



## Colorado Science and Engineering Fair

## 2025 Individual Project Abstract Form

**Please print 2 copies of the completed form. Sign both copies, keep 1 for your notebook and submit 1 copy to your Regional Fair Director with your other paperwork.**

Title of Project: Measuring Chemical Kinetics in High School Labs

Finalist's Name: Neha Pesaramelli

School and City: Peak to Peak Charter School, Lafayette

Sponsor's Name: Bayley Zubler

Category: Chemistry

Division: Senior (grades 9 - 12)

Abstract (250 words or less):

Chemical kinetics plays a crucial role in fields such as pharmaceuticals, environmental science, and industrial chemistry. This study investigates the reaction between crystal violet (CV) and sodium hydroxide (NaOH) to answer the research question: How does the concentration of crystal violet affect the rate of its reaction with NaOH, and how can this experiment be optimized for high school laboratory use in terms of cost, safety, and accessibility?

The reaction rate was determined using the initial rates method with two approaches: an algebraic method, where the initial rate was calculated from using the slope formula, and a graphical method, where a tangent line was used to estimate the instantaneous rate at the reaction's start. The reaction was found to be second order overall.

To enhance safety and accessibility, this experiment was designed to use low concentrations of reagents, reducing toxicity and cost of materials while maintaining measurable reaction rates. The integration of mathematical problem-solving further strengthened the educational value of the experiment, making it an accessible and engaging learning tool for students.

By optimizing this reaction for safety, affordability, and hands-on learning, this study presents a practical approach to teaching chemical kinetics in high school laboratories while reinforcing key scientific and mathematical principles.

*I hereby certify that the above statements are correct and the information provided in the Abstract is the result of one year's research. I also attest that the above properly reflects my own work.*

Finalist's Signature:

Date:

In addition, all students must complete the ISEF Student Checklist (1A), Research Plan, Approval Form (1B), and Checklist for Adult Sponsor (1), and any other ISEF forms required for this type of project. See the International Rules and Guidelines for form requirements. Return COPIES of all of these forms to your Regional Fair Director with you Finalist Verification/Permission Form. **A signed copy of this form must be included in your notebook.**