Sara Edinger Murphy

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Education

California Institute of Technology — Pasadena, CA
Ph.D, Environmental Science and Engineering — Expected May 2024

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.

Occidental College · *Adjunct Professor* — Fall 2023 - Present

- Physical Chemistry II (CHEM 305)
- Foundations of General Chemistry Laboratory (CHEM 120L)

California Institute of Technology · *Teaching Assistant* — Spring 2020 - Spring 2023

- Earth's Climate (ESE 1)
- Quantum Chemistry (Ch 21a)
- Earth's Biogeochemical Cycles (ESE 103)
- Atmospheric Chemistry (ESE 171)

Pomona College · *Teaching and Laboratory Assistant* Fall 2015 - Spring 2017

- · Physical Chemistry (Chem 158A PO)
- · General Chemistry (Chem 001 PO)
- · General Chemistry Laboratory (Chem 001L PO)

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*.

Submitted Publications

- · Lilian A. Dove, Clare E. Singer, **Sara E. Murphy**. Ten Steps to Make Qualifying Examinations in Geoscience Graduate Programs More Equitable. Submitted to *AGU Advances*.

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.
- · Atmospheric Chemistry Gordon Research Conference, Newry, ME. *Identification and Quantification of Alkyl Nitrates in the Los Angeles Urban Atmosphere*. August 2023. Poster.

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
- Violin Teacher 2014 - Present

Additional Skills

- 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, FTIR
- 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