Education \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**University of Minnesota—Twin Cites** 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 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. **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>.
2. **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>.
3. 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>.
4. **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 Cites** 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.

Teaching Experience \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**University of Minnesota—Twin Cites** 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 *Jan. – May 2022*
* Organic Chemistry Tutor, Organic Chemistry Connections *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 Cites** 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.