

Madeline A. Murphy

✉ murp1677@umn.edu

🔗 <https://maddymurphy.github.io/>

Education

University of Minnesota—Twin Cities

Minneapolis, MN

B.S. Chemical Engineering, summa cum laude, GPA 4.00/4.00

2020-2024

Advisor: Paul Dauenhauer

Honors Thesis: Circumfluence of Catalytic Loops

Scholarships & Fellowships

2024 National Science Foundation Graduate Research Fellowship

2023 Charles A. Mann Scholarship | University of Minnesota

2020-2024 National Scholarship | University of Minnesota

2020 College Fairs of Denver Scholarship

Awards & Honors

2020-2023 College of Science and Engineering Dean's List | University of Minnesota

2020 Lakewood High School Valedictorian

2020 National Merit Commended

Publications

4. **Murphy, M**; Gathmann, S. R.; Getman, R.; Grabow, L.; Abdelrahman, O. A.; Dauenhauer, P. J. Catalytic Resonance Theory: The Catalytic Mechanics of Programmable Ratchets. *Chem. Sci.* 2024, 15. <https://doi.org/10.1039/D4SC04069D>.
3. **Murphy M**, Noordhoek K, Gathmann S, Dauenhauer P, Bartel C. Catalytic Resonance Theory: Forecasting the Flow of Programmable Catalytic Loops. *ChemRxiv*. 2024; <https://doi.org/10.26434/chemrxiv-2024-n10m0>.
2. Brauer S, Mastalski I, **Murphy M**, Hoekstra B, Monson L, Dauenhauer P, et al. Reaction Kinetics of the Autocatalytic Hydrolyses of Alkyl Lactates. *ChemRxiv. Cambridge: Cambridge Open Engage*; 2023; <https://doi.org/10.26434/chemrxiv-2023-0qf21>.
1. **Murphy M**, Gathmann SR, Bartel CJ, Abdelrahman OA, Dauenhauer P. Catalytic Resonance Theory: Circumfluence of Programmable Catalytic Loops. *Journal of Catalysis*, 430, 115343. <https://doi.org/10.1016/j.jcat.2024.115343>

Research Experience

University of Minnesota—Twin Cities

Minneapolis, MN

Undergraduate Researcher, Dauenhauer Group

Aug. 2022 – May 2024

- Led a computational project researching catalytic resonance theory applied to a loop reaction.
- Successfully applied computational skills by using Julia and parallel computing resources to model the desired chemical reactions and processes.

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Teaching Experience

University of Minnesota—Twin Cities

Minneapolis, MN

Undergraduate Teaching Assistant

Aug. 2022 – Dec. 2023

- Introduction to the Science and Engineering of Materials (MATS 2001)

Undergraduate Tutor

- College of Science and Engineering Tutor, Taylor Tutoring Center
- Organic Chemistry Tutor, Organic Chemistry Connections

Jan. – May 2022

Jan. – Dec. 2021

Work Experience

ABV Technology

St. Paul, MN

Chemical Engineering Intern

May 2022 – Aug. 2022

- Calibrated and tested 10 beta-units of new analytical equipment and trained all internal employees and customers on operating the equipment.
- Led the development of sample preparation for the analytical equipment and introduced a new method of degassing that significantly decreased the CO₂ concentration in the input beverage, reducing the error in the measured results.
- Immersed myself in studying the complex thermal modeling implemented in the equipment and grew a deeper understanding of circuit boards and software engineering.

Leprino Foods Co.

Denver, CO

Chemistry Laboratory Intern

June 2021-Aug. 2021

- Fostered a clean and organized lab environment to ensure accurate and reliable results while performing quality assurance and research testing.
- Demonstrated the ability to quickly learn and follow standard operating procedures.

Leadership Experience

University of Minnesota—Twin Cities

Minneapolis, MN

American Institute of Chemical Engineers, Secretary

Aug. 2023 – May 2024

- Crafted weekly emails to inform members of upcoming events, department notices, and potential scholarship, research, and job opportunities.
- Participated in DEI initiatives within the executive team. Created monthly presentations to bring awareness for underrepresented groups and current worldwide opportunities.

Department of Chemical Engineering and Materials Science, Ambassador *Aug. 2023 – May 2024*

- Led events tailored for new and prospective students interested in pursuing a major in the department.
- Created initiative to increase community amongst undergraduate students in the department through planning new events to drive connections and engagement.