

**SAFETY***matters*

# Dow-UCSB Safety Initiative

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# SAFETY*matters*

## Timeline

- December 2011: Criminal Charges Filed by LADA Against UC Regents.
- Spring 2012: UC Santa Barbara Begins Joint Safety initiative with DOW.
- July 25<sup>th</sup>, 2012: Settlement Agreement between LADA and UC Regents.

'Settlement Agreement': A legal document outlining required safety program elements along with strict timelines for achieving each element. Consists mostly of elements described in California's Title 8 CCR, with details on how to implement those elements.

## Our Safety Program

We develop the details with our priorities in mind:  
*Work safely AND efficiently*

### OSHA Regulations

Broad descriptions  
of requirements, +  
a few specified  
elements

### Intended Effect

Safe Workplace

BUT  
If we fail, we get

## OSHA's Safety Program

OSHA develops the details for us with their priorities in mind:  
*Reduce worker injury and illness.*  
THIS IS DEPT. OF CHEMISTRY'S CURRENT SITUATION.

**It Behooves Us to have a Well Designed and Well Executed Safety Program.**

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## Dow Initiative Goals vs. Settlement Agreement

	DOW	Settlement Agreement
Policy/infrastructure	Hazard Analysis	Hazard Analysis
	Enhanced/enforced PPE policy	Enhanced/enforced PPE policy
	Training	Training
	Enhanced inspections	Enhanced inspections
Culture	Near miss reporting	
	Safety moments	
	Awareness campaigns	
	Student/postdoc empowerment	

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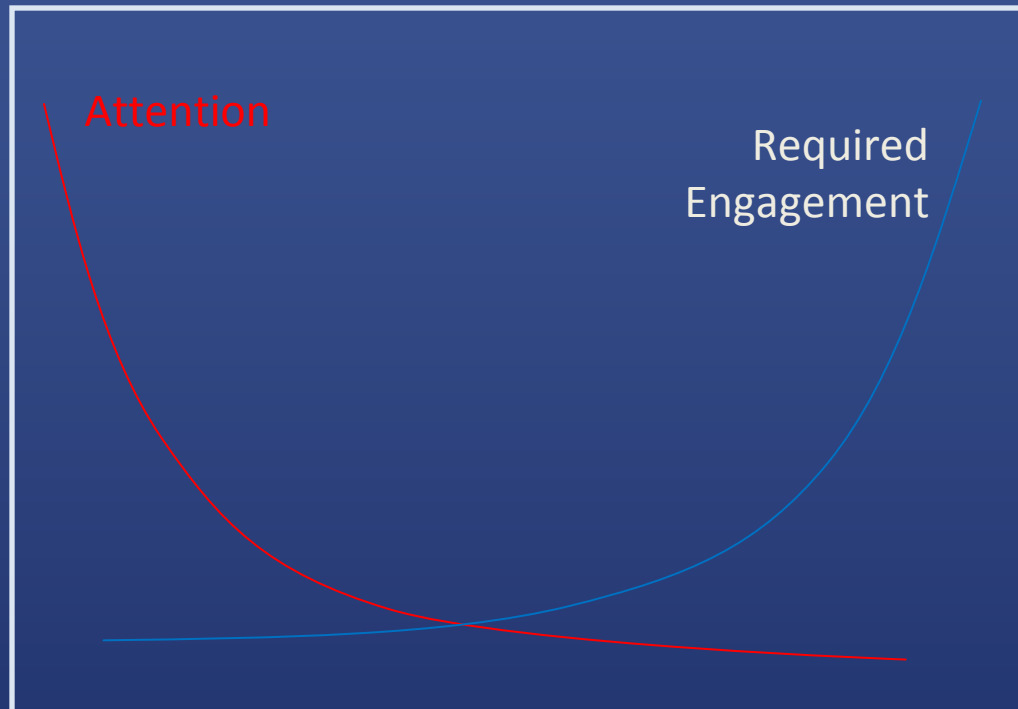
## Hazard Analysis (or: Stop and Think)

DEFINITION: The act of reducing risk in an experiment by asking yourself the following questions BEFORE beginning the work:

- What are the **hazards**?
- What is the **worst thing** that could happen?
- What can be done to **prevent** this from happening?
- What can be done to **protect** you from these hazards?
- What should be done if **something goes wrong**?

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Why is this a good idea?



# or Experience with Safety protocols / procedures →

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## Hazard Analysis Implementation at UC

- Standard Operating Procedures (SOP)
  - The most laborious facet of the settlement agreement from the researchers' perspective.
  - Thousands of chemical and process SOP were generated across the system, customized to each group's research.
  - Scale of effort unprecedented at UC ( or any academic institution?)
- Software interface tool (RADiCAL) developed in house at UC. Currently beta testing.

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## PPE and Training Policies

- Standardized PPE and training policies for all UC campuses implemented.
- Creates a consistent standard across all campuses.
- Increases documentation of training and PPE distribution.
- Shifts cost burden for PPE away from PI and to a centralized funding source.



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## Enhanced Inspections

- Working towards increasing EH&S inspections from 1X/yr to 2-4X/yr for high hazard labs (settlement agreement)
- Would like to develop internal self-inspections for departments (non-settlement agreement):
  - Past effort #1: grad student inspection crew covers all labs...FAILED
  - Past effort #2: self inspection within each group...FAILED
  - Open to suggestions.

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## Near Miss Reporting

Challenges:

- Efficient reporting protocol
- Stigma of admitting errors
- Effective distribution of lessons learned

## Near Miss Reporting Form

### Definition:

A near miss is a safety related incident that does not cause personal injury, damage to equipment or buildings, or require the discharge of a fire extinguisher. If any of the above has occurred, please report the incident at the [incident reporting section of the EH&S web site](#).

### Why document Near Misses?:

Documenting near misses provides a mechanism to get EH&S issues communicated and addressed, and, most importantly, serves as an educational tool for all of our colleagues. With the permission from the reporting individual, the incident and what we can learn from it will be compiled into a safety memo for distribution around campus. *This will help prevent others from potentially getting hurt or unintentionally causing harm to others!* The reporter's identity will remain anonymous.

Your name and contact information are not required, therefore complete anonymity is possible. If you do choose to enter your personal information, this will help us in learning the root causes of the incident and thereby increase the amount of learning achievable.

### Personal Information (optional):

Name:

Email:

Phone number:

### Incident Description:

Date:

Time:

Location:

Description of incident (please be as detailed as possible):

Reporter's opinion of the causes of the incident (both immediate and root causes):

Reporter's opinion as to what preventative measures would help prevent future incidents:

- Web-based form allows full anonymity, if desired
- We hope that over time, this feature will cease to be used.

- After analysis, an educational document is generated.
- Originally distributed as fliers and email.
- Moving to electronic distribution via building monitors.

NEAR MISS, definition: Any safety related incident that does not cause injury, property damage or the discharge of a fire extinguisher.

# SAFETY matters

## Near Miss: Quenching Sodium Hydride (NaH)

### Incident:

An old bottle of 60% Sodium Hydride in mineral oil was being quenched for disposal. The bottle was placed on the benchtop and water was added dropwise. A small flame formed and extinguished itself immediately. Enough smoke was generated to set off the fire alarm and initiate an emergency response.

### Causes:

**Root Causes:** Quenching a pyrophoric solid with water.  
Action not performed under inert atmosphere.

**Contributing Cause:** Action not performed in a fume hood.

### Corrective Actions:

#### The correct procedure for future quenching operations:

In an uncluttered hood, suspend the NaH in toluene in a nitrogen-purged round bottom flask equipped with a stir-bar. Cool in an ice-water bath and add isopropanol dropwise by syringe while stirring. When it seems that all the material is quenched, add methanol dropwise to ensure that all is quenched. Let it stir a while just to make sure. Then, add water DROPSWISE to be absolutely certain that all is reacted.

For a detailed SOP for the safe use of pyrophoric solids, click [here](#).

For a detailed SOP for the safe use of pyrophoric liquids, click [here](#).

To report a near miss, contact Alex Moretto at [moretto@chem.ucsb.edu](mailto:moretto@chem.ucsb.edu) or X4930.

All near miss informational fliers are anonymous and approved by the reporting individual.

A Safety Message from UCSB Environmental Health & Safety, and your Chemical Laboratory Safety Officer

Comments, concerns or topic ideas for future postings? Contact: [Moretto@chem.ucsb.edu](mailto:Moretto@chem.ucsb.edu)



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## Safety Moments

- 5-10 min. safety presentations at the beginning of meetings.
- Initiated by getting myself invited to group meetings to give 10 min. mini-trainings.
- Currently, about 30% of groups have self-initiated safety moments at group meetings. Working to increase.
- Ex. Topics: chemical storage, labeling, emergency response, pyrophoric handling,...

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## Awareness Campaigns

### 1. Quarterly Newsletter. Distributed via email

September 2012

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A Quarterly Laboratory Safety Newsletter for the Department of Chemistry & Biochemistry and the College of Engineering

### In the Literature:

With the help of an inexpensive iron porphyrin catalyst, chemists in Switzerland have developed a safe way to generate diazomethane, an important reagent for cyclopropanation reactions (*Science*, DOI: [10.1126/science.1218781](https://doi.org/10.1126/science.1218781)). The new user-friendly protocol provides chemists with easy access to cyclopropyl groups for pharmaceuticals and materials.



Diazomethane (CH<sub>2</sub>N<sub>2</sub>) demands special care. Not only is it explosive, but it is also highly toxic. Even less explosive analogs of the compound, such as trimethylsilyldiazomethane, have proven deadly, with two chemists succumbing to the effects of that compound in separate events in 2008.

The new protocol, developed by Erick M. Carreira and Bill Morandi of the Swiss Federal Institute of Technology, Zurich, allows for the in situ formation of diazomethane for use in cyclopropanation reactions. The risks associated with isolation of bulk quantities of diazomethane have thereby been removed.

### Quick Tips:

#### Cryogenics

- Avoid eye/skin contact.
- Use cryogenic gloves.
- Always wear appropriate eye protection.
- DO NOT store dry ice or liquid nitrogen in confined, unventilated areas such as walk-in refrigerators.
- DO NOT store dry ice or liquid nitrogen in a sealed container.
- If exposed, place affected body part in a warm water bath ( $\leq 40$  °C). Do not rub the skin.

### UCSB Safety Policy Highlight:

#### Seismic Hazard Reduction

- Anchor all furnishing and equipment over 48 inches in height.
- Store large, heavy items below head level
- Secure all compressed gas cylinders.
- Equip shelving with lips or other restraining devices.



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## Awareness campaigns

2. Top 10 Safety Expectations.  
Hard Copy posted in labs.

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#### Top 10 Laboratory Safety Expectations

1. Always wear safety glasses in the lab.
2. Evaluate hazards BEFORE beginning an experiment.
3. Label all chemicals, samples and waste properly.
4. Store chemicals properly:  
Organize by compatibility class. Flammable liquids in flammables cabinets.  
Shelves should have a lip for seismic safety.
5. Dispose of all waste appropriately. Segregate your waste.  
Keep waste containers closed when not in use.
6. Keep clutter to a minimum. No storage in fume hoods.
7. Secure all gas cylinders with approved cylinder mounts.  
Bolted to the structure. Welded link chain. No C-clamps or straps.
8. Keep your fume hood sash down when not in use.  
Do not raise the sash above the arrow when in use.
9. Know what to do in an emergency.  
Familiarize yourself with the UCSB Emergency Flipchart
10. Remove gloves when leaving the lab.





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## Awareness Campaigns

3. Stall Wall posters.  
Started as hard copy fliers for  
restroom and hallway walls.

Now transitioning to...

Stall Wall Safety Tip #1

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#### Housekeeping and Clutter in the Laboratory

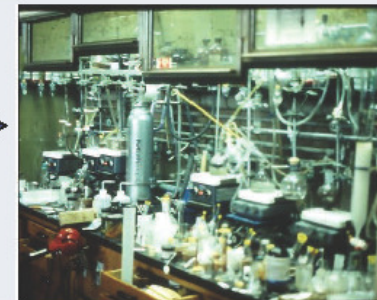


← **BE LIKE THIS**

*Uncluttered and organized.*  
Wipe down bench and hood surfaces  
regularly

**NOT LIKE THIS** →

*Fume hoods are not for storage*



*Dispose of what you don't need promptly. Label and store what you do need appropriately.*

- Keep chemicals stored in the appropriate storage areas, not in your fume hood.
- Keep your bench and your fume hood as clear as possible.
- Cap and label all containers. It is good practice, and it is the law!
- Keep waste containers closed when not in use. Those fumes are toxic.
- Do not block walkways, electrical panels or emergency eyewash/showers.

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Distribution via building monitors:

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## Student/Postdoc Empowerment

- Researchers at all levels must feel empowered to question others' behavior.
- A very difficult cultural shift in academic setting.
- Our approach includes creation of graduate student safety committee.
  - Gives grad student ownership of safety.
  - Gives them the opportunity to implement safety protocols.
  - Set example for other students/postdocs.

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## Conclusion

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	Enhanced inspections	Needs work	Enhanced inspections 
	Near miss reporting		
Culture	Safety moments	Needs work	
	Awareness campaigns		
	Student/postdoc empowerment	Needs work	