Sara Edinger Murphy

1200 E. California Blvd., MC 170-25, Pasadena, CA 91125
(310) 945 - 6427
semurphy@caltech.edu

Education

California Institute of Technology — Pasadena, CA
Ph.D, Environmental Science and Engineering — Expected December 2023

California Institute of Technology — Pasadena, CA
M.S., Environmental Science and Engineering — June 2021

Pomona College — Claremont, CA
B.A., Chemistry (Minor in Linguistics) - *Cum Laude* — May 2018

Research Experience

Doctoral Student Researcher, Caltech — Septemeber 2018 - present
Thesis advisor: Prof. Paul O. Wennberg

Thesis title: *Elucidating the Products and Kinetics of Bimolecular Alkene-Derived Peroxy Radical Reactions*

Undergraduate Researcher, Pomona College — June 2017 - May 2018
Research advisor: Prof. Fred J. Grieman

Thesis title: *Laboratory Studies of the Rates of Chlorine Radical Reactions with Acetaldehyde and Methanol*

Visiting Student Researcher, Jet Propulsion Laboratory — June 2017 - May 2018
Research advisors: Prof. Fred J. Grieman and Dr. Stan Sander

Topic: Measuring the rates of tropospheric radical-radical reactions

Teaching and Mentoring

Caltech Undergraduate Research Programs · *Mentor* — September 2020 - June 2022

- Designed research projects for undergraduates.
- Trained students to operate laboratory instruments.
- Trained students in skills essential for experimental atmospheric chemistry, including designing and executing experiments, data analysis, and literature searches.
- Organized opportunities for students to present their work and contributions to the research group and to the wider Caltech community.

Earth's Climate (ESE 1) · *Teaching Assistant* — Spring 2023

- Ran a weekly 1-hour recitation section for nine undergraduate students to review core course content.
- Graded student problem sets and provided feedback on student projects.
- Ran office hours to help students with problem sets and answer student questions about course material.

Quantum Chemistry (Ch 21a) · *Teaching Assistant* — Fall 2022

- Ran office hours to assist students with problem sets and to answer student questions about course content.

· Graded student problem sets and exams.

Earth's Biogeochemical Cycles (ESE 103) · *Teaching Assistant* Winter 2021 & 2022

· Designed, organized, and executed Matlab workshops for undegraduate and graduate students to prepare for the course.

· Developed answer keys for problem sets.

· Assisted the instructor in the design of problem sets.

· Conducted recitation sessions to answer student questions and review key topics.

Atmospheric Chemistry (ESE 171) · *Teaching Assistant* Spring 2020

· Transitioned the course, alongside the instructor, to remote instruction in the midst of the COVID-19 pandemic.

· Organized and presented recitation sections covering and reviewing key concepts, and answered student questions about course content.

· Wrote keys for problem sets, assisted in problem set design, and graded problem sets and course assessments.

Physical Chemistry (Chem 158A PO) · *Teaching Assistant* Fall 2017

· Ran office hours twice a week to answer student questions and facilitated review sessions to reinforce key concetps.

· Graded student problem sets.

General Chemistry (Chem 001 PO) · *Teaching and Laboratory Assistant* Fall 2015 & Spring 2017

· TA for General Chemistry course specifically designed to promote more underrepresented students in Chemistry.

· Ran twice weekly mentor sessions, answered student questions, reviewed key concepts, and ran problem sessions.

· Graded student problem sets and lab reports.

· Set up labs, assisted students during the lab period, and answered student questions about lab write-ups.

Honors, Awards, and Grants

Linde Laboratory Award for Community Building 2022
Received for excellence in service to the department and excellence in mentorship.

Rose Hills Foundation Graduate Fellowship 2018 - 2019

Richard Jahns Teaching Prize - *Nominated* 2021
Nominated by students for excellence in teaching during the pandemic

Donald A. Strauss Fellow 2017 - 2018
Received a grant for $10,000 to start and run a sustainable music program for underrepresented and low income elementary and middle school students in the city of Pomona at the dA Center for the Arts.

Davis Projects for Peace Fellow 2016 - 2017
Received a grant for $10,000 to run a summer music camp for low income elementary and middle school students in the city of Pomona.

Publications

· **Sara E. Murphy**, John D. Crounse, Kristian H. Møller, Samir P. Rezgui, Nicholas J. Hafeman, James Park, Henrik J. Kjaergaard, Brian M. Stoltz, and Paul O. Wennberg. (2023). Accretion Product Formation in the Self-Reaction of Ethene-Derived Hydroxy Peroxy Radicals, *RSC Environmental Sciences - Atmospheres*

· Paul Van Rooy, Afsara Tasnia, Barbara Barletta, Reina Buenconsejo, John D. Crounse, Christopher M. Kenseth, Simone Meinardi, **Sara Murphy**, Harrison Parker, Benjamin Schulze, John H. Seinfeld, Paul O. Wennberg, Donald R. Blake, and Kelley C. Barsanti. (2021). Observations of Volatile Organic Compounds in the Los Angeles Basin during COVID-19, *ACS Earth and Space Chemistry*.

Presentations

· Caltech Environmental Science and Engineering Seminar, Pasadena, CA. *Formation of Accretion Products from Peroxy Radical Self-Reactions*. May 2020. Talk.

· Caltech Science and Society Seminar, Pasadena, CA. *Exploring alkene-derived peroxy radical chemistry in the lab and in the field*. October 2021. Talk.

· Atmospheric Chemical Mechanisms Conference, Davis, CA. *Formation of Accretion Products from Ethene-Derived Peroxy Radical Self-Reactions*. December 2022. Talk.

Field Campaigns

Re-Evaluating the Chemistry of Air Pollutants in California (RECAP-CA) June - September 2021
Deployed the Caltech GC-HRToF-CIMS, in conjunction with other instruments from Caltech and NOAA, to study changes in summer air quality in Los Angeles, specifically measuring hydroperoxides and nitrates.

Los Angeles Air Quality Campaign (LAAQC) June - September 2020
Deployed the Caltech GC-HRToF-CIMS, in conjunction with other instruments from Caltech and UC Riverside to observe changes in LA air quality during the pandemic.

Outreach and Community Engagement

Visiting Scientists January 2022 - September 2022
Visit three Madison Elementary School 5th Grade classrooms for three hours each week to lead science lessons and hands-on activities for students.

Stars High School January 2021
Designed and presented interactive, three-lesson course for high school students about the intersections of science and social justice.

Women in STEM Program August 2022
Ran lab tours for high school women interested in pursuing STEM in college.

Draper Center for Community Partnerships September 2015 - May 2018
Coordinated and led programs that promoted community outreach, including the Alternative Spring Break Program and the Next Level Program, a program designed to promote college access for local high school students in the city of Pomona.

Musician in Residence, dA Center for the Arts May 2016 - May 2018
Coordinated and taught music programs aimed at low income youth at the dA Center of the Arts in the city of Pomona.

Other Community Involvement, Employment, and Service

· Website Coordinator for Wennberg Group June 2021 - Present
· Caltech Orchestra Violinist September 2018 - Present
· DEI Meeting Coordinator for Wennberg Group June 2020 - Present
· Violin Teacher 2014 - Present

Additional Skills

- Extensive experience with the following instrumentation: Gas Chromatography, Chemical Ionization High Resolution Mass Spectrometry, Infrared Kinetic Spectroscopy, Excimer Lasers, UV/VIS Spectrometry, Liquid Chromatography Mass Spectrometry
- Fixing and building instrumentation, including: soldering, designing and building circuits, editing and preparing instrument software, plumbing, leak checking
- Coding: Fluent in Matlab, Proficient in Python, Latex, and C++
- Grant Writing
- Organizing and leading meetings and programs