College of Dental Medicine
HAZCOMM and Environmental Health & Safety

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Research Safety Team, EH&S
Training Agenda

- Basic Concepts in Safety
- Regulatory Introduction
- Chemical Hazards
- Chemical Safety
- Controlling Hazards
- Emergency Management
Why Training?

- Crucial for a safe work place
- Policy/Procedures may vary
- Required by Occupational Safety & Health Administration (OSHA)
- To understand your rights & responsibilities
- Participate in safety programs and take appropriate action
Roles & Responsibilities

Columbia University

- Identify Hazards
- Provide PPE
- Provide Information
- Provide Training
  - Including task specific training

You

- Ensure your own safety
- Report hazards
- Use PPE
- Follow policies/procedures
- Get Trained
- Promote a safe, healthy & environmentally sound workplace
What is Safety Culture?

The Safety Culture of an organization is the product of the individual and group values, attitudes, perceptions, competencies and patterns of behavior that determine the commitment to, and the style and proficiency of, an organization’s health and safety management.
Columbia University laboratories and dental clinics must comply with rules set by the following regulatory bodies:

- **New York City**
  - Fire Department (FDNY)
  - Department of Environmental Protection (DEP)

- **New York State**
  - Department of Environmental Conservation (NYSDEC)

- **Federal**
  - Department of Labor: Occupational Safety and Health Administration (OSHA)
  - United States Environmental Protection Agency (USEPA)
OSHA Hazard Communication Standard

- 29 CFR 1910.1200
- You may be exposed to hazardous chemicals in the workplace and have a right to know about the hazards they may pose, and how to protect against exposures.
- The classification of chemical hazards, and the dissemination of safety information to personnel working with chemicals.
Recognizing & Evaluating Hazards

**Signs**

- Biohazard
- Radiation
- Danger
- High Voltage
- Carcinogen

**Labels**

- Sigma Methanol 1 liter M-3641 Lot 12040

**Pictograms**

- Biohazard
- Radiation
- Danger
- High Voltage
- Carcinogen
Chemical Container Labels

SAMPLE LABEL

Product Identifier

Company Name

Street Address

City

Postal Code

Product Name

State

Country

Emergency Phone Number

Hazard Pictograms

Signal Word

Danger

Keep container tightly closed. Store in a cool, well-ventilated place that is locked.
Keep away from heat/sparks/open flame. No smoking.
Only use non-sparking tools.
Use explosion-proof electrical equipment.
Take precautionary measures against static discharge.
Ground and bond container and receiving equipment.
Do not breathe vapors.
Wear protective gloves.
Do not eat, drink or smoke when using this product.
Wash hands thoroughly after handling.
Dispose of in accordance with local, regional, national, international regulations as specified.

In Case of Fire: use dry chemical (BC) or Carbon Dioxide (CO2) fire extinguisher to extinguish.

First Aid
If exposed call Poison Center.
If on skin (or hair): Take off immediately any contaminated clothing. Rinse skin with water.

Highly flammable liquid and vapor. May cause liver and kidney damage.

Precautionary Statements

Supplemental Information

Directions for Use

Fill weight: Lot Number:
Gross weight: Fill Date:
Expiration Date:
<table>
<thead>
<tr>
<th>Health Hazard</th>
<th>Flame</th>
<th>Exclamation Mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Carcinogen</td>
<td>- Flammables</td>
<td>- Irritant (skin and eye)</td>
</tr>
<tr>
<td>- Mutagenicity</td>
<td>- Pyrophorics</td>
<td>- Skin Sensitizer</td>
</tr>
<tr>
<td>- Reproductive Toxicity</td>
<td>- Self-Heating</td>
<td>- Acute Toxicity (harmful)</td>
</tr>
<tr>
<td>- Respiratory Sensitizer</td>
<td>- Emits Flammable Gas</td>
<td>- Narcotic Effects</td>
</tr>
<tr>
<td>- Target Organ Toxicity</td>
<td>- Self-Reactives</td>
<td>- Respiratory Tract</td>
</tr>
<tr>
<td>- Aspiration Toxicity</td>
<td>- Organic Peroxides</td>
<td>- Irritant</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Hazardous to Ozone Layer</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Non-Mandatory)</td>
</tr>
<tr>
<td>Gas Cylinder</td>
<td>Corrosion</td>
<td>Exploding Bomb</td>
</tr>
<tr>
<td>- Gases Under Pressure</td>
<td>- Skin Corrosion/ Burns</td>
<td>- Explosives</td>
</tr>
<tr>
<td></td>
<td>- Eye Damage</td>
<td>- Self-Reactives</td>
</tr>
<tr>
<td></td>
<td>- Corrosive to Metals</td>
<td>- Organic Peroxides</td>
</tr>
<tr>
<td>Flame Over Circle</td>
<td>Environment (Non-Mandatory)</td>
<td>Skull and Crossbones</td>
</tr>
<tr>
<td>- Oxidizers</td>
<td>- Aquatic Toxicity</td>
<td>- Acute Toxicity (fatal or</td>
</tr>
<tr>
<td></td>
<td></td>
<td>toxic)</td>
</tr>
</tbody>
</table>
GHS: Safety Data Sheets

1. Identification
2. Hazard Identification
3. Composition
4. First Aid Measures
5. Fire-fighting measures
6. Accidental release measures
7. Handling & Storage
8. Exposure Controls
9. Physical & Chemical Properties
10. Stability & Reactivity
11. Toxicological information
12. Ecological information
13. Disposal considerations
14. Transport information
15. Regulatory information
16. Other information

New SDS! Check it Out
Chemical Example: Methyl methacrylate
Using ChemWatch

- Columbia’s online source for safety data sheets.
  - Available from any computer on the CU network.

http://jr.chemwatch.net/chemffx/
Exposure Limits

An occupational exposure limit is an upper limit of the acceptable concentration of a hazardous substance in the workplace.

- In the United States, Permissible Exposure Limits (PELs) are legally binding and enforced by OSHA.

**Methyl Methacrylate:**
OSHA PEL: 100 ppm

**Mercury:**
OSHA PEL: 0.1 mg/m³ or 0.012 ppm

Please see SDS, OSHA website, or contact EH&S for more information.
Exposure Monitoring & Medical Surveillance

Exposure Monitoring

- Personnel exposure to a substance will be monitored when there is reason to believe that exposure levels for that substance may exceed safe levels or when it is required by regulation.
- Regular monitoring performed for those working closely with regulated chemicals (i.e., Formaldehyde and mercury).

Medical Surveillance

- Personnel are provided medical consultation or examination when necessary.
### Methyl Methtacrylate

<table>
<thead>
<tr>
<th>VC 8-Teaching Lab (room 215)</th>
<th>Detected VOC Concentrations (PPM)</th>
<th>OSHA-PEL</th>
<th>Above Limit</th>
<th></th>
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<tbody>
<tr>
<td>Bench 77</td>
<td>0</td>
<td>100 ppm</td>
<td>No</td>
<td></td>
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<tr>
<td>Bench 16</td>
<td>0</td>
<td>100 ppm</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Bench 70</td>
<td>0</td>
<td>100 ppm</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Bench 38</td>
<td>5</td>
<td>100 ppm</td>
<td>No</td>
<td></td>
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<tr>
<td>Bench 43</td>
<td>0</td>
<td>100 ppm</td>
<td>No</td>
<td></td>
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<tr>
<td>Bench 60</td>
<td>0</td>
<td>100 ppm</td>
<td>No</td>
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<tr>
<td>Bench 5</td>
<td>0</td>
<td>100 ppm</td>
<td>No</td>
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</table>

<table>
<thead>
<tr>
<th>VC 8-Teaching Lab (room 215)</th>
<th>Detected VOC Concentrations (PPM)</th>
<th>OSHA-PEL</th>
<th>Above Limit</th>
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<tbody>
<tr>
<td>Bench 49</td>
<td>0.4</td>
<td>100 ppm</td>
<td>No</td>
<td></td>
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<tr>
<td>Bench 22</td>
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<td>100 ppm</td>
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<td></td>
</tr>
<tr>
<td>Waste Storage</td>
<td>0.0</td>
<td>100 ppm</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Bench 66</td>
<td>0.3</td>
<td>100 ppm</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Bench 65</td>
<td>0.5</td>
<td>100 ppm</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Bench 63</td>
<td>0.4</td>
<td>100 ppm</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Bench 60</td>
<td>0.5</td>
<td>100 ppm</td>
<td>No</td>
<td></td>
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<tr>
<td>VC 8-Teaching Lab (room 215)</td>
<td>Detected Mercury Vapor Concentrations (mg/m³)</td>
<td>OSHA-PEL</td>
<td>Above Limit (Yes/No)</td>
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<tr>
<td>-----------------------------</td>
<td>------------------------------------------------</td>
<td>----------</td>
<td>-----------------------</td>
<td></td>
</tr>
<tr>
<td>Bench 46</td>
<td>0</td>
<td>0.10 mg/m³</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Bench 16</td>
<td>0</td>
<td>0.10 mg/m³</td>
<td>No</td>
<td></td>
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<tr>
<td>Bench 70</td>
<td>0</td>
<td>0.10 mg/m³</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Bench 39</td>
<td>0</td>
<td>0.10 mg/m³</td>
<td>No</td>
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<tr>
<td>Bench 36</td>
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<td>0.10 mg/m³</td>
<td>No</td>
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<tr>
<td>Bench 43</td>
<td>0</td>
<td>0.10 mg/m³</td>
<td>No</td>
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<tr>
<td>Bench 60</td>
<td>0</td>
<td>0.10 mg/m³</td>
<td>No</td>
<td></td>
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<tr>
<td>Bench 5</td>
<td>0</td>
<td>0.10 mg/m³</td>
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<tr>
<td>Bench 13</td>
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<td>0.10 mg/m³</td>
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2014

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<tr>
<th>VC 8-Teaching Lab (room 215)</th>
<th>Detected Mercury Vapor Concentrations (mg/m³)</th>
<th>OSHA-PEL</th>
<th>Above Limit (Yes/No)</th>
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<tbody>
<tr>
<td>Bench 34</td>
<td>0.005</td>
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<td>Waste Area</td>
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<tr>
<td>Bench 1</td>
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<td></td>
<td>No</td>
</tr>
<tr>
<td>Bench 43</td>
<td>0.001</td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>Bench 45</td>
<td>0.000</td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>Bench 49</td>
<td>0.000</td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>Bench 16</td>
<td>0.004</td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>Bench 29</td>
<td>0.003</td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>Bench 7</td>
<td>0.007</td>
<td></td>
<td>No</td>
</tr>
</tbody>
</table>

Exposure Monitoring & Hazard Assessment

Mercury

2013

2014
College of Dental Medicine
HAZCOMM and Environmental Health & Safety

Chemical Hazards
Chemical Hazards: Routes of Exposure

How might you be exposed to a chemical hazard?

- **Inhalation**
  - Be aware of aerosol-producing procedures such as accidental spills, removing caps/tops, & clean-up can put you at increased risk of exposure.

- **Absorption**
  - The skin is the largest organ in the human body and offers an important protective cover. Your skin is the major route of entry for hazardous substances in the workplace.

- **Ingestion**
  - A common route of chemical exposure is INGESTION due to contaminated food or hands. **NO EATING OR DRINKING IN THE LAB AND CLINIC!**
Chemical Hazards: Routes of Exposure
Chemical Hazards: Routes of Exposure

- **Injection**

  Sharps, including needles, razor blades, and glass can cause cuts, lacerations, and punctures.

  All needles, syringes and blades must be discarded in rigid sharps containers regardless of the status of biological contamination.

  Limit use, do not recap needles
  Do not remove needles from syringes
  Do not bend, break, or manipulate syringes
Chemical Exposure: Health Effects

- **Acute effects** – Sudden, traumatic effects
  - Headaches, dizziness, burns from corrosive chemicals, rash
    
    Example: Methyl Methacrylate- irritating to the skin, eyes, and mucous membranes & including headache, lethargy, lightheadedness

- **Chronic effects** – Slow, gradual effects not readily perceivable until long after the initial exposure
  - Cancer, mutation, reproductive effects
    
    Example: Methyl Methacrylate- reduced lung function has been reported in chronically exposed workers

Not all chemical exposures will show immediate effects!
Controlling Hazards
Hierarchy of Controls

- Elimination
- Substitution
- Engineering
- Administrative
- Personal Protective Equipment (PPE)
Controlling Hazards

- Mercury Dental Filling vs Resin Composite
  - Elimination
  - Substitution

Amalgams
Composite Restorations
Controlling Hazards

Engineering Controls

Elimination

- HVAC System
- Fume Hoods
- Machine Guards

Substitution

Engineering

Administrative

Protective Equipment

Personal Protective Equipment (PPE)
Controlling Hazards

Administrative Controls

- Policies, procedures, effective communication and best work practices designed to ensure the safety of personnel.
- Consult an experienced staff or faculty member before modifying a protocol, or procedure.
Controlling Hazards

Administrative Controls

- Proper storage and segregation of hazardous materials.
- Proper chemical container labeling.
Administrative Controls: Compressed Gases

You must label, store, and use cylinders of gases, such as oxygen, nitrous oxide, and propane according to published standards.

- Always in the upright position
- All compressed gases restrained
  - Chained to a wall
  - Or using a Cart
- Must be capped if not in use
- Do not hang items on them
Controlling Hazards

Administrative Controls: Housekeeping
Controlling Hazards

MUST BE WORN AT ALL TIMES IN THE LAB:

- Proper Work Attire
- Scrubs
- Lab coats/Aprons
- Safety glasses / goggles
- Protective gloves
Controlling Hazards: Proper Work Attire

When working in the lab & clinic you must wear PPE & proper attire or you will be asked to leave the immediately.
Columbia University PPE Policy

Columbia University’s Personal Protective Equipment Policy addresses the use of PPE in all University laboratories & support areas. The Policy is designed to ensure that the University’s research & teaching community understand proper PPE selection, PPE use and maintenance, and meet established safety standards.

Please visit the PPE website for details & guidance on the policy!

http://www.ehs.columbia.edu/ppe.html
Controlling Hazards: PPE Webpage

Environmental Health and Safety

Personal Protective Equipment

Columbia University’s Personal Protective Equipment Policy addresses the use of PPE in all University laboratories & support areas. The Policy is designed to ensure that the University’s research & teaching community understand proper PPE selection, PPE use and maintenance, and meet established safety standards.

PPE Policy

The appropriate use of PPE is critical in reducing exposure to laboratory hazards and represents the last line of defense against potential exposure. PPE is provided at no cost to affected personnel and used whenever the potential for occupational exposure exists. In most instances, the minimum level of PPE for laboratory personnel consists of a lab coat, gloves, and eye protection.

Please visit the links below for detailed information regarding PPE:

- PPE Hazard Assessment Tool
- Laboratory Coats
- Other Clothing Considerations
- Hand Protection
- Respiratory Protection
- Eye & Face Protection

In addition to understanding the appropriate uses of various types of PPE, it is equally important to realize that all PPE items have limitations that should be considered in making a selection. Please note, PPE should never be used as a substitute for proper engineering and administrative controls or prudent work practices, but only as an additional measure of protection once all other reasonable precautions have been taken.
Controlling Hazards: PPE
Where can PPE should be found?
Location of PPE on VC-7

- Gowns
- Mask & Face Shields
- Gloves
Controlling Hazards: PPE & General Areas

- Wearing gloves on elevators is **Not Permitted**.
- *Never Touch* elevator buttons or door knobs with gloves
- Always remember to remove your gloves when you leave your work station.
- Remember to remove disposable gowns before leaving clinical areas. Never step outside of VC with gowns & gloves.
College of Dental Medicine
HAZCOM and Environmental Health & Safety

Emergency Management
Emergency Management

Emergency Equipment

- Showers, eyewashes, spill supplies, and fire extinguishers need to be unobstructed
- Don't wait for an Emergency
  - Test eyewashes weekly

Keep Clear of Obstruction
Emergency Management

Reporting Laboratory Emergencies

- Provide:
  - Name & UNI
  - Location (Building, Room)
  - Phone Number
  - Incident Details
  - Any Personal Injury

Reporting Fire, Smoke Conditions or Personal Injury

<table>
<thead>
<tr>
<th>Campus</th>
<th>Public Safety from a Campus Phone</th>
<th>Public Safety from a Personal Phone</th>
<th>EH&amp;S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical Center</td>
<td>(212) 305-7979</td>
<td>(212) 305-8100</td>
<td>(212)305-6780</td>
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Emergency Management

Chemical Emergencies - Manageable Spills

Call Facilities to mop up spills of non-hazardous materials.

Examples:
- Water
- Bleach
- Other disinfectants

Small amounts of low hazard chemicals & biological spills can be managed by you!

Columbia University
Environmental Health and Safety
Emergency Management

Chemical Emergencies - Manageable Spills

- Please visit the EH&S Website to review this and other help emergency response videos.

- [http://ehs.columbia.edu/LabEmergencyResponseVideos.html](http://ehs.columbia.edu/LabEmergencyResponseVideos.html)
Chemical Emergencies - Unmanageable Spills

Call EH&S at 305-6780 with:

- Chemical identity if known
- Volume
- Location
- Your name, UNI, and telephone number
Chemical Emergencies - Personal Decontamination

- Flush contaminated eyes, face, arms, and body area with copious amounts of water.
- Remove contaminated clothing.
- If there are no visible burns, wash gently with soap and warm water.
- Seek medical attention, if necessary.
- Inform your supervisor. If there are no visible burns, wash gently with soap and warm water.
# Emergency Management

## Spills and Emergency Response
Where to go for Injuries and Health Emergencies

<table>
<thead>
<tr>
<th>Campus</th>
<th>Hours</th>
<th>Students</th>
<th>Public Safety Contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>CUMC</td>
<td>Business-Hours</td>
<td>Student Health Services - 60 Haven Avenue (212) 305-3400</td>
<td>(212) 305-7979</td>
</tr>
<tr>
<td></td>
<td>After-Hours</td>
<td>NYPH Emergency Department - First Floor of the Vanderbilt Clinic (VC)</td>
<td></td>
</tr>
</tbody>
</table>
Reminder

- Be familiar with the location of Emergency Equipment.
- Address manageable spills as soon as they occur.
- If this cannot be done immediately, mark off the area & ALERT people around you.
- Take Action!! Call Facilities or EH&S immediately.
What Does Safety Mean To You?
Thanks for your attention!