

MINT Lab and Safety Orientation

MINT CHP

Chemical Hygiene Plan

- The handbook contains the MINT CHP. Please read it and once you have read it, please sign, date, and return acceptance policy.
- It illustrates some of the hazards and policies that can be experienced in MINT labs.
- Access to labs will be restricted to **ONLY AUTHORIZED USERS**.

Who's an authorized user?

Someone who (has been trained on the equipment, has registered with MINT, has an advisor who has signed the IP agreement*, and agreed to follow the lab rules and signed off on them)

**or received an exception from the director*

this is the point of the signup sheet. it will be cross-checked

email addresses:

training@mint.ua.edu

access@mint.ua.edu

info@mint.ua.edu

(lab#)@mint.ua.edu

Safety First

- see <http://bama.ua.edu/~ehs/faq.html>
- it is dangerous to work without knowing the hazards
- your primary responsibility is to work safely.
- MINT Hazards
 - **Compressed Gas** - explode
 - **Electric Shock** - it burns
 - **Cryogenics** - it also burns
 - **Chemicals** - you have no idea what we have here ...
 - **Lasers** - do you value depth perception?
 - **X-Rays** - burns, to say the least
 - **Physical Strain** - use the right tool for the job
 - **Fire** - see most items above
 - Be aware of other potential dangers. There are many.

Beware

- A compressed gas cylinder contains an extremely large amount of stored energy (tens of mega joules).
- All liquids are hazardous to the eyes (always wear safety glasses when handling liquids).
- Every wire should be handled as if there is a danger of electric shock. (yes, high I/low V too)

Make Safety Part of the Procedure

- If in doubt, ask.
 - what do you think really costs more time?
- Don't sacrifice safety for speed.
 - you will get neither
- Always follow the proper procedures.
- Use your senses to notice when something needs attention. And log it!
- Never work alone.
 - no excuses

Safety Administrators

- OSHA: Occupational Safety and Health Administration.
- EPA: Environmental Protection Agency.
- Local contacts that insure compliance:
 - MINT Facilities Manager, John Hawkins
 - Marcy Whitney, Laboratory Safety Manager, UA/EHS: 348-8435.

(pre) Crisis!!

- Where is the nearest fire extinguisher?
- Where is the nearest eye-wash station?
- Where is the nearest chemical shower?
- Where is the nearest fire alarm?
- What's the quickest way out of the building?

(pre) Crisis!!

- Where is the nearest fire extinguisher?
- Where is the nearest eye-wash station?
- Where is the nearest chemical shower?
- Where is the nearest fire alarm?
- What's the quickest way out of the building?

NO, really: someone answer now.

Crisis!!

- **Lab Matters:**

- water leaks, etc:
- find the facilities manager
- find a faculty member (names on doors)
- find a lab master

- after hours: contact campus police 8-5454.

Crisis!!

- **Building Matters:**

These problems include, plumbing problems in the bathrooms, malfunctioning A/C or heating, malfunctioning elevators, and the like

- Lawrence K. Hill 8-3262 hill7@eng.ua.edu
- Robert Fanning 8-0368 rfanning@eng.ua.edu
- after hours - campus police

Crisis!!

- **OJIs: On the Job Injuries**

Go to the University medical center during business hours if it is not serious

- it does happen.
- if Capstone is closed, or if the injury is critical, you will need to go to the emergency room at DCH. The number for the Capstone Medical Center (University Medical Center) is 8-1770.
- you have 48 hours to report the injury.

911 versus 9-911

Incoming Chemical Inventory

- When chemicals arrive in MINT, they must be placed in inventory.
- There will be a slip of paper placed on the carton.
- It is important that the information is written down and returned to me.
- It will have a unique number and a Barcode. The Barcode is to be placed on the container.
- When the contents are expended, give me the Barcode number and it will be taken off inventory.
- **PICK UP ASAP**
- **J. Hawkins handles this.**

Inventory Number _____
Chemical Name _____ Amount _____
CAS numbers _____
Your Name _____ Date _____
Chemical storage location _____
Manufacturer _____
Stock number _____
(please print out the following information, write the number on the container, and place this sheet in James Weston's Mailbox)

CAS
chemical abstracts service
n(X)-XX-X

Chemical Safety

Material Safety Data Sheet

Page 1 of 6



Item Details

Material Safety Data Sheet

acc. to OSHA and ANSI

Printing date 08/16/2002

Reviewed on 04/30/1999

<p>1 Identification of substance:</p> <p>Product details:</p> <p>Trade name: Platinum (II) 2,4-pentanedionate</p> <p>Stock number: 10526</p> <p>Manufacturer/Supplier: Alfa Aesar, A Johnson Matthey company Johnson Matthey Catalog Company, Inc. 30 Bond Street Ward Hill, MA 01835-8099 Emergency Phone: (978) 521-6300 CHEMTREC: (800) 424-9300 Web Site: www.alfa.com</p> <p>Information department: Health, Safety and Environmental Department</p> <p>Emergency information: During normal hours the Health, Safety and Environmental Department. After normal hours call Chemtrec at (800) 424-9300.</p>
<p>2 Composition/Data on components:</p> <p>Chemical characterization: Description: (CAS#) Platinum (II) 2,4-pentanedionate (CAS# 15170-57-7), 100%</p> <p>Identification number (s):</p> <p>EINECS Number: 239-223-5</p>
<p>3 Hazards identification</p> <p>Hazard description: Not applicable</p> <p>Information pertaining to particular dangers for man and environment: Not applicable</p>
<p>4 First aid measures</p> <p>After inhalation:</p>

- Substances that are present in MINT have their hazards listed in a MSDS:

MATERIALS
SAFETY
DATA
SHEET

- These are filed on the share drive by their CAS number.

www.bama.ua.edu/~ehs

Can access MSDS files at the CEMS site

<http://www.alfa.com/CGI-BIN/LANSASWEB?WEBEVENT+L055ECD45349880003C190...> 2/18/2003

The University of Alabama

Center For Materials For Information Technology
An NSF Materials Research Science and Engineering Center

What's in an MSDS?

- Sect. 1 Chemical Identification
- Sect. 2 Composition/Identification of ingredients
- Sect. 3 **Hazards Identification**
- Sect. 4 **First Aid Measures**
- Sect. 5 Fire Fighting Measures
- Sect. 6 **Accidental Release Measures**
- Sect. 7 **Handling and Storage**
- Sect. 8 **Exposure Controls/Personal Protection**
- Sect. 9 Physical and Chemical Properties
- Sect. 10 **Stability and Reactivity**
- Sect. 11 Toxicological information
- Sect. 12 Ecological Information
- Sect. 13 Disposal Considerations
- Sect. 14 Transportation Information
- Sect. 15 Regulatory Information
- Sect. 16 Other Information

Chemical labeling

- Contains X, Y, Z
- YOUR NAME
- DATE



- When you leave your “waste stream” will have to be disposed of.
- KNOWNNS can be easily disposed of
- UNKNOWNNS are difficult to dispose of (\$, time)

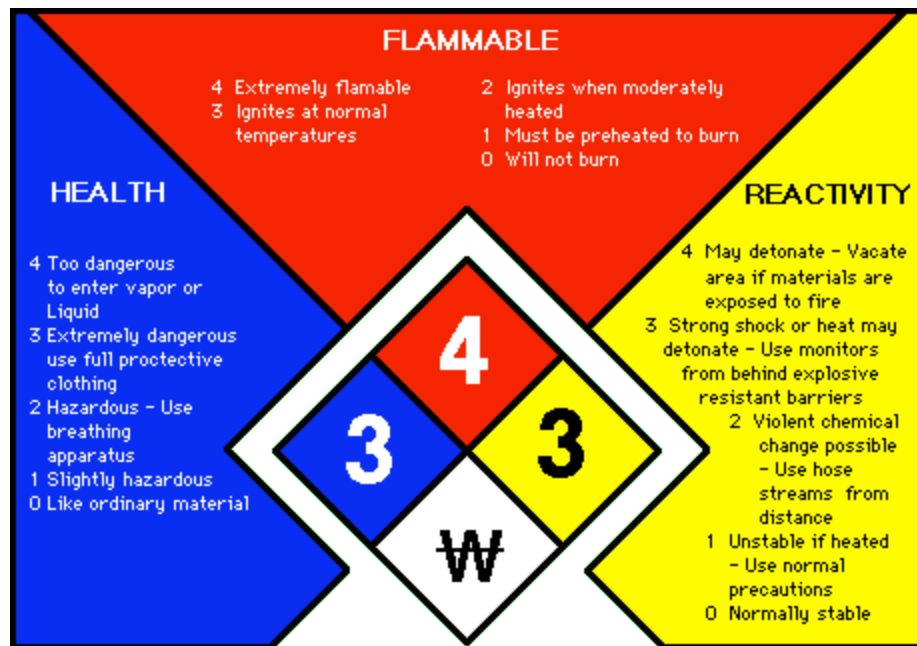
Hazards Identification

- National Fire Protection Association method of hazard identification
- 0 (no hazard) to 4 (Extremely Hazardous)

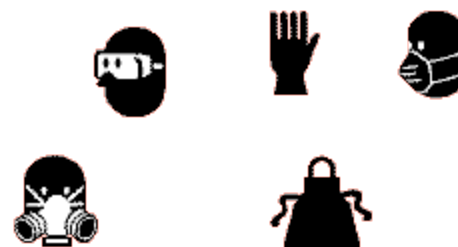
Flammable

HEALTH

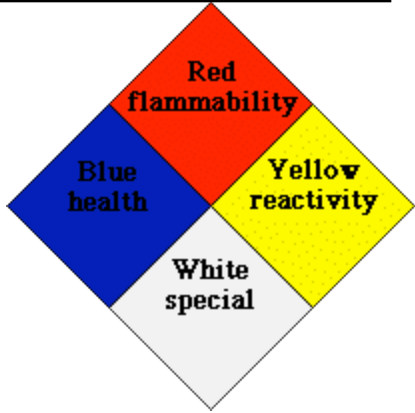
Reactivity



Personal Protective Equipment PPE (iconic)



NFPA Chemical Hazard Labels



Health (Blue)

4	Danger	May be fatal on short exposure. Specialized protective equipment required
3	Warning	Corrosive or toxic. Avoid skin contact or inhalation
2	Warning	May be harmful if inhaled or absorbed
1	Caution	May be irritating
0		No unusual hazard

Flammability (Red)

4	Danger	Flammable gas or extremely flammable liquid
3	Warning	Flammable liquid flash point below 100° F
2	Caution	Combustible liquid flash point of 100° to 200° F
1		Combustible if heated
0		Not combustible

Reactivity (Yellow)

4	Danger	Explosive material at room temperature
3	Danger	May be explosive if shocked, heated under confinement or mixed with water
2	Warning	Unstable or may react violently if mixed with water
1	Caution	May react if heated or mixed with water but not violently
0	Stable	Not reactive when mixed with water

Special Notice Key (White)

W	Water Reactive
Oxy	Oxidizing Agent

Unwanted Chemical Pickup

- For legal reasons, please do not label chemicals that you have generated as “WASTE.”
- Label them as “UNWANTED.”
- Please put an unwanted label on the container and inform me that you wish it picked up.
- Call EHS (Environmental Health and Safety) and schedule a pickup.
348-5905

UNWANTED CHEMICAL	
Contents	
_____	%
_____	%
_____	%
_____	%
Contact: John Hawkins 205-D Bevill	

Be as explicit as possible

Your Role

- Learn to perform research properly.
- Teach others.
- Keep accurate and complete records of your activities in the laboratory.
- Process results fully to understand the purpose, procedure and outcome of the experiment.
- Present and publish research results.
- Recognize new discoveries.

Procedure

- Keep a complete notebook.
- Record use of equipment in instrument logbooks.
- Notify proper personnel of broken or malfunctioning equipment.
- Return tools or equipment after use.
- Try to leave the work environment in a better condition than when you started.
- If in doubt, ask.

so who to ask?

- John Hawkins
 - lab masters ...
 - faculty member listed on the door
-
- but whatever you do, **DON'T GUESS**

Laboratory Notebook

- Record date and time at beginning of each activity.
- Record initial condition of instrument to be used (pressure, sample, initial settings, etc.).
- Record result of activity *especially when things go wrong*.
- Record filenames of all collected data **STANDARD**
- Record compositions, thicknesses and other relevant information for processed samples.
- Record instrument condition at end of the activity.
- Cross-reference this information in instrument log books.

Your logbook

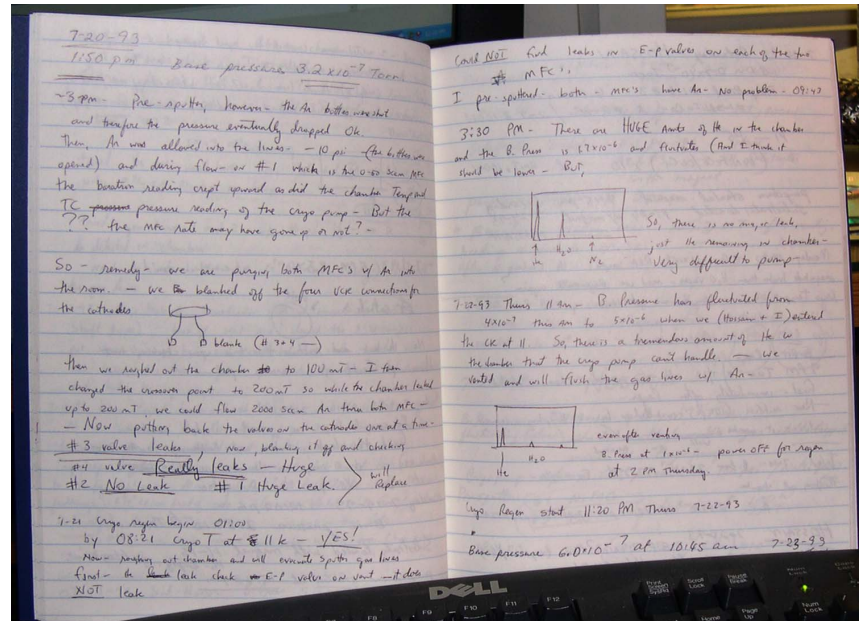
- Your logbook should be your friend, companion, confidante, etc. during your research.
- You should write down
 - procedures
 - results
 - minutes of meetings
 - suspicions or thoughts
- Entries need to include a date
 - Should be written in ink
- This is where important information is kept. It is your off-line memory.
- ELECTRONIC DATA
 - USB stick for temporary xfer ...
 - but NOT reliable long-term
 - BACKUP, redundancy



logbooks over 7 years

Machine logbooks

- MINT consists of shared equipment.
- Each major piece of equipment has a logbook.
- It is used to show who has been using the equipment, what has happened, problems that have occurred, instructions to the next user, random thoughts, the weather...*anything other users will need to know*
- Not recording this information in the logbooks is BAD and in some cases (X-ray machines) a punishable offense.
- This has been an area of embarrassingly poor performance



Diagnosis of a vacuum leak, Vac Tek system 1993

Sample Labeling

- Keep samples in properly labeled containers.
- Labeling should include:
 - Composition
 - Fabrication system
 - Date of fabrication
 - Your name
- While in use, keep samples in a safe place with contact information in clear view.
- For disposal see facilities manager for the proper procedure.

Tools

- If you borrow it, leave a note telling who, where and when. Then bring it back.
- If you use it, bring it back immediately after you are finished with it.
- If you break it, either fix it or arrange for it to be fixed.
- Admit that you broke it, there is no penalty, only analysis.
- Find out how to order replacements for missing or broken tools (and how much they cost!)
- Leave the work environment in a better condition than when you started.

Computer Use

- Do not modify instrument control software without first:
 - Backing up the original version.
 - Discussing modifications with the instrument contact person.
 - Measure a “standard sample” before and after modifying control software.
- If in doubt, ask.

Keep Clean

- Place tools, manuals, and materials in their proper locations *even ones you didn't use*.
- Remove hazardous and unwanted materials from the work area when finished.
- Clean work area before and after each project.
- Leave a note on projects in progress giving date, name, and contact information.
- Leave the area cleaner than when you started.

Equipment Maintenance

- Always use the proper tools for disassembly and reassembly (if you can't find the tool, get a new one).
- Replace broken or missing parts before reassembly.
- Never tamper with an interlock.
- Check for leaks, shorts, loose parts, oil levels, strange noises, smoke, and puddles.
- Leave the equipment in a better condition than when you started.

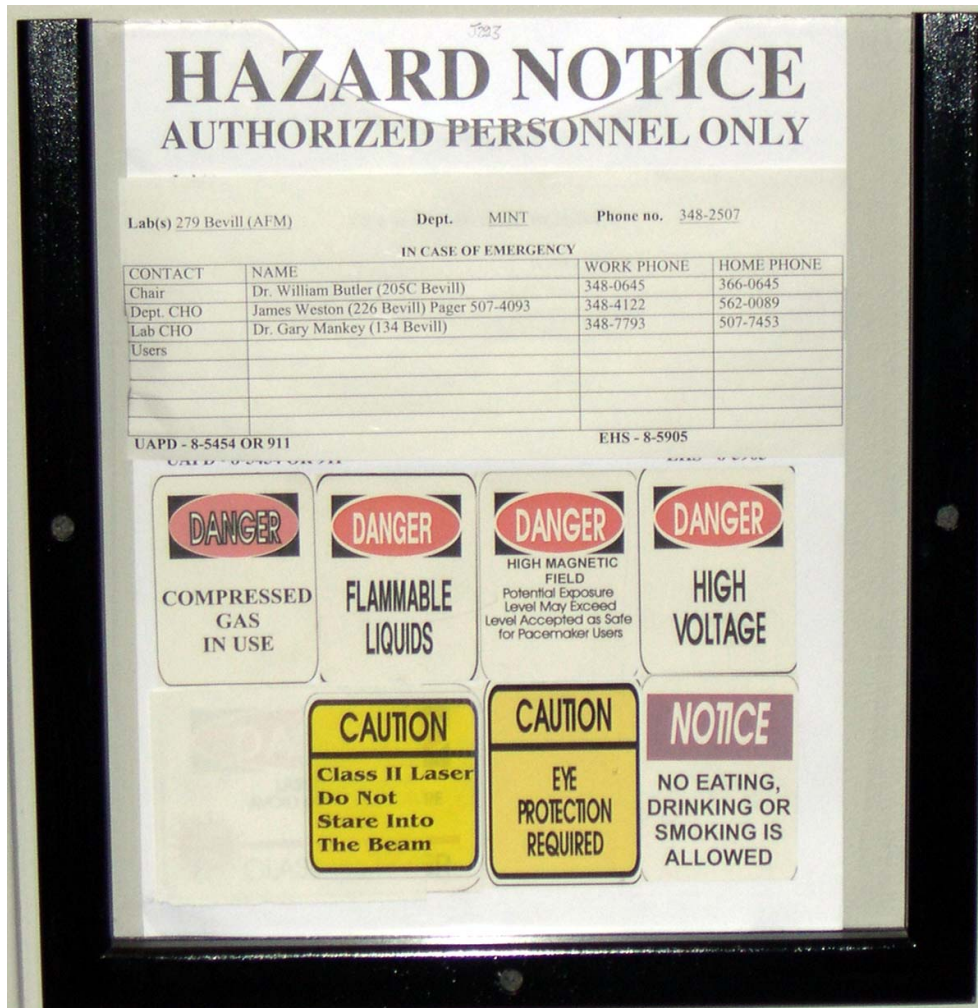
Laboratory Etiquette

- If you use the next-to-last item, order some more.
- Place a note on malfunctioning equipment.
- Interact with other experimenters.
- Leave a note when you borrow something:
 - Where did it go?
 - Who took it?
 - When was it taken?
 - How can I get it back?
- Be considerate of others—share to evolve.
- If in doubt, ask.

Signage I

- Each MINT lab has a placard that indicates to people who enter the lab the kinds of hazards that might be encountered.
- If you have questions about the hazards, ask the lab CHO (Chemical hygiene officer)

new picture with john's name



Signage II

- In some cases there are interlocked signs that illuminate when potentially hazardous equipment is in use.
- X-ray producing equipment
- Lasers
- In some cases, the equipment will not power unless the interlocking switch is flipped. This will automatically turn on the in-use sign

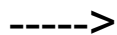


Signage III

- Many labs have signs at eye-level on the door informing users of standard practice.

more pics

put these everywhere



no food or drink pic
everywhere



Compressed Gases

- Always move gas cylinders with the cap screwed on.
- Always chain the cylinder to a support frame, clamp, etc.
- The 4 Hazards: Flammability, stored energy (PV work), asphyxiation, poisoning
- ELEVATORS ...
 - only freight elevators, period



This was a LECTURE bottle

<http://ehs.ucdavis.edu/ehs/ucih/pages/lessons.cfm>

Compressed Gases

- The gas cylinders are stored in B006.
- This room is kept locked
- Kept on hand
 - UHP Ar
 - UHP He
 - Nitrogen (Vent and UHP)
 - UHP Oxygen
 - Mixes (Ar-H)
- “Check out the cylinders”
name-date-location



Cryogenics

- Potential for severe burns –
Helium 4.2°K
Nitrogen 77°K
- Use gloves when holding transfer lines.
- Only decant into systems or dewars.
- Nitrogen dewars are magnetic steel, rather than non-magnetic stainless steel



High Voltage

- One of the biggest hazards in MINT
Ion mill PBN runs at 60 amps
- Know of several arcing events
MINT, melting head of stainless screw
MIT, finger lost from arc
- Do not perform electrical diagnostics **ALONE**
electricity will cause muscles to contract and clench

Housekeeping issues

- No eating/drinking/smoking in labs
- Do not throw glass, syringes, needles, or silicon wafers into the garbage cans; Use a separate sharps container.
- If there are cables on the floor or a warning sign above the door, the housekeeping staff will not enter the lab. Please put the garbage can outside the door when it needs to be emptied and make sure that the lab is cleaner when you leave.
cable cover in 180, e.g.,
- ***Bigger things: label as “garbage” or “trash” or it will not leave***
- ***Leave the lab better than you found it.***

We are planning on assigning the Fridays alternate from 2 pm seminar as a lab cleaning/discussion session.

and now a lesson in
FAIL

Instrument scheduling

- we are going to start using the CAF's software
- all online scheduling
- log in to the system when you start,
- log off when done

- why?
 - common system = sanity, moreso
 - immediately know when time is available
 - know if the instrument is free NOW
 - know if the instrument is even operational

more

- you must be given clearance to sign up on a particular instrument
- you can sign up for an account already
 - <http://mint.ua.edu/fom/login.asp>
- touch screen computer for easy login (2nd floor)

- Covers (at first):
 - XRD (Philips, Rigaku)
 - AGFM
 - VSM
 - AFM ... ion mill ... KEY??? ... what else

scheduling

- 1 week in advance max
- no set maximum hrs ... but BE NICE
 - suggest: max 4 hour blocks
 - don't take the same block for a straight week
- instrument currently unused?
 - take time right now!
 - until next scheduled block
 - can log in 29 min after someone fails to show

teeth

- there are 2 types of user accounts:
 - 24 hour access
 - 8 hour access
- easy ways to be an 8 hour user
 - not logging in/out
 - not signing up
 - overscheduling
 - failing to properly report/log instrument status
 - logging someone else in who isn't qualified
- magic relay boxes ...

why?

- sudden outbreak of common sense
- too many scheduling systems
- occasional unprofessional behavior
- accountability

- too many things broken ‘all of a sudden’
 - you can *never* just write “OK” in the logbook