Laboratory Safety Training

Contacts and Objectives

<table>
<thead>
<tr>
<th>Resource</th>
<th>Contact Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste Management</td>
<td>OPM 100 813-974-4036</td>
</tr>
<tr>
<td>Industrial Hygiene</td>
<td>Occupational Safety</td>
</tr>
<tr>
<td>Asbestos/Indoor Air Quality</td>
<td>Property Insurance/Risk Management</td>
</tr>
<tr>
<td>Fire Safety</td>
<td>Lab Safety</td>
</tr>
<tr>
<td></td>
<td>Waste Management</td>
</tr>
</tbody>
</table>

Training Objectives

- To provide safety guidelines for workers and researchers in USF laboratories
- To make you aware of hazardous waste and accident management procedures
- To provide contact information and resources to aid in safety concerns

Individual Responsibility

- The key to having a safe laboratory environment lies with an individual's commitment to safety while conducting research.
- Most accidents can be avoided by using common sense and good judgment.
- Before working in labs, an individual should consult with his/her PI/ Lab Supervisor about:
  - The potentially hazardous chemicals within the lab
  - Location of safety equipment
  - Required safety trainings

Chemical Hygiene Plan

- The USF Chemical Hygiene Plan (CHP) applies to all laboratory personnel and chemical laboratories at USF. The CHP specifies what procedures, lab equipment, PPE, and work practices should be used to minimize risk for lab occupants. It also identifies the responsibilities of faculty, staff, and students working in the laboratories at USF.
- All lab personnel must have access to the Chemical Hygiene Plan. You can review the Chemical Hygiene Plan at [http://www.usf.edu/administrative-services/environmental-health-safety/programs-services/laboratory-safety/lab-reviews.aspx](http://www.usf.edu/administrative-services/environmental-health-safety/programs-services/laboratory-safety/lab-reviews.aspx)
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Recognizing Hazards: Resources

1.) Manufacturer’s Label
   The manufacturer of a chemical must provide a label that indicates:
   - Full name of chemical
   - Hazard warnings
   - Name and address of manufacturer
   * Chemical containers without manufacturer’s labels should be returned to the manufacturer.

2.) Safety Data Sheets (SDS)
   An SDS (formerly called MSDS) is a document, prepared by the manufacturer, which contains safety information for materials containing hazardous chemicals. It tells about:
   - Material components
   - Dangers
   - Safe handling of material
   Manufacturers provide SDSs:
   - with shipments
   - by fax
   - online
   - subscriptions
   Be sure that you have immediate access to the SDS for chemicals you are working with.
   An example of an SDS can be found at the end of this packet for reference.

3.) NFPA Label

This label was developed by the National Fire Protection Association to identify and rank a material’s hazards. Hazards are rated from 0 (no hazard) to 4 (extremely hazardous).

- Fire Hazard – labeled in red
- Health Hazard – labeled in blue
- Reactivity Hazard – labeled in yellow
- Specific Hazard – labeled in white (OX=oxidizer, W=use no water, CORR=corrosive, ALK=alkali)
Recognizing Hazards: Hazard Classes

<table>
<thead>
<tr>
<th>FLAMMABLE</th>
<th>![Flammable Icon]</th>
</tr>
</thead>
<tbody>
<tr>
<td>• A material that may catch fire and burn in air</td>
<td></td>
</tr>
<tr>
<td>• Any liquid having a flashpoint below 100 degrees F (37.8 degrees C).</td>
<td></td>
</tr>
<tr>
<td>• Flammable vapors are usually heavier than air (vapor density &gt; 1), so it is possible for the vapors to travel along floors and, if an ignition source is present, result in a flashback fire.</td>
<td></td>
</tr>
<tr>
<td>• Store flammable liquids only in specially designed flammable storage cabinets and refrigerators/freezers or explosion-proof refrigerators/freezers away from ignition sources and oxidizers.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OXIDIZER/REACTIVE</th>
<th>![Oxidizer Icon]</th>
</tr>
</thead>
<tbody>
<tr>
<td>• An unstable material that may ignite, explode, or produce toxic gas under certain conditions</td>
<td></td>
</tr>
<tr>
<td>• Examples include sodium, t-butyl lithium, aluminum nitrate, perchloric acid, nitric acid, and sodium peroxide.</td>
<td></td>
</tr>
<tr>
<td>• Store away from flammable materials and place in a secondary containment when stored with incompatible materials.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CORROSIVE</th>
<th>![Corrosive Icon]</th>
</tr>
</thead>
<tbody>
<tr>
<td>• A material that destroys metal and can cause destruction of tissue upon exposure</td>
<td></td>
</tr>
<tr>
<td>• Has a pH of less than 2 or greater than 12.5</td>
<td></td>
</tr>
<tr>
<td>• Examples include strong acids such as hydrochloric acid and sulfuric acid, and strong bases such as potassium hydroxide and sodium hydroxide.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POISON/TOXIC</th>
<th>![Poison Icon]</th>
</tr>
</thead>
<tbody>
<tr>
<td>• A material that is harmful or fatal if ingested or absorbed</td>
<td></td>
</tr>
<tr>
<td>• Toxic chemicals have an LD50 of 50 - 500 mg/kg, single oral dose for rats. Highly toxic chemicals have an LD50 of &lt; 50 mg/kg, single oral dose for rats.</td>
<td></td>
</tr>
<tr>
<td>• Store in a secure, sealed container below shoulder level. Use only in designated areas.</td>
<td></td>
</tr>
</tbody>
</table>

Recognizing Hazards: Special Hazards

Never work alone and always follow Standard Operating Procedures (SOPs) approved by your supervisor. Written procedures are required for work involving hazardous chemicals (including EPA p-listed, DHS listed, carcinogens, toxic gases, time-sensitive, pyrophoric). Templates for SOPs can be found at http://www.usf.edu/administrative-services/environmental-health-safety/programs-services/laboratory-safety/sops.aspx

ART STUDIO
• EH&S offers a Safety & Compliance in the Arts Training, phone: (813) 974-4036
### BIOSAFETY
- Wash hands before leaving lab, wear gloves and a lab coat, do not pipette by mouth, do not eat, drink, or apply cosmetics in the lab
- USF Biosafety Program offers a Biosafety course, phone: (813) 974-5638

### COMPRESSED GAS CYLINDER
- Must be attached to a permanent fixture or they may injure someone if they fall
- May rupture, sending metal shards flying or becoming a missile-like projectile from the force of the escaping gas
- Leaking cylinders are asphyxiation, poisoning, or fire hazards depending on the type of gas
- Do not roll or drag cylinders

### CRYOGENIC FLUIDS
- Asphyxiation and burn hazard
- Full face protection, apron, and proper gloves
- Metal watches and jewelry on hands should be removed before use

### ELECTRICAL/FIRE
- Do not run wires where they may be damaged. To avoid shock, remove metal rings, bracelets, and watches from hands and make sure hands, tools, equipment, and floor are dry. Know the location of the emergency power off.
- Do not use extension cords, daisy-chain power strips, block exit doors or corridors, store items within 18” of a sprinkler head, or prop open fire doors
- EH&S offers a Fire Safety training course

### GLASS
- Before using glassware, inspect glass for cracks or chips. Follow careful handling and storage procedures to avoid damaging glassware.
- Clean up broken glass with tongs or a broom and a dust pan, never your hands.
- Dispose of glass in a designated cardboard box lined with a plastic bag

### HOT PLATES
- Read and follow manufacturer’s directions
- Do not cover heating surface with foil
- Do not leave unattended while heating
- Do not heat volatile materials using a hot plate

### HYDROFLUORIC ACID
- Highly corrosive and penetrates the skin to destroy soft tissue and bone. Burns from dilute solutions are not apparent for several hours.
- Calcium gluconate gel should be applied immediately after exposure. Seek medical attention.

### LIGHT SENSITIVE CHEMICALS
- Light causes degradation, forming new chemicals or causing pressure build-up
- Examples include Bromine, Mercuric Salts, Potassium Ferricyanide, and Sodium Iodide
<table>
<thead>
<tr>
<th><strong>MERCURY</strong></th>
<th><img src="image1.png" alt="Image" /></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Use non-mercury thermometers</td>
<td></td>
</tr>
<tr>
<td>• Mercury exposure damages every system in the body</td>
<td></td>
</tr>
<tr>
<td>• Wearing nitrile gloves, splash goggles and an impervious apron, seal a broken mercury thermometer in a container and call EH&amp;S for pickup</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>NITRIC ACID</strong></th>
<th><img src="image2.png" alt="Image" /></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Highly corrosive and a strong oxidizer</td>
<td></td>
</tr>
<tr>
<td>• Store separately from other chemicals or in secondary containment</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>P-LISTED CHEMICALS</strong></th>
<th><img src="image3.png" alt="Image" /></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Are listed as acutely hazardous by the EPA</td>
<td></td>
</tr>
<tr>
<td>• Should be marked by a green sticker</td>
<td></td>
</tr>
<tr>
<td>• Include sodium azide, osmium tetroxide, arsenic, and cyanide compounds</td>
<td></td>
</tr>
<tr>
<td>• Complete list in Appendix A of USF Hazardous Waste Plan (see references)</td>
<td></td>
</tr>
<tr>
<td>• The empty containers are hazardous waste and must be disposed of through EH&amp;S</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>PERCHLORIC ACID</strong></th>
<th><img src="image4.png" alt="Image" /></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Highly corrosive and forms explosive anhydrous crystals</td>
<td></td>
</tr>
<tr>
<td>• Use only in a fume hood designed with a water wash down to prevent crystal formation</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>RADIATION/LASERS</strong></th>
<th><img src="image5.png" alt="Image" /></th>
</tr>
</thead>
<tbody>
<tr>
<td>• USF Radiation Safety offers a Radiation Training Course, phone (813) 974-1194</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>SHARPS</strong></th>
<th><img src="image6.png" alt="Image" /></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Needles and needle-syringe units are disposed of in a red box labeled “SHARPS DISPOSAL”</td>
<td></td>
</tr>
<tr>
<td>• Never recap needles</td>
<td></td>
</tr>
<tr>
<td>• Razors, scalpels, and sharp pieces of glass, metal, or plastic must be boxed or wrapped securely before disposal as regular trash</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>SHOP</strong></th>
<th><img src="image7.png" alt="Image" /></th>
</tr>
</thead>
<tbody>
<tr>
<td>• EH&amp;S offers a Shop Safety Course</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>TIME-SENSITIVE CHEMICALS</strong></th>
<th><img src="image8.png" alt="Image" /></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Form explosive crystals upon prolonged storage</td>
<td></td>
</tr>
<tr>
<td>• Check for crystallization periodically and dispose of after 12-18 months</td>
<td></td>
</tr>
<tr>
<td>• Examples include peroxide formers such as ethers, tetrahydrofuran, styrene and explosives such as picric and picrylsulfonic acid</td>
<td></td>
</tr>
<tr>
<td>• Do not attempt to open any expired time-sensitive chemicals, contact EH&amp;S</td>
<td></td>
</tr>
</tbody>
</table>
Minimizing Hazards: Chemical Storage

- Do not store chemicals above eye level, especially corrosive liquids. Do not store chemicals in the fume hoods, on bench tops, or on the floor.
- As a general rule, separate chemicals by hazard class. Some chemicals belong to more than one.
- Flammable liquids must be stored in approved flammable cabinets and flammable-rated refrigerators.
- Acids and bases (caustics) should be stored in chemical resistant cabinets either separately or in secondary containment.
- **Acetic acid** is a flammable acid and should be stored in the flammable cabinet.
- **Nitric acid** should be stored away from other acids or in secondary containment.
- Store oxidizers and toxics near a fume hood.

Minimizing Hazards: Chemical Inventory

- Keep a comprehensive list of materials being stored in the lab and update yearly.
- Useful in keeping track of time-sensitive chemicals with limited shelf lives.
- Mark chemicals with date received, date opened, and date of expiration.

Hazard Assessment: Exposure and Risk

Chemicals can enter the body four different ways:

- Absorption through the skin.
- Inhalation.
- Ingestion (eating and drinking).
- Injection (needles or sharp pieces of glass, plastic, or metal).

Whether or not your exposure will result in injury depends on:

- Exposure frequency.
- Exposure duration.
- Age, sex, and genetics.

Assess your risk by considering these questions:

- 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 from these hazards?
- What should be done if something goes wrong?

Exposure risk can be minimized using:
- Substitution of less hazardous materials
- Engineering controls (example: working in the fume hood)
- Administrative controls (Chemical Hygiene Plan, training)
- Personal protective equipment (PPE)

LD50 (Lethal Dose, 50%) is a measure of a material’s acute toxicity and is the individual dose required to kill 50 percent of a population of test animals. The smaller the number is, the more toxic the substance. The LD50 for a material can be found on the SDS. Some LD50’s are listed below.

<table>
<thead>
<tr>
<th>Substance</th>
<th>LD50 (mg/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethanol</td>
<td>7000</td>
</tr>
<tr>
<td>Acetaminophen (Tylenol)</td>
<td>2000</td>
</tr>
<tr>
<td>Caffeine</td>
<td>150</td>
</tr>
<tr>
<td>Nicotine</td>
<td>50</td>
</tr>
<tr>
<td>Sodium Cyanide</td>
<td>6</td>
</tr>
<tr>
<td>Botulinum Toxin A</td>
<td>0.000001</td>
</tr>
</tbody>
</table>

**Minimizing Hazards: Personal Protective Equipment**

Everyone in the lab, including visitors, should wear long pants and shoes that cover the entire foot.

**EYE PROTECTION**
- Safety glasses protect eyes against flying debris
- Splash goggles protect eyes against liquid splashes
- Full face shields over splash goggles provide extra protection when working with corrosive chemicals
- UV-rated glasses protect against UV exposure, such as while using a transilluminator
- In 2005, The National Institute for Safety and Health (NIOSH) recommended that contact lens wear be permitted during work with hazardous chemicals provided suitable eye protection was worn and written guidelines and a hazard assessment were in place.

**GLOVES**
- Wear when handling hazardous materials, sharp, or very hot or cold items
- Latex, vinyl, or nitrile gloves are appropriate most of the time
- Glove compatibility charts provide information for specific chemicals, see [http://www.chemrest.com/](http://www.chemrest.com/)
LAB COATS AND APRONS
- Regular lab coats provide minimal protection. Flame-resistant lab coats should be worn if working with flammable liquids or pyrophorics.
- Impervious aprons provide extra protection against corrosive liquids
- Do not take lab coats home to wash, use a professional dry cleaner

RESPIRATOR
- Consult EH&S before use. Federal regulations prohibit the use of respirators by untrained personnel or students. If EH&S determines use is necessary, the individual must participate in the University’s respirator program. This includes an annual medical evaluation, respirator fit test, and training.

FUME HOOD
- Protects against exposure to hazardous fumes or dusts
- Keep sash as low as possible when using, close sash when not using
- Work at least six inches inside sash and avoid sudden movements

Emergency Response: Spills
Small spills may be cleaned up by the lab as long as personnel have proper supplies, knowledge, PPE, and are comfortable doing so.
- Consult the SDS of the spilled chemical & wear proper PPE prior to clean-up.
- Spread absorbent around spill site and over liquid’s surface and wait 15 minutes.
- Collect wet absorbent & transfer to a plastic bucket or bag using dustpan & brush.
- Dispose of as hazardous waste.

SPILL KIT
- Store in an accessible location
- Absorbent material, goggles, gloves, broom, dustpan, bucket
- For biohazardous spills, also have 10% bleach or other disinfectant

If one of the following conditions occurs, call EH&S:
- Spill is large
- Spill involves extremely hazardous chemicals
- Ventilation is inadequate
- No spill clean-up materials
- Personnel uncomfortable handling clean-up
- If a spilled chemical enters the drain, soil or water body

Emergency Response: Accidents
If there is an emergency, call 911 or University Police. Be prepared to give detailed information about your location.
Laboratory Safety Training

**EYEWASH**
- If chemicals get into eyes, flush eyes for 15 minutes
- Lab personnel must flush eyewash weekly and keep a record
- Do not block with glassware or equipment

**SHOWER**
- If chemicals get onto clothes/skin, rinse for 15 minutes, removing contaminated clothing
- USF tests showers annually
- Do not store items under shower

**FIRST AID KIT**
- Know location
- Check completeness and expiration dates

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**Emergency Response: Fire**
You are not expected to fight the fire. Follow these emergency procedures to assure your safety:

1. Yell out FIRE FIRE FIRE!
2. Alert other building occupants by activating the fire alarm by using the manual pull station.
3. Attempt to extinguish fire, if it is small and you know how to use an extinguisher.
4. Close all doors behind you as you evacuate the building.
5. Call 911 or University Police at 813-974-2628 as soon as possible outside the building.
6. Give as much information as possible to the emergency dispatcher.
7. Meet in the designated relocation area at least 150 feet from the building.

**FIRE EXTINGUISHER**
- USF Tests annually
- EH&S offers training, call for more information
- To use, remember P.A.S.S. (Pull the pin, Aim at the base of the fire, Squeeze the lever, and Sweep back and forth)

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**Fire Code Violations**
The top ten violations recorded by the State Fire Marshal are:

1. Extensions cords used as permanent wiring
2. Daisy chaining power strips (i.e., plugging one power strip into another)
3. Blocked exit doors
4. Furniture in exit corridors that block clear egress width
5. Excessive storage that blocks access to fire alarm and electrical panels
6. Storage within 18 inches of a fire sprinkler head
7. Propping open fire doors with door wedges
8. Gas cylinders not properly secured or removed from lab when empty
9. Improper storage of flammable liquids
10. Unapproved portable heaters

**Emergency Response: Incident Reporting**


Workers’ Compensation (WC) covers faculty, staff, and official volunteers at the University of South Florida. Teaching and graduate assistants are included as staff.

If you are injured on the job:
- Notify your supervisor
- Supervisor will contact AmeriSys at 800-455-2079
- Proceed to approved medical facility
- Send injury report to WC office within 24 hours
- Forms are available on the Workers’ Compensation website, [http://usfweb2.usf.edu/hr/](http://usfweb2.usf.edu/hr/)

**Hazardous Waste**

In 1976, Congress passed the Resource Conservation and Recovery Act (RCRA). This law gave the Environmental Protection Agency (EPA) the authority to regulate all individuals who generate and accumulate hazardous wastes. All labs, studios, and shops that generate and accumulate hazardous wastes are subject to unannounced inspections from the Florida Department of Environmental Protection and/or EPA and are thus subject to fines.

**Universal Waste**

These materials are subject to hazardous wastes regulations unless they are managed or recycled according to the universal waste regulations.
- Nickel Cadmium, Lithium Ion, Nickel Metal Hydride, Lead Acid, Mercury or Silver Hydride batteries must be segregated and collected in a container labeled with its contents.
- Fluorescent and High Intensity Device (HID) lamps (either used or broken) must be stored in a plastic lined box or metal container labeled “Waste Mercury Bulbs”.
- Mercury thermometers, thermostats, and barometers must be stored in a plastic lined box or metal container labeled “Waste Mercury Devices”.

**Chemical Waste**

- At USF, all chemical waste must be treated as hazardous waste and must be collected. No dumping of hazardous wastes, including rags, in the trash or down the drain.
- Empty chemical containers can be disposed in the lab trash or reused to store hazardous wastes, EXCEPT for empty containers that stored acutely hazardous wastes (EPA P-listed). These cannot go in the trash and must be disposed of through EH&S.
- Before disposal, remove or deface the label with a marker and write “Empty” on the bottle. The lids on empty flammable containers should be removed before disposal.
- Lead solder remnants must be collected and disposed of as hazardous waste.
- Only completely empty spray cans with intact nozzles can be put into regular trash. If the nozzle is missing or the container is not empty it is hazardous waste.

**Figure 2: Chemical Waste Handling**

<table>
<thead>
<tr>
<th>Collect Waste</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Containers for solid or liquid waste, tags, and labels are available through the Hazardous Inventory Tracking System (HITS)</td>
</tr>
<tr>
<td>• Must be labeled “Hazardous Waste” and include the date, the percent content of each chemical, and a description of its hazard class (for example: toxic)</td>
</tr>
<tr>
<td>• Attach a yellow waste tag when waste is first added</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Store Waste</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Keep in a Satellite Accumulation Area (SAA)</td>
</tr>
<tr>
<td>• Do not use food or drink containers to store waste</td>
</tr>
<tr>
<td>• Floor storage must have secondary containment</td>
</tr>
<tr>
<td>• Containers must be kept closed, funnels removed</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Waste Pick-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Log on to HITS at [HITS] to request pick-up</td>
</tr>
<tr>
<td>• Use the Lab Cleanout form to request pick-up of more than 20 items</td>
</tr>
<tr>
<td>• Contact Facilities Management to pick up universal waste lamps and batteries</td>
</tr>
</tbody>
</table>

**Biomedical Waste**

- Any solid or liquid waste which may present a threat of infection to humans.
- All needles, whether infectious or not, must be disposed of as biomedical waste. Never recap needles.
- Biomedical waste mixed with chemical waste must be managed as hazardous waste. Please separate biomedical waste from biomedical waste mixed with chemical or radioactive waste.
- Place red bags into an outer container prior to use. The outer container must be rigid, leak-resistant and puncture-resistant. Reusable outer containers shall be constructed of smooth, easily cleanable materials and shall be decontaminated after each use.
- USF’s biomedical waste service provider, Medigreen, removes waste. The custodial staff will not remove any biomedical waste.

**Figure 3: Universal Biomedical Waste Symbol**
**Figure 4: Biomedical Waste Handling**

**Identify**
- Any solid or liquid waste which may present a threat of infection to humans
- Blood, needles, contaminated sharps
- Animal parts/tissues

**Segregate**
- Place in a sharps container or red bag
- Non infectious pipettes, tubes, scalpels may go into regular trash if they are well wrapped or placed in the Broken Glass Box
- Do not put any regular trash in with biomedical waste

**Label and Store**
- The universal biomedical waste symbol and the words “Biomedical Waste”, the facility name (e.g. USF), address, phone number and contact name must be displayed on each container/bag
- Cannot be stored longer than 30 days

**Transport**
- Wear a lab coat and gloves and use a rolling cart to move waste
- Contractor transports and disposes of all biomedical wastes
- Current contractor is: Medigreen, Orlando, FL
References
Department Of Labor, Occupational Safety and Health Administration Industry Standards, 29 CFR Part 1910

*Ethics Point* collects anonymous reporting of activities that may involve misconduct, unsafe conditions, or other violations of USF System policies https://secure.ethicspoint.com/domain/media/en/gui/14773/index.html


*RCRA Online* is a database of documents covering the management of non-hazardous, hazardous, and medical waste http://www.epa.gov/rcraonline

*USF Biomedical Waste Management Plan* provides the requirements for the proper management of biomedical waste at USF

*USF Chemical Hygiene Plan* is a broad outline of chemical safety procedures and must be available to all Principal Investigators, students, lab workers, and volunteers http://www.usf.edu/administrative-services/environmental-health-safety/programs-services/laboratory-safety/lab-reviews.aspx


*Wireless Information System for Emergency Responders (WISER)* provides information on hazardous substances and is available as a standalone application on computers and mobile devices https://wiser.nlm.nih.gov/
In memory of those who have lost their lives in laboratory accidents

<table>
<thead>
<tr>
<th>Date</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>Richard Din</td>
<td>Exposure to bacterial strain leading to septicemia and meningitis</td>
</tr>
<tr>
<td>2011</td>
<td>Adrian Martin</td>
<td>Methane explosion</td>
</tr>
<tr>
<td>2011</td>
<td>Michelle Dufault</td>
<td>Suffocation when hair became entangled in a lathe</td>
</tr>
<tr>
<td>2009</td>
<td>Sheri Sangji</td>
<td>Burned from a T-butyl lithium fire</td>
</tr>
<tr>
<td>2005</td>
<td>Kenton Joel Carnegie</td>
<td>Wolf attack during field work</td>
</tr>
<tr>
<td>2004</td>
<td>Unknown</td>
<td>Burned after being trapped inside steam washer used to clean animal cages</td>
</tr>
<tr>
<td>2003</td>
<td>Raquel Vieira de Savariego</td>
<td>Vehicle overturned on the way to the field camp</td>
</tr>
<tr>
<td>1999</td>
<td>Unknown</td>
<td>Toluene inhalation</td>
</tr>
<tr>
<td>1997</td>
<td>Karen Wetterhahn</td>
<td>Dimethylmercury poisoning</td>
</tr>
<tr>
<td>1996</td>
<td>Michael Hanly</td>
<td>Sanitation worker poisoned by discarded hydrofluoric acid</td>
</tr>
<tr>
<td>1995</td>
<td>Unknown</td>
<td>Hantavirus exposure from field work</td>
</tr>
<tr>
<td>1992</td>
<td>Unknown (2)</td>
<td>Suffocation in cold room when liquid nitrogen spilled</td>
</tr>
<tr>
<td>1990</td>
<td>Unknown</td>
<td>Drowning during oceanography field work</td>
</tr>
<tr>
<td>1989</td>
<td>Unknown</td>
<td>Electrocution while working on a television in physics class</td>
</tr>
<tr>
<td>1988</td>
<td>Dawn Collins</td>
<td>Poisoning after drinking saline contaminated with sodium azide</td>
</tr>
<tr>
<td>1988</td>
<td>Unknown</td>
<td>Custodian inhaled old chemicals discarded in dumpster by new high school teacher</td>
</tr>
<tr>
<td>1980</td>
<td>Unknown</td>
<td>Poisoning after drinking water from a lab faucet in a beaker</td>
</tr>
<tr>
<td>1979</td>
<td>Unknown</td>
<td>Organic extraction solvent fire</td>
</tr>
<tr>
<td>1979</td>
<td>Unknown</td>
<td>Nitroglycerine explosion</td>
</tr>
<tr>
<td>1976</td>
<td>Unknown</td>
<td>Alcohol fire occurred while trying to refill a lighted lamp</td>
</tr>
<tr>
<td>1972</td>
<td>Unknown</td>
<td>Electrocution while working on live circuits</td>
</tr>
<tr>
<td>1969</td>
<td>Unknown</td>
<td>Sodium explosion</td>
</tr>
<tr>
<td>1967</td>
<td>Unknown</td>
<td>Explosion and fire possibly caused by accidentally mixing cleaning solution with nitric instead of sulfuric acid</td>
</tr>
<tr>
<td>1966</td>
<td>Unknown</td>
<td>Struck by unsecured gas cylinder that fell, ruptured, and broke through cinderblock wall</td>
</tr>
<tr>
<td>1966</td>
<td>Unknown</td>
<td>Electrocution while conducting electrophoresis</td>
</tr>
<tr>
<td>1966,</td>
<td>John Gallant</td>
<td>Electrocution by oscilloscope</td>
</tr>
<tr>
<td>1953</td>
<td>Unknown</td>
<td>Explosion occurred while opening bottle containing peroxides</td>
</tr>
<tr>
<td>1940</td>
<td>Unknown</td>
<td>Explosion of chemicals stored in a household refrigerator</td>
</tr>
</tbody>
</table>

http://www.resources.lab safetyinstitute.org/MemorialWall.html
Safety Data Sheet

Ethanol, Denatured, 95%

Section 1 Product Description

Product Name: Ethanol, Denatured, 95%
Recommended Use: Science education applications
Synonyms: Alcohol, Ethyl alcohol
Distributor: Carolina Biological Supply Company, 2700 York Road, Burlington, NC 27215-3388
Chemical Information: 800-227-1150 (8am-5pm (ET) M-F)
Chemrec: 800-424-9000 (Transportation Spill Response 24 hours)

Section 2 Hazard Identification

Classification of the chemical in accordance with paragraph (d) of §1910.1200;

DANGER

Highly flammable liquid and vapor. May cause damage to organs.

GHS Classification:
Flammable Liquid Category 2, Specific Target Organ Systemic Toxicity (STOT) - Single Exposure Category 2

Other Safety Precautions: IF exposed or if you feel unwell. Call a POISON CENTER or doctor/physician.
Acute Toxicity Dermal Contains 90.075 % of the mixture consists of ingredient(s) of unknown toxicity

Section 3 Composition / Information on Ingredients

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS #</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethanol</td>
<td>64-17-5</td>
<td>85.88</td>
</tr>
<tr>
<td>Water</td>
<td>7732-15-5</td>
<td>5.00</td>
</tr>
<tr>
<td>2-Propanol</td>
<td>67-63-0</td>
<td>4.75</td>
</tr>
<tr>
<td>Methanol</td>
<td>67-56-1</td>
<td>4.28</td>
</tr>
</tbody>
</table>

Section 4 First Aid Measures

Emergency and First Aid Procedures

Inhalation: In case of accident by inhalation: remove casualty to fresh air and keep at rest.
Eyes: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
Skin Contact: After contact with skin, wash immediately with plenty of water.
Ingestion: If swallowed, do not induce vomiting; seek medical advice immediately and show this container or label.

Section 5 Firefighting Procedures

Extinguishing Media: Use dry chemical, CO2 or appropriate foam.
Fire Fighting Methods and Protection: Firefighters should wear full protective equipment and NIOSH approved self-contained breathing apparatus.
Fire and/or Explosion Hazards: Vapors may travel back to ignition source. Closed Containers exposed to heat may explode. Extremely flammable.
Hazardous Combustion Products: Carbon dioxide, Carbon monoxide

Section 6 Spill or Leak Procedures

Steps to Take in Case Material Is Released or Spilled: No health affects expected from the clean-up of this material if contact can be avoided. Follow personal protective equipment recommendations found in Section 8 of this MSDS. Ventilate the contaminated area.
Safety Data Sheet

Prevent the spread of any spill to minimize harm to human health and the environment if safe to do so. Wear complete and proper personal protective equipment following the recommendation of Section 8 at a minimum. Like with suitable absorbent material like granulated clay. Gather and store in a sealed container pending a waste disposal evaluation.

Section 7 Handling and Storage

Handling: Keep away from heat/sparks/open flames/hot surfaces. – No smoking. Keep container tightly closed. Ground/Bond container and receiving equipment. Use explosion-proof electrical/ventilating/airing.../equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Do not breathe dust/fume/gas/mist/vapors/spray. Wash thoroughly after handling. Do no eat, drink or smoke when using this product. Wear protective gloves/protective clothing/eye protection/face protection.

Storage: Keep container tightly closed. Store in a well-ventilated place. Keep cool. Store locked up.


Section 8 Protection Information

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH (TWA)</th>
<th>STEL</th>
<th>OSHA PEL (TWA)</th>
<th>STEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethanol</td>
<td>N/A</td>
<td>1000 ppm STEL</td>
<td>1000 ppm TWA; 1000 mg/m³ TWA</td>
<td>N/A</td>
</tr>
<tr>
<td>2-Propanol</td>
<td>200 ppm TWA</td>
<td>400 ppm STEL</td>
<td>400 ppm TWA; 380 mg/m³ TWA</td>
<td>N/A</td>
</tr>
<tr>
<td>Methanol</td>
<td>200 ppm TWA</td>
<td>250 ppm STEL</td>
<td>200 ppm TWA; 260 mg/m³ TWA</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Control Parameters

Engineering Measures: Local exhaust ventilation or other engineering controls are normally required when handling or using this product to avoid overexposure.

Personal Protective Equipment (PPE):
Respiratory Protection: No respiratory protection required under normal conditions of use. Provide general exhaust ventilation if symptoms of overexposure occur as explained Section 11. A respirator is not normally required.
Respirator Type(s): None required where adequate ventilation is provided. If airborne concentrations are above the applicable exposure limits, use NIOSH/MSHA approved respiratory protection.
Eye Protection: Wear chemical splash goggles when handling this product. Have an eye wash station available.
Skin Protection: Wear protective gloves. Inspect gloves for chemical break-through and replace at regular intervals. Clean protective equipment regularly. Wash hands and other exposed areas with mild soap and water before eating, drinking, and when leaving work

Gloves:

Section 9 Physical Data

Formula: See Section 3
Molecular Weight: (Ethanol) 46.07
Appearance: Colorless Liquid
Odor: Moderate Alcohol Odor
Odor Threshold: No data available
pH: No data available
Melting Point: 114 °C
Boiling Point: 78 °C
Flash Point: 17 °C
Flammable Limits in Air: (Ethanol) LEL: 3.3% UEL: 19%

Vapor Pressure: 57.3 hPa at 20°C
Evaporation Rate (BisAc=1): 3.3
Vapor Density (Air=1): 1.6
Specific Gravity: (Ethanol) 0.789 at 20°C
Solubility in Water: Soluble
Log Pow (calculated): -0.32
Autoignition Temperature: 363 °C
Decomposition Temperature: No data available
Viscosity: No data available
Percent Volatile by Volume: 90%

Section 10 Reactivity Data

Reactivity: Not generally reactive under normal conditions.
Chemical Stability: Stable under normal conditions.
Conditions to Avoid: Temperatures above the high flash point of this combustible material in combination with sparks, open flames, or other sources of ignition.
Incompatible Materials: Organic Peroxides. Strong acids, Oxidizing materials, Water-reactive materials
Hazardous Decomposition Products: Carbon dioxide
Hazardous Polymerization: Will not occur

Section 11 Toxicity Data
Safety Data Sheet

Routes of Entry: Inhalation and ingestion.
Symptoms (Acute): Respiratory irritation, Dermatitis, Central Nervous System Depression
Delayed Effects: Liver disorders

Acute Toxicity:
Chemical Name | CAS Number | Oral LD50 | Oral LD50 Rat | Oral LD50 mg/kg | Dermal LD50 | Dermal LD50 mg/kg | Inhalation LC50 | Inhalation LC50 mg/L
--- | --- | --- | --- | --- | --- | --- | --- | ---
Ethanol | 64-17-5 | Not applicable | 7060 mg/kg | | | | | 124.7 mg/L
Water | 7732-18-5 | 67-63-0 | Not applicable | 4396 mg/kg | | | | 12800 mg/kg
2-Propanol | 67-56-1 | | | | | | | 12870 mg/kg
Methanol | 67-56-1 | Oral LD50 Rat | 5028 mg/kg | | | | | 15800 mg/kg

Carcinogenicity:
Chemical Name | CAS Number | IARC | NTP | OSHA
--- | --- | --- | --- | ---
Ethanol | 64-17-5 | Listed | Listed | Listed
2-Propanol | 67-63-0 | Not listed | Not listed | Not listed
Methanol | 67-56-1 | Not listed | Not listed | Not listed

Chronic Effects:
Mutagenicity: No evidence of a mutagenic effect.
Teratogenicity: No evidence of a teratogenic effect (birth defect).
Sensitization: No evidence of a sensitization effect.
Reproductive: No evidence of negative reproductive effects.
Target Organ Effects:
Acute: Central Nervous System, Eyes
Chronic: Eyes

Section 12 Ecological Data

Overview: Slight ecological hazard. In high concentrations, this product may be dangerous to plants and/or wildlife.
Mobility: This material is expected to have moderate mobility in soil. It absorbs to most soil types.
Persistence: Biodegradation is expected to be a major fate process for this material.
Bioaccumulation: Bioconcentration is not expected to occur.
Degradability: Biodegrades quickly.
Other Adverse Effects: No data

Chemical Name | CAS Number | Eco Toxicity
--- | --- | ---
Ethanol | 64-17-5 | 96 HR LC50 PIMEPHALES PROMELAS > 100 MG/L (STATIC)
Water | 7732-18-5 | No data available
2-Propanol | 67-63-0 | 96 HR LC50 LEPOMIS MACRORHINUS > 1400000 µG/L
Methanol | 67-56-1 | 48 HR EC50 DAPHNIA MAGNA 2 MG/L (STATIC)
| | | 24 HR EC50 DAPHNIA MAGNA 10800 MG/L
| | | 48 HR LC50 DAPHNIA MAGNA 6200 - 14221 MG/L
| | | 48 HR EC50 DAPHNIA MAGNA 12596 MG/L
| | | 72 HR EC50 DESMOSOMESUS SUBSPICATUS > 1000 MG/L
| | | 96 HR EC50 DESMOSOMESUS SUBSPICATUS > 1000 MG/L

Section 13 Disposal Information

Disposal Methods: Dispose in accordance with all applicable Federal, State and Local regulations. Always contact a permitted waste disposer (TSO) to assure compliance.
Waste Disposal Code(s): If discarded, this product is considered a RCRA ignitable waste, 0001.
Safety Data Sheet

Section 14 Transport Information

Ground - DOT Proper Shipping Name: UN1170 Ethanol Solutions
Air - IATA Proper Shipping Name: UN1170 Ethanol Solutions
Class 3 P.G. II

Section 15 Regulatory Information

TSCA Status: All components in this product are on the TSCA Inventory.

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS Number</th>
<th>§ 313 Name</th>
<th>§ 304 RQ</th>
<th>CERCLA RQ</th>
<th>§ 302 TPQ</th>
<th>TQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethanol</td>
<td>64-17-5</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>2-Propanol</td>
<td>67-63-0</td>
<td>Isopropyl alcohol</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Methanol</td>
<td>67-56-1</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

California Prop 65: WARNING: This product contains a chemical known to the state of California to cause cancer and birth defects or other reproductive harm.

Section 16 Additional Information

Revised: 04/01/2013 Replaces: 03/19/2013 Printed: 06-21-2013

The information provided in this (Material) Safety Data Sheet represents a compilation of data drawn directly from various sources available to us. Carolina Biological Supply makes no representation or guarantee as to the suitability of this information to a particular application of the substance covered in the (Material) Safety Data Sheet.

Glossary

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACGIH</td>
<td>American Conference of Governmental Industrial Hygienists</td>
</tr>
<tr>
<td>CAS</td>
<td>Chemical Abstract Service Number</td>
</tr>
<tr>
<td>CERCLA</td>
<td>Comprehensive Environmental Response, Compensation, and Liability Act</td>
</tr>
<tr>
<td>DOT</td>
<td>U.S. Department of Transportation</td>
</tr>
<tr>
<td>IARC</td>
<td>International Agency for Research on Cancer</td>
</tr>
<tr>
<td>N/A</td>
<td>Not Available</td>
</tr>
<tr>
<td>NTP</td>
<td>National Toxicology Program</td>
</tr>
<tr>
<td>OSHA</td>
<td>Occupational Safety and Health Administration</td>
</tr>
<tr>
<td>PEL</td>
<td>Permissible Exposure Limit</td>
</tr>
<tr>
<td>ppm</td>
<td>Parts per million</td>
</tr>
<tr>
<td>RCRA</td>
<td>Resource Conservation and Recovery Act</td>
</tr>
<tr>
<td>SARA</td>
<td>Superfund Amendments and Reauthorization Act</td>
</tr>
<tr>
<td>TLV</td>
<td>Threshold Limit Value</td>
</tr>
<tr>
<td>TSCA</td>
<td>Toxic Substances Control Act</td>
</tr>
<tr>
<td>IDLH</td>
<td>Immediately dangerous to life and health</td>
</tr>
</tbody>
</table>
Laboratory Safety Training
Hazardous Waste Refresher
Biomedical Waste Refresher
Hazardous Communication
Personal Protective Equipment
Slips, Trips, and Falls
Hearing Conservation
Golf Cart Training
Asbestos Awareness Training
Fire Prevention Safety Training

Environmental Health & Safety

4202 E. Fowler Ave. OPM 100
Tampa, FL 33620
(813) 974-4036
http://www.usf.edu/eh&s/