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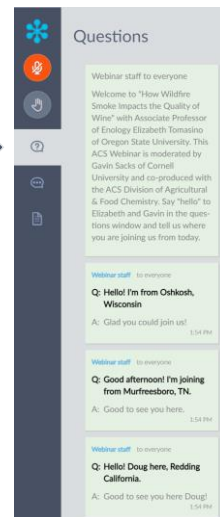


**Questions or Comments?**

Type them into the questions box!



**"Why am I muted?"**  
Don't worry. Everyone is muted except the Presenter and the Host. Thank you and enjoy the show.



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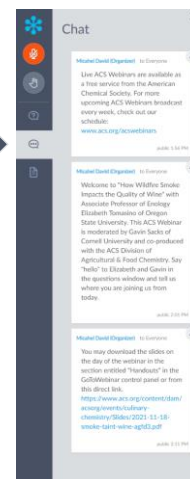
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Announcements and hyperlinks from our team



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## A Career Planning Tool For Chemical Scientists



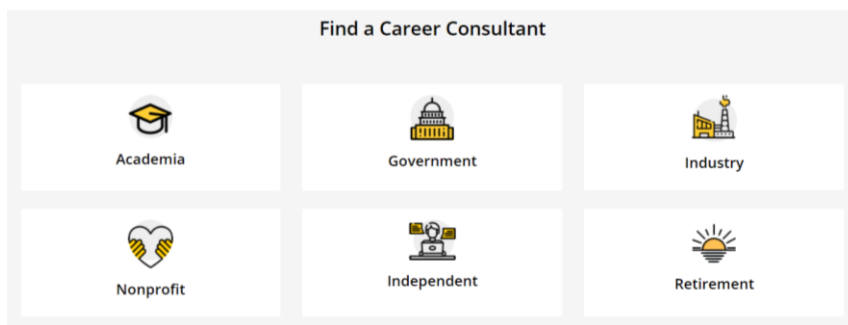
**ChemIDP** is an Individual Development Plan designed specifically for graduate students and postdoctoral scholars in the chemical sciences. Through immersive, self-paced activities, users explore potential careers, determine specific skills needed for success, and develop plans to achieve professional goals. **ChemIDP** tracks user progress and input, providing tips and strategies to complete goals and guide career exploration.

<https://chemidp.acs.org>

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## Career Consultant Directory



- ACS Member-exclusive program that allows you to arrange a one-on-one appointment with a certified ACS Career Consultant.
- Consultants provide personalized career advice to ACS Members.
- Browse our Career Consultant roster and request your one-on-one appointment today!

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## ACS Bridge Program



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Email us at [bridge@acs.org](mailto:bridge@acs.org)

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[www.acsprf.org](http://www.acsprf.org)



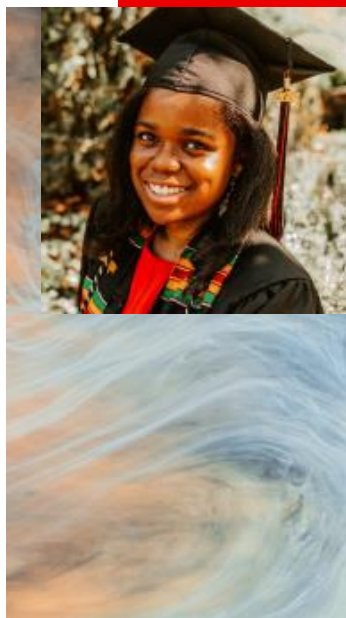
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## ACS Scholar Adunoluwa Obisesan

BS, Massachusetts Institute of Technology, June 2021  
(Chemical-biological Engineering, Computer Science & Molecular Biology)

*"The ACS Scholars Program provided me with monetary support as well as a valuable network of peers and mentors who have transformed my life and will help me in my future endeavors. The program enabled me to achieve more than I could have ever dreamed. Thank you so much!"*

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## ACS OFFICE OF DEIR

Advancing ACS' Core Value of Diversity, Equity, Inclusion and Respect



### Resources

<p><b>Inclusivity Style Guide</b></p> <p>Designed to help staff and members use language and images that respect diversity in all its forms.</p> <p>→</p>	<p><b>ACS Webinars on Diversity</b></p> <p>Covering diversity and inclusion at the workplace</p> <p>→</p>
<p><b>ACS Publications DEIR Hub</b></p> <p>See what ACS Publications is doing for fostering inclusivity in scholarly publishing</p> <p>→</p>	<p><b>ACS Volunteer and ACS Meetings Code of Conduct</b></p> <p>Fostering a positive and welcoming environment for attendees, volunteers and staff.</p> <p>→</p>
<p><b>C&amp;EN Trailblazers</b></p> <p>C&amp;EN highlights scientists from different backgrounds who are making an impact in chemistry.</p> <p>→</p>	<p><b>NEW! Download DEIR Educational Resources</b></p> <p>Download this educational guide for additional recommendations on videos, articles, books, podcasts, and more on diversity, inclusion, and related topics.</p> <p>→</p>
<p><b>Quick Guide: Inclusion Moments</b></p> <p>Learn more about what Inclusion Moments are and see ideas to host them during your meetings.</p> <p>→</p>	<p><b>Quick Guide: How to host inclusive in-person events</b></p> <p>Recommendations and best practices to ensure that your events can accommodate everyone.</p> <p>→</p>

### Diversity, Equity, Inclusion, and Respect

\*\*Adapted from definitions from the Ford Foundation Center for Social Justice:

#### Equity\*\*

Seeks to ensure fair treatment, equality of opportunity, and fairness in access to information and resources for all. We believe this is only possible in an environment built on respect and dignity. Equity requires the identification and elimination of barriers that have prevented the full participation of some groups.

#### Diversity\*\*

The representation of varied identities and differences (race, ethnicity, gender, disability, sexual orientation, gender identity, national origin, tribe, caste, socio-economic status, thinking, and communication styles, etc.) collectively and as individuals. ACS seeks to proactively engage, understand, and draw on a variety of perspectives.

#### Inclusion\*\*

Builds a culture of belonging by actively inviting the contribution and participation of all people. Every person's voice adds value, and ACS strives to create balance in the face of power differences. In addition, no one person can or should be called upon to represent an entire community.

#### Respect

Ensures that each person is treated with professionalism, integrity, and ethics underpinning all interpersonal interactions.

<https://www.acs.org/diversity>

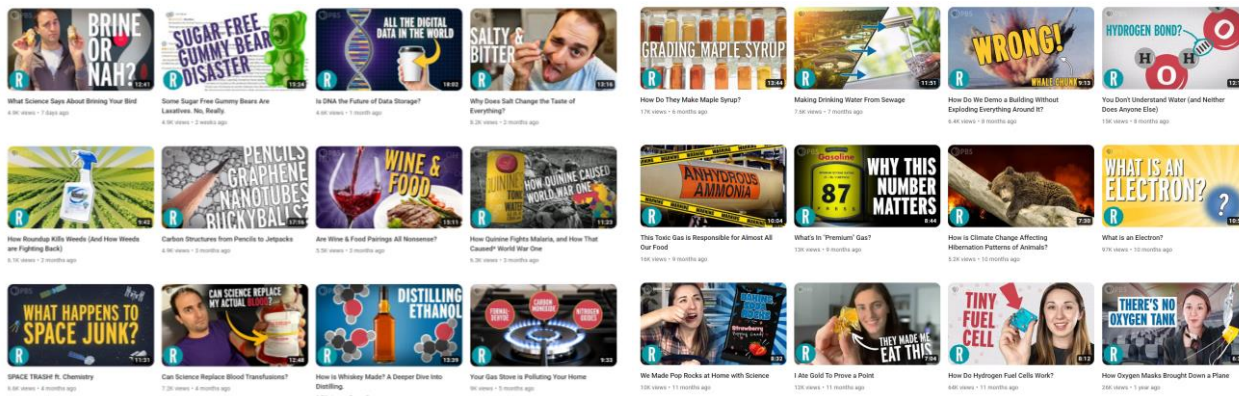
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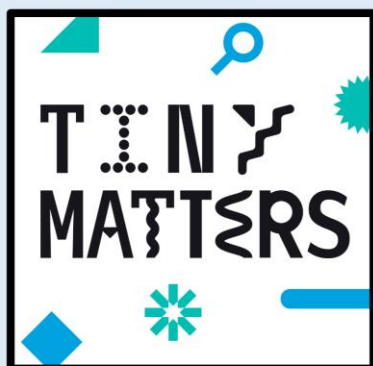
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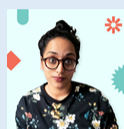
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## c&en's STEREO CHEMISTRY



**Bonus Episode**  
Carolyn Bertozzi and K. Barry Sharpless chat about sharing the 2022 Nobel Prize in Chemistry  
December 6, 2022



**Bonus Episode**  
Bioorthogonal, click chemistry clinch the Nobel Prize  
October 5, 2022



**Episode #40**  
Lithium mining's water use sparks bitter conflicts and novel chemistry  
September 13, 2022



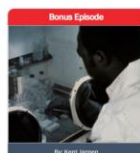
**Bonus Episode**  
Happy 100th birthday, John Goodenough! Stereo Chemistry revisits a fan-favorite interview with the renowned scientist  
July 25, 2022



**Bonus Episode**  
Jess Wade on Wikipedia and work-life balance  
June 21, 2022



**Bonus Episode**  
The sticky science of why we eat so much sugar  
May 31, 2022



**Bonus Episode**  
There's more to James Harris's story  
April 27, 2022



**Bonus Episode**  
The helium shortage that wasn't supposed to be  
March 24, 2022

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## ACS Industry Member Programs

- **ACS Industry Matters**

ACS member only content with exclusive insights from industry leaders to help you succeed in your career. #ACSIndustryMatters

Preview Content: [acs.org/indnl](https://acs.org/indnl)

- **ACS Innovation Hub LinkedIn Group**

Connect, collaborate and stay informed about the trends leading chemical innovation.

Join: [bit.ly/ACSinnovationhub](https://bit.ly/ACSinnovationhub)

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**ACS on Campus** is the American Chemical Society's initiative dedicated to helping students advance their education and careers.



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[acsoncampus.acs.org](https://acsoncampus.acs.org)

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## ACS Career Resources



### Virtual Office Hours



<https://www.acs.org/careerconsulting.html>

### Personal Career Consultations

**Jim Tung**  
Marketing  
Lucas Laboratories  
B.S., Biochemistry, University of Oregon  
Ph.D., Organic Chemistry, University of Notre Dame

Jim Tung works at Lucas Laboratories in Portland, OR, currently as a business development manager. He has been with Lucas for 10 years, working on developing new chemical manufacturing projects. Before that, he was a senior research chemist at Oblet Research in Champaign, IL, performing kilo-scale organic chemistry.

An Oregon native, Jim got his B.S. in biochemistry from the University of Oregon, his Ph.D. in organic chemistry from the University of Notre Dame, with postdoctoral experience at Pfizer's laboratories in La Jolla, CA. He is past chair of the Portland Section of the American Chemical Society and was 2019 general co-chair of NORM 2019. He has interests in process chemistry, labor economics, social media outreach and encouraging career exploration and development for younger chemists.

Ask me about:  
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Applying for academic jobs  
Getting your first job

Contact with Jim

<https://www.acs.org/careerconsulting.html>

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## FALL 2023

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AUGUST 13-17 | San Francisco, CA | Hybrid

<https://www.acs.org/meetings/acs-meetings/fall-2023.html>

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## WORKSHOP: RAMP IN THE RESEARCH LAB

Wednesday, August 2, 2023 | 2:00 PM – 5:00 PM EDT



Register by Friday, July 21, 2023!



[tinyurl.com/RAMP-workshop-Aug23](https://tinyurl.com/RAMP-workshop-Aug23)



Learn the principles of the **RAMP** paradigm through a series of case studies and discussion sessions focused on practicing each of the **RAMP** steps. Near the end, participants will apply a risk assessment guide to an experimental procedure to help build confidence in doing risk assessments in research labs.

### WORKSHOP GOALS ARE TO:

- Educate participants about the value and principles of RAMP risk assessment.
- Guide participants through breakout sessions to practice RAMP steps with case studies and to practice a full risk assessment.
- Supply participants with the knowledge and resources to incorporate risk assessment into their research lab.

*This 3-hour virtual workshop, led by grad student researchers with significant lab safety experience, is primarily directed at frontline researchers at academic institutions: Graduate students, Postdoctoral scholars, Undergraduate students, Faculty and safety staff are also welcome to participate.*

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Wednesday, July 12, 2023 | 2-3pm ET

### Chemistry and the Economy: 2023 Mid-Year Review

Co-produced with ACS Industry Member Programs  
and ACS BMGT



Thursday, July 13, 2023 | 2-3pm ET

### How Student Feedback Can Help Us Teach Better

Co-produced with ACS Education and the Society  
Committee on Education



Thursday, July 27, 2023 | 2-3pm ET

### The Art of Securing Research Funding: Crafting Effective Grant Proposals

Co-produced with ACS Office of Research Grants and the  
ACS Petroleum Research Fund

Register for Free

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WILL BEGIN SHORTLY...

👋 Say hello in the  
questions window!

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## Help! What Industrial Hygienists Can Do For Chemists



MAHDI FAHIM, MS

Director of Research Operations  
and EHS, Joint School of  
Nanoscience and Nanoengineering



JENNIFER MATTLER GUZMAN, MS, CIH

Industrial Hygienist and  
Chemical Hygiene Officer,  
Stanford University



ROBIN M. IZZO, MS

Assistant Vice President, Environmental  
Health and Safety, Princeton University  
and Chair-Elect, ACS CHAS

*This ACS Webinar<sup>®</sup> is co-produced with ACS Division of Chemical Health & Safety and the Committee on Chemical Safety.*

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# ACS Webinar

## Help!

### What Industrial Hygienists Can Do for Chemists?

July 6, 2023

Mahdi Fahim

Director of Research Operations and EHS - JSNN

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## Joint School of Nanoscience and Nanoengineering (JSNN)

- JSNN is an academic collaboration between [North Carolina Agricultural and Technical State University \(NC A&T\)](#) and [The University of North Carolina at Greensboro \(UNC Greensboro\)](#)
- Offers four different degree programs:
  - [Master of Science \(M.S.\) in Nanoscience](#)
  - [Ph.D. in Nanoscience](#)
  - [M.S. in Nanoengineering](#)
  - [Ph.D. in Nanoengineering](#)
- Also offers nine [Graduate Certificates Programs](#)
- Research focus areas include:
  - **SYNTHETIC BIOLOGY**
  - **NANOMATERIALS: MOLECULAR STRUCTURES AND DEVICES**
  - **COMPUTATIONAL NANOTECHNOLOGY**
  - **ENVIRONMENTAL SCIENCE AND SUSTAINABILITY**



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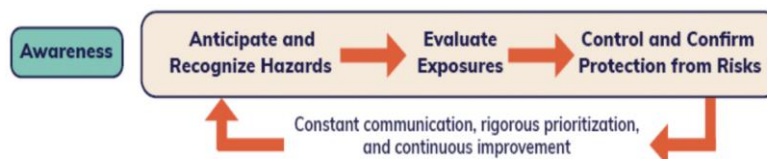
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# What is Industrial Hygiene ?

(Occupational and Environmental Health and Safety Professional)

## ➤ AIHA (American Industrial Hygienist Association):

"...The Occupational, Environmental, or Industrial Hygiene Professions (generally known as OEHS) are defined as the art and science dedicated to the **Anticipation, Recognition, Evaluation, Control, and Confirmation of protection** from those environmental stressors in, or arising from, the workplace that may result in injury, illness, impairment, or affect the well-being of workers and members of the community. These stressors are varied and include **biological, chemical, physical, ergonomic, and psycho-social factors**"



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# Safety VS. Compliance

- IH specialists support research and development from both compliance and safety perspectives:
  - **Federal and State regulatory agencies compliance**
    - OSHA, EPA, DEA, DHS, CDC, IACUC, NRC, etc.
      - Lab safety, HAZCOM, regulated chemicals, controlled substances, Biological safety, animal care,
    - Guidelines, codes, and standards
      - NFPA, ACGIH, NIOSH, AIHA, etc.
  - **Safety**
    - Institutional safety requirements
    - Safety culture
    - Training, SOP, hazard review, inspection, test, exposure prevention, exposure assessment, fire safety, emergency response, etc.

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# Hazard Evaluation and Control

- As a chemist, you would encounter risks and hazards beyond just chemicals" Chemical
  - Biological
  - Physical
    - Noise and vibration, heat, EMF
  - Radiation
    - Ionizing (generating devices and material)
    - Non-ionizing (laser, EMF, UV, IR, etc.)
  - Ergonomic
  - Electrical
  - Psychological
    - Work stress
  - Safety
    - Fall, slips, machine guarding, etc.



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# Hazard VS. Risk

- Hazard is based on the nature/type of a material or procedure (**What**)
  - **Potential to cause harm**
  - Identifiable through available tools (e.g., SDS)
- Risk is based on the material use/application (**How**)
  - **Probability for hazard to cause harm**
  - Not given, must be calculated
  - Is a moving target, as a process is modified
    - Temperature, concentration, volume, etc.



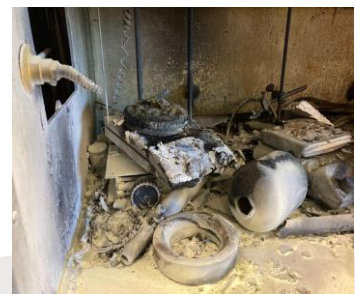
		Impact				
		Negligible	Minor	Moderate	Significant	Severe
Likelihood	Very Likely	Low Med	Medium	Med Hi	High	High
	Likely	Low	Low Med	Medium	Med Hi	High
	Possible	Low	Low Med	Medium	Med Hi	Med Hi
	Unlikely	Low	Low Med	Low Med	Medium	Med Hi
	Very Unlikely	Low	Low	Low Med	Medium	Medium

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# Chemical Hazards

- **Health Hazards**
  - Negative impact on human body/health upon exposure
  - Chemical gets on/in body
    - Toxic, corrosive, mutagen, teratogen, sensitizer, etc.
- **Physical hazard**
  - Fire and explosion
    - Chemical reactions
    - Unstable chemicals



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# IH and Chemical Exposure Prevention

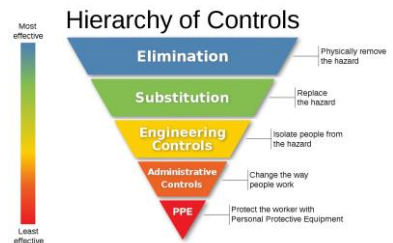
## ➤ Exposure assessment

- Quantitate assessment tools and **instruments**
- Qualitative assessments
- Exposure has already happened



## ➤ Exposure prevention

- Based on the hierarchy of control
- Inhalation, skin absorption, injection, ingestion
- Also includes mitigation (e.g., PPE)
- **Many occupational diseases have no cure, prevention is the only option**



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# Engineering Control - Why is it So Important?

## ➤ EPA

- There are over **80,000** chemicals listed under EPA TSCA (Toxic Substances Control Act)

## ➤ W.H.O.

- "More than 160 million chemicals are known to humans"
- "About 40,000–60,000 of them can be found in commerce"

## ➤ Among thousands of existing chemicals, less than **700** have an established permissible exposure limit (PEL)

## ➤ Less information is available about

- Synergistic effects upon exposure
- Engineered nanomaterials

"OSHA recognizes that many of its permissible exposure limits (PELs) are outdated and inadequate for ensuring protection of worker health. Most of OSHA's PELs were issued shortly after adoption of the Occupational Safety and Health (OSH) Act in 1970 and have not been updated since that time ..."

<https://www.osha.gov/annotated-pels>

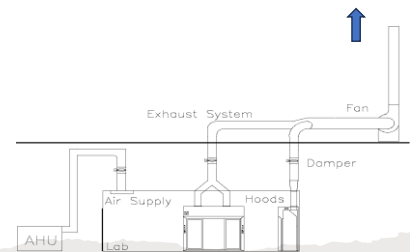
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## Engineering Control - Local Exhaust Ventilation

- Fume hoods in laboratories are the most important engineering controls available for exposure minimization/prevention
- If properly **designed, selected, installed, used, and maintained**
  - Can almost eliminate exposure to chemicals
- Expected protection is achieved through a "local exhaust ventilation management program:
  - Designers
  - Installers
  - IH
  - Users
  - Facilities/maintenance



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## IH and Local Exhaust Ventilation (Design)

- Early involvement of the IH specialist in design review is crucial
- Examples:
  - System selection
    - **VAV vs. CAV**
    - Air changes per hour (ACS)
  - **Lab layout**
    - Fume hood location (high traffic areas and cross drafts)
    - Supply and exhaust diffuser locations
  - Code compliance
  - Diversity (design for less than 100% use)
  - System layout
    - **Re-entrainment**

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## IH and Local Exhaust Ventilation (Design- Lab Layout)

- Improper fume hood location can compromise hood safety/containment
  - Cross drafts from doors, traffic/walk by
  - Supply diffuser
    - High velocity
    - Too close to hood

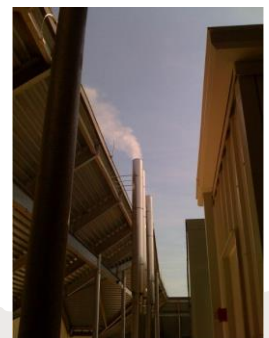


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## IH and Local Exhaust Ventilation (Design- Re-entrainment)

- Return of fume hood exhaust back into the building through building air intake
  - Inadequate stack height or exhaust air velocity
  - Vicinity of the exhaust stack to building intake
  - Requires proper design and tests for verification



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## IH and Local Exhaust Ventilation (System and Equipment Selection)

- Devices must be selected based on the
  - Hazard evaluation / management of change
  - User's need and input
    - Perchloric acid hood
    - Acid digestion hood
    - Recirculating (ductless hood)
    - High efficiency/low flow hood
    - Size, depth, material, etc.



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## IH and Local Exhaust Ventilation (Installation)

- Performing testes and inspections to verify proper function
  - As installed and as used tests
    - ASHRAE 110 test (American Society of Heating, Refrigerating, and Air-Conditioning Engineers)
      - Uses a tracer gas test
      - Evaluates fume hood, lab environment, and exhaust system controls
  - Routine face velocity tests



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## Audience Survey Question

ANSWER THE QUESTION ON BLUE SCREEN IN ONE MOMENT



### Which of the followings explains the fume hood test program in your workplace?

- A routine test is performed, and users are aware of the results
- A routine test is performed, but results are not communicated
- I'm not aware of any routine tests being performed
- We do not have any fume hoods

*\* If your answer differs greatly from the choices above tell us in the chat!*

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## IH and Local Exhaust Ventilation (User Training)

User's education and training is a critical element in program success

- Differences between fume hoods and other local exhaust devices
- Understanding their basic functions
- Limitations
- Proper use
- Reporting malfunction
- Emergencies
- Communication/trust
- Fume hood alarm set points and function




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## IH and Local Exhaust Ventilation (User Training)

- Differences between VAV (variable air volume) and CAV (constant air volume) hoods/systems

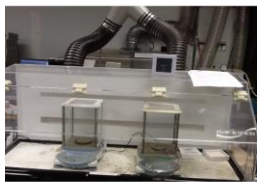
CAV vs. VAV	
CAV	VAV
• SASH ↓	• SASH ↓
• Velocity (fpm) ↑	• Velocity (fpm) constant
• Flow (ft <sup>3</sup> ) constant	• Flow (ft <sup>3</sup> ) ↓
No energy saving by sash adjustment	Saving energy by closing the sash 

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## IH and Local Exhaust Ventilation (User Training)

- Understanding other exhaust devices
  - Gas cabinets, snorkels, wet benches, laminar flow hoods, glove boxes, balance enclosures, **laser cutters etc.**
    - Differences
    - Applications
    - Limitations



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## IH and Local Exhaust Ventilation (User Training)

- Night set back
- Zone presence (motion) sensors
- Automatic sash closures
- Light sensors, etc.



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## IH and Local Exhaust Ventilation (User's Role)



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## IH and Local Exhaust Ventilation (User's Role)



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## IH and Local Exhaust Ventilation (Maintenance)

- The last piece of the Exhaust Ventilation Management team
- Joint training with IH
- Preventive maintenance
- Inspections
- Responds to reported deficiencies/work orders
- Manages/approves modifications
- Communication/tag out procedure



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## IH and Local Exhaust Ventilation (Maintenance – Tag Out /Communication)

- The last piece of the Exhaust Ventilation Management team
- Joint training with IH
- Preventive maintenance
- Inspections
- Responds to reported deficiencies/work orders
- Manages/approves modifications

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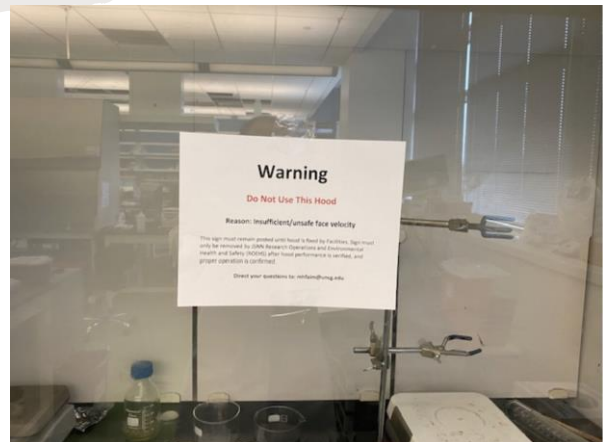
## IH and Local Exhaust Ventilation (Maintenance – Tag Out /Communication)

*CBC News, Canada: May 14, 2009*

"... a technician at a pharmaceutical plant was exposed to a toxic chemical while working in a lab without proper ventilation before he died.

... A quality-control technician, died in hospital on Oct. 8, about 18 hours after working with trimethylsilyldiazomomethane at the Sepracor Canada Ltd. laboratory in Windsor.

.... The lab's protective fume hoods were turned off so that work could be done on the roof. Officials are trying to answer why.... was working with a life-threatening chemical without adequate ventilation.



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## Summary

- IH specialists assist chemists in identifying hazards and calculating risks associated with chemicals
- **IH Anticipation, Recognition, Evaluation, Control, and Confirmation of protection** is essential for chemical exposure prevention and assessment
- Local exhaust ventilation/fume hoods are the most important elements of exposure prevention for working with hazardous chemicals
- IH professionals lead an exhaust ventilation management program within which all stakeholders play their role in ensuring a safe, complaint, efficient, and dependable work environment

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Thanks for Your Attention  
We will answer your questions at the  
end of the next presentation

Next Presenter:  
**Jennifer Mattler Guzman, Stanford University**  
**Reproductive Health Hazards**

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# Reproductive and Developmental Health for Chemists

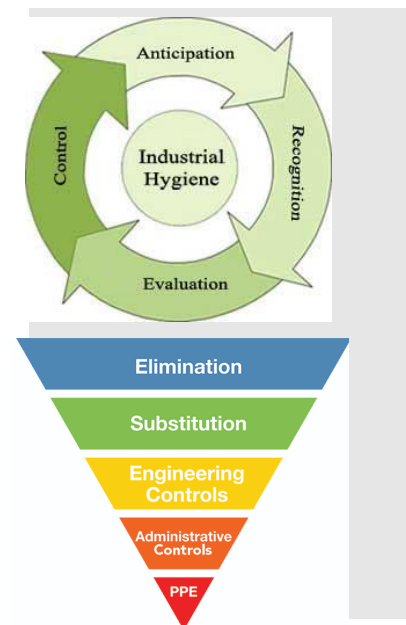
What an IH Can Do for You  
Jennifer Mattler Guzman

Stanford University

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## Industrial Hygiene Approach

- **Anticipation** – Awareness of potential hazards
- **Recognition** – Identification of hazards
- **Evaluation** – Assessment of risk and exposure
- **Control** – Reduction of risk and exposure



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## How do we work safely...with reproduction and development in mind?

Awareness  
Evaluation  
Exposure Control  
Communication

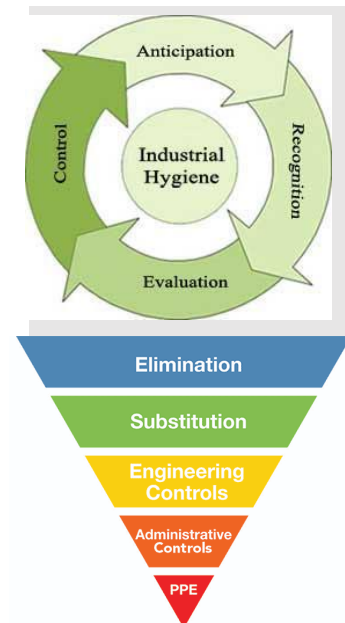


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## Industrial Hygiene Approach

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## Awareness - Identify Hazards

- Known carcinogens/reproductive hazards
  - Lead, antineoplastics, pesticides, organic solvents
- Resources
  - SDS
  - NIOSH
  - ECHA
  - ACGIH TLVs
  - ReproTox
  - MotherToBaby



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### Audience Survey Question

ANSWER THE QUESTION ON BLUE SCREEN IN ONE MOMENT



**Which of the following is NOT a known reproductive and developmental health hazard?**

- Shift work
- Ionizing radiation
- Noise < 100 dB
- Cadmium
- Cytomegalovirus (CMV)

*\* If your answer differs greatly from the choices above tell us in the chat!*

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## Awareness - Non-Chemical Hazards



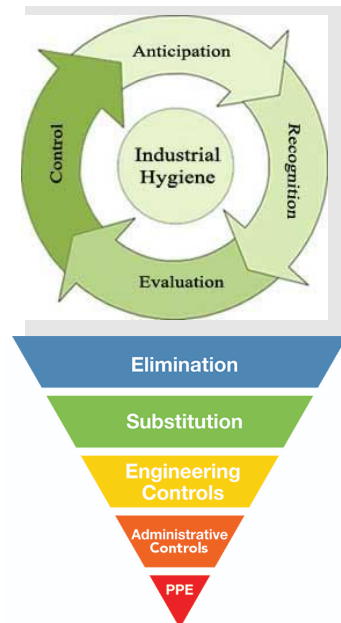
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## Industrial Hygiene Approach

- Anticipation – Awareness of potential hazards
- Recognition – Identification of hazards
- **Evaluation** – Assessment of risk and exposure
- Control – Reduction of risk and exposure



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## Evaluation

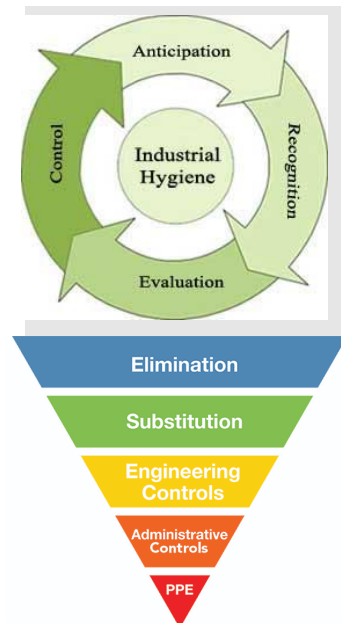
- Quantity
- Frequency
- Duration
- Existing safety controls
- Air monitoring

$$\text{Hazard} \times \text{Exposure} = \text{Risk}$$



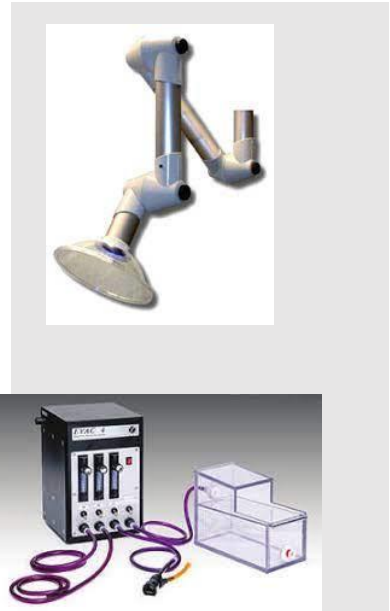
## Industrial Hygiene Approach

- Anticipation – Awareness of potential hazards
- Recognition – Identification of hazards
- Evaluation – Assessment of risk and exposure
- **Control** – Reduction of risk and exposure



## Exposure Control - Ventilation

- Fume hood use and effectiveness
- Other ventilation controls
  - Snorkels
  - Specialized equipment



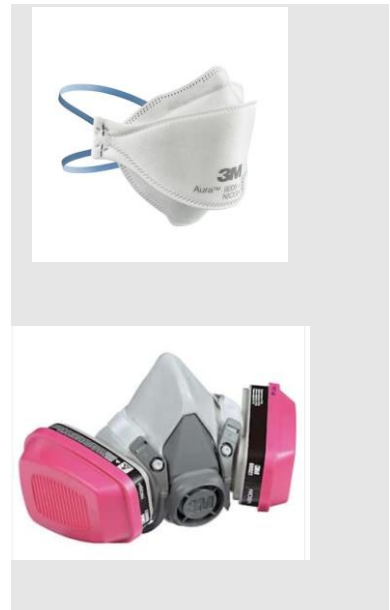
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## Exposure Control - PPE

- Gloves
- Lab coat
- Respirators
  - Type of respirator for the hazards/exposure level
  - Cartridge selection



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## Communication

- Professional expertise
- Report to supervisor, physician.  
Collaborative decision making
  - Physician accommodation letter
  - Pregnant Workers Fairness Act, 2023
- Peace of mind



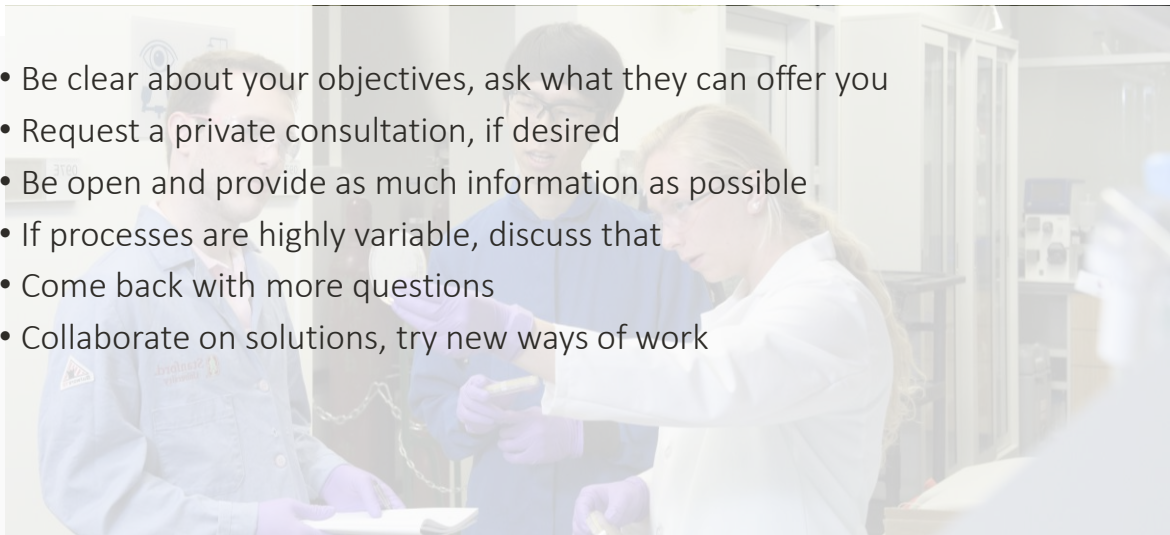
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## How Best to Work with an IH

- Be clear about your objectives, ask what they can offer you
- Request a private consultation, if desired
- Be open and provide as much information as possible
- If processes are highly variable, discuss that
- Come back with more questions
- Collaborate on solutions, try new ways of work



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**WORKSHOP: RAMP IN THE RESEARCH LAB**

Wednesday, August 2, 2023 | 2:00 PM – 5:00 PM EDT



Register by Friday, July 21, 2023!

[tinyurl.com/RAMP-workshop-Aug23](https://tinyurl.com/RAMP-workshop-Aug23)

Learn the principles of the **RAMP** paradigm through a series of case studies and discussion sessions focused on practicing each of the **RAMP** steps. Near the end, participants will apply a risk assessment guide to an experimental procedure to help build confidence in doing risk assessments in research labs.

**WORKSHOP GOALS ARE TO:**

- Educate participants about the value and principles of RAMP risk assessment.
- Guide participants through breakout sessions to practice RAMP steps with case studies and to practice a full risk assessment.
- Supply participants with the knowledge and resources to incorporate risk assessment into their research lab.

*This 3-hour virtual workshop, led by grad student researchers with significant lab safety experience, is primarily directed at frontline researchers at academic institutions: Graduate students, Postdoctoral scholars, Undergraduate students, Faculty and safety staff are also welcome to participate.*

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[www.acs.org/acswebinars](http://www.acs.org/acswebinars)**THE LIVE Q&A IS ABOUT TO BEGIN!**

Keep submitting your questions in the questions window!

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Wednesday, July 12, 2023 | 2-3pm ET

### Chemistry and the Economy: 2023 Mid-Year Review

Co-produced with ACS Industry Member Programs  
and ACS BMGT



Thursday, July 13, 2023 | 2-3pm ET

### How Student Feedback Can Help Us Teach Better

Co-produced with ACS Education and the Society  
Committee on Education



Thursday, July 27, 2023 | 2-3pm ET

### The Art of Securing Research Funding: Crafting Effective Grant Proposals

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ACS Petroleum Research Fund

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