CALIFORNIA SCIENCE & ENGINEERING FAIR
2018 PROJECT SUMMARY

Name(s)
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Project Number
J0609

Project Title
Oscillating Chemical Reactions with Malonic Acid

Abstract

Objectives/Goals
The objective of this study is to find the amount of malonic acid that provides the quickest color changes in the chemical reaction to apply to smart glass.

Methods/Materials
Manganese sulfate monohydrate, varying amounts of malonic acid, sodium iodate, sulfamic acid, hydrogen peroxide, distilled water, starch, Science Journal light sensor. Two solutions were made, one with distilled water, sodium iodate, and sulfamic acid, the other with hydrogen peroxide, malonic acid, manganese sulfate monohydrate, and starch; solutions were placed on light sensor and mixed. This was repeated five times for each of the five malonic acid amounts for a total of twenty-five iterations.

Results
Results showed the solutions containing 1 gram malonic acid had quickest color changes, ranging from 11.49 to 13.68 seconds for each color change. The solutions containing 1/3 gram malonic acid changed colors slowest ranging from 22.28 to 26.84 seconds.

Conclusions/Discussion
Benefits of creating oscillating reactions using malonic acid include: saving energy from previous costs on heating and cooling systems and reducing greenhouse gas emissions by using smart glass. In conclusion, the scientist determined that by using the right ratio of malonic acid, the optimal rate of color change in smart glass can be achieved.

Summary Statement
I devised an oscillating chemical reaction using the optimal amount of malonic acid to change colors quicker than the existing chemical reactions used in smart glass.

Help Received
I received supervision while handling the chemicals during the experiment and performed the rest of the experiment independently.