Help Received Equipment obtained from Mr. Mike Antrim's high school chemistry lab; Photos of trials taken by parents											