

Laboratory Safety Training

Environmental Health and Safety



Why You Need Lab Safety Training

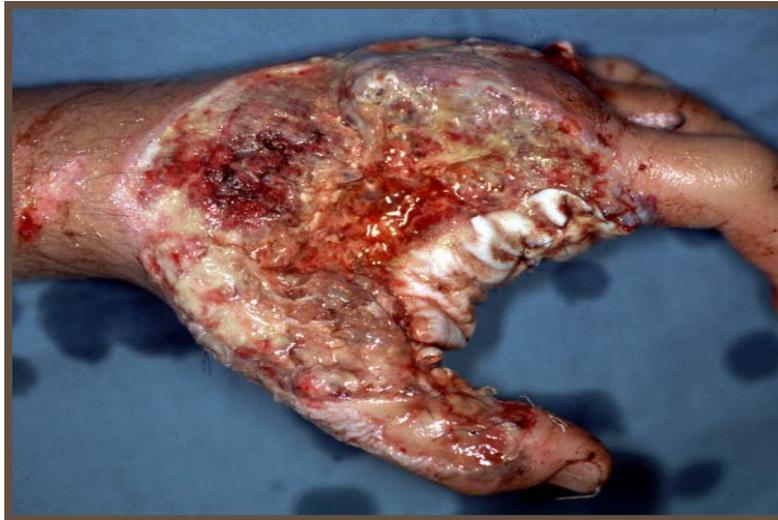
- Hazardous materials and/or equipment. You need to understand the risks and how to mitigate them.
- OSU requires training as part of its overall risk management and safety programs.
- Training is required under various state and federal regulations.

Some Consequences of Unsafe Research Work Practices



- Damage to property
- Work results compromised or lost
- Fines, sanctions
- And most importantly...

Some Consequences of Unsafe Research Work Practices



- Personal injury or illness
- Death or disablement

Roles and Responsibilities

- You are responsible for your own safety!
- Principal investigators / supervisors
 - responsible for training personnel in safe conduct of specific tasks, safe equipment use, and for ensuring compliance with rules
- Environmental Health & Safety
 - providing guidance, support and assistance for lab safety and regulatory compliance

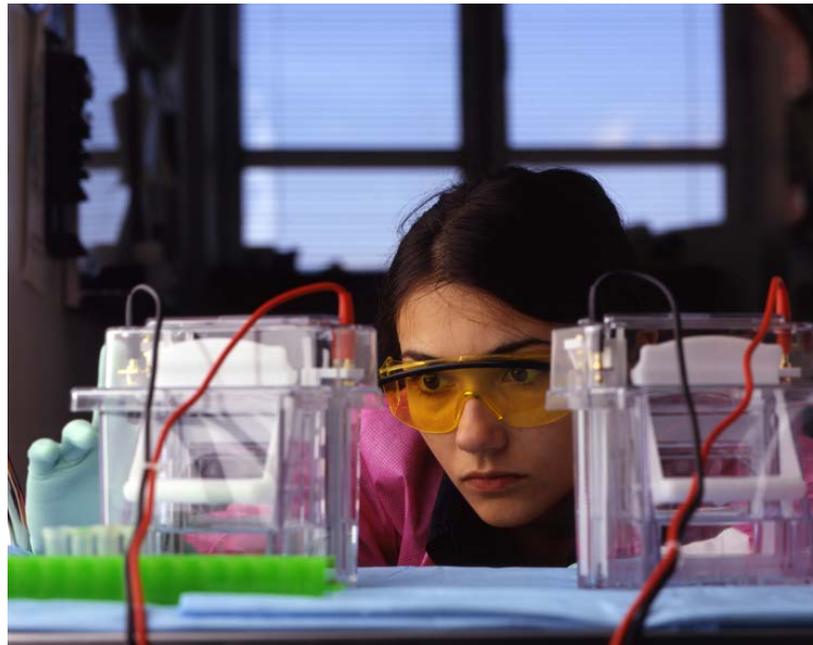
Keys to Safety in the Laboratory

- Containment
 - Two layers of containment or more
- Personal Protection
 - Use appropriate personal protective equipment.
- Disposal
 - Collect and discard used hazardous materials and wastes properly.
- Equipment
 - Operate research equipment properly; use safety devices.

Keys to Safety in the Laboratory

Recognizing and understanding hazards present:

- Toxic / hazardous chemicals
- Biological / radiological hazards
- Equipment

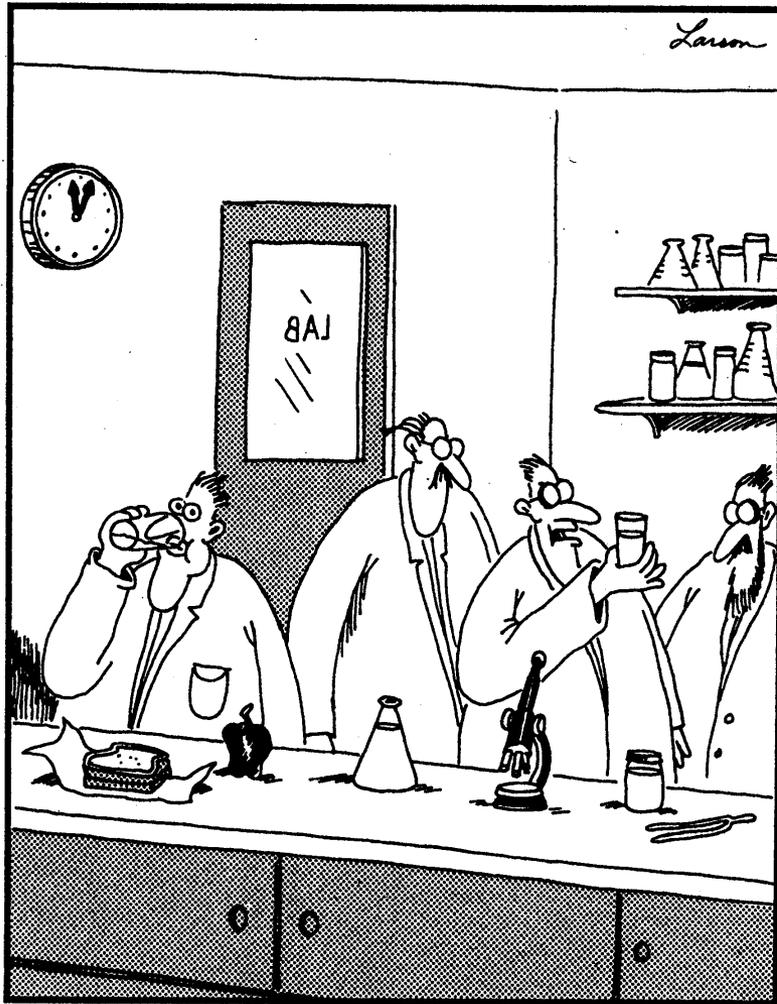


OH LAB SAFETY...

TELL ME MORE!

makeameme.org

You must follow safety rules at OSU.



- No consumption or storage of food or drink in labs.
- No handling of contact lenses, application of lip balm or cosmetics in labs.

“What the? ... This is lemonade!
Where’s my culture of amoebic dysentery?”

More rules...



Proper lab attire minimizes exposed skin.
Absolutely no open toe footwear!

Pay attention to warning labels and signs.

Hazards must be identified by appropriate signage.

CAUTION

 CAUTION RADIOACTIVE MATERIALS	 BIOHAZARD	BIO SAFETY LEVEL 2	 TOXIC GAS	 TOXIC CHEMICALS	 CANCER HAZARD
CANCER SUSPECT AGENT	Reproductive Hazard	 Food & Beverage Prohibited			



Legend	
Blue	Health Hazard
Red	Fla
Yellow	Reactivity
White	Other Hazard (reacts with water or is an oxidizer)
Numbers are used to rank the degree for each type of hazard: 4 = extreme hazard 3 = serious hazard 2 = moderate hazard 1 = slight hazard 0 = no or minimal hazard	
Special Notes	

Principal Contact: John Doe Room: 99B 999 Phone: 555-5555	
Department Pharmacology	
Emergency Contact: John Doe Campus Phone: 555-5555 Home Phone: 615-555-5555 Cell Phone: Pager:	Emergency Contact: Campus Phone: Home Phone: Cell Phone: Pager:
in the event of an emergency, please contact VUPD at 1-1911. (Before removing sign, please contact VEHIS at 2-7057)	
Posted	Posted by



Transporting Hazardous / Biological Materials

- Transporting of hazardous or biological materials:
 - Layers
 - leak-proof
 - compatible with chemicals.
- Use a university vehicle if possible. If using a personal car, make sure you know if your insurance will cover accidents.
- Have spill remediation materials in the vehicle.



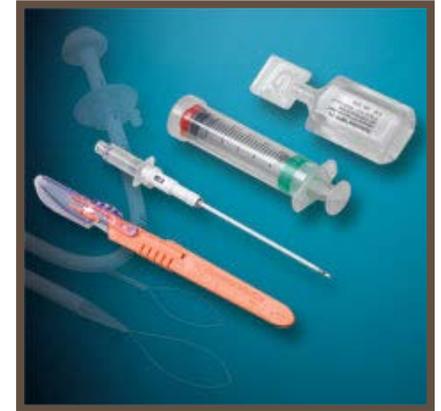
Safety Equipment

- If properly used, safety equipment can reduce risks prevent exposures to hazardous materials.
- Know:
 - where to find
 - how to use
- Accessibility:
 - close to work
 - tested / certified

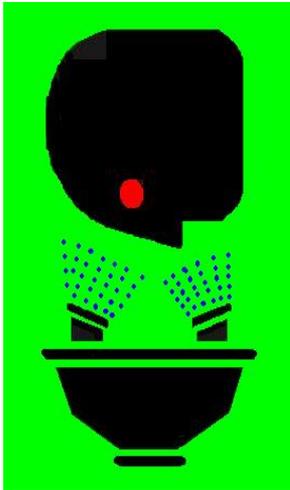


Become familiar with safety equipment in your lab

- Biological Safety Cabinet
- Safety engineered sharps
- Eyewash / Safety showers
- Fire extinguisher
- First aid kits
- Fume Hoods
- Spill kits
- Respirators and other specialized equipment



Emergency Eyewash & Showers



- Know where they are
- Know how to use them

Provide Unobstructed Access

- Eyewash must be accessible **with no obstacles** or doors in between the worker and the eyewash.
- Activate the eyewash and lean over the unit to flush the eyes out.



Chemical Fume Hoods

Use a chemical fume hood for opening or working with volatile chemicals.



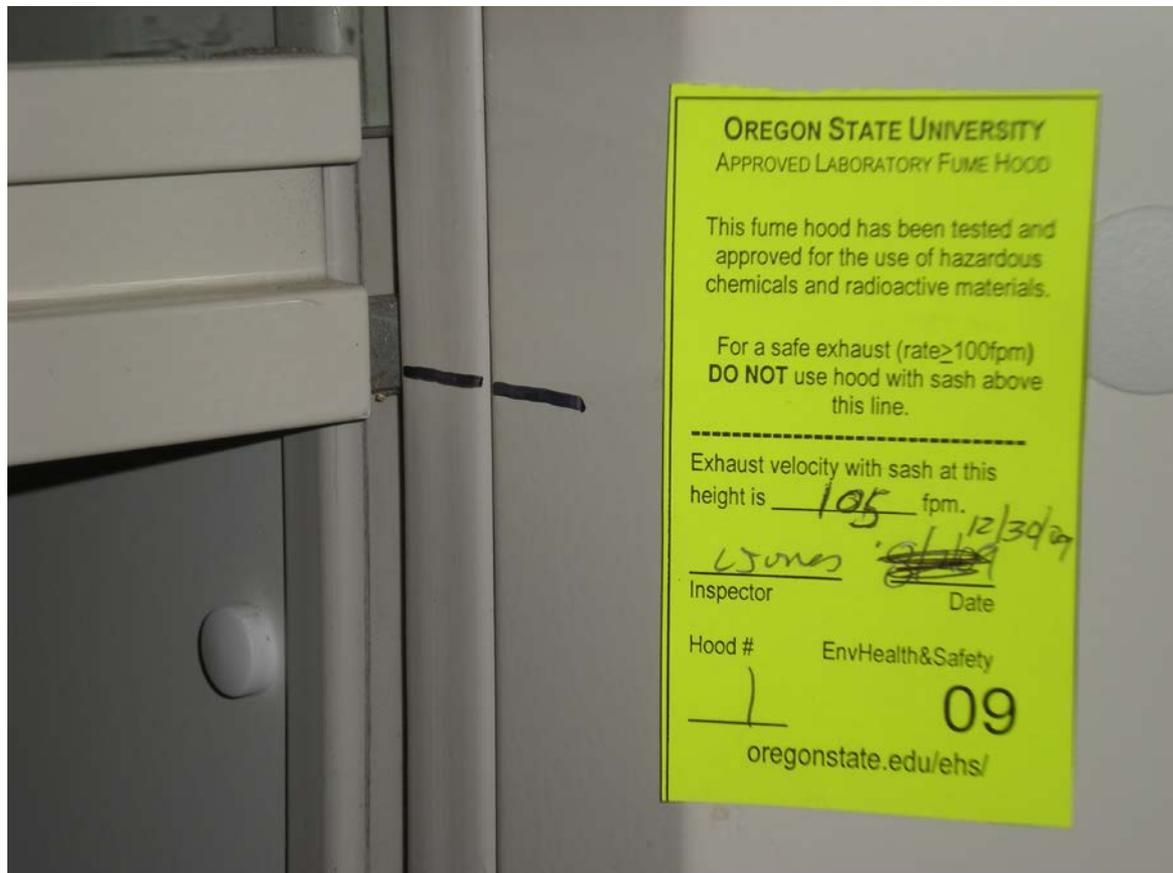
Chemical Fume Hood: Proper Use

- Work 5-6" back from hood face
- Use personal protective equipment (gloves, lab coat, eye protection)
- Move slowly: sash, equipment, and YOU
- Keep countertop / workspace as clear as possible
- Electric connections and plugs: **outside the hood**



Chemical Fume Hood: Proper Use

- Sash height
- Recent flow measurement label?



Clean Benches

“Clean benches” work by pushing HEPA filtered, sterile air over the work surface...directly at the worker.

Never use for volatile chemicals or biological hazards.



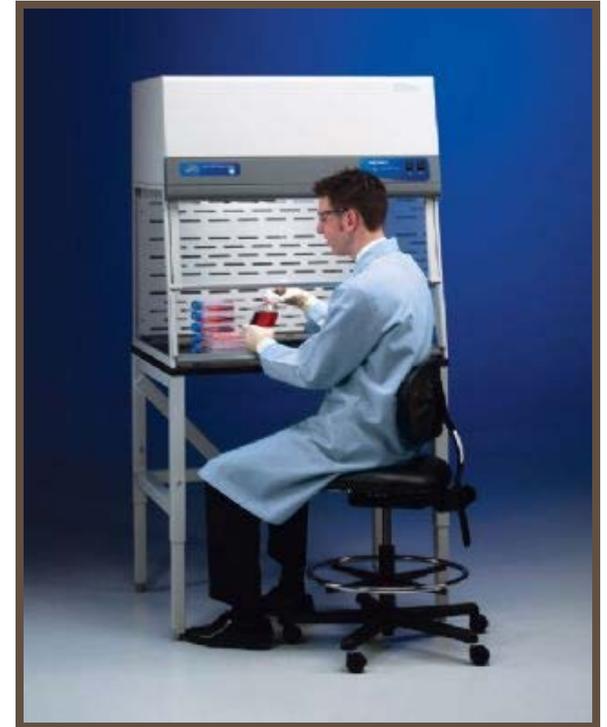
They protect the product from microbial contamination, but not the worker.

Biological Safety Cabinet

Class I or Class II.

Class I = protection for worker, but not the “product” from biological or particulate materials.

- terminal hazardous biological materials
- sterility is not a concern
- particulate hazardous materials.



Biological Safety Cabinet

Class II = 2 way protection

Use when:

- Handling biological hazards (infectious agents)
- Cell or tissue culture
- Infected or carcinogen – treated small animals
- Particulate hazards present



Working in a BSC – Biosafety Cabinet

- Placement
- Clean/disinfect work surfaces before and after work.
- Slow deliberate movements
- Place supplies in the BSC when working, remove them when done.



Other Safety Equipment: Fire Extinguishers

- Fire extinguishers: in hallways, maintained by OSU; know where the nearest one is.
- Training
- Never attempt to use on large fires; **get out and call 911.**



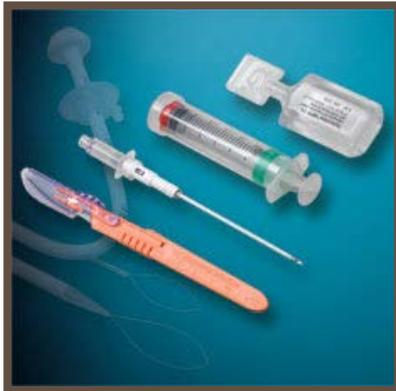
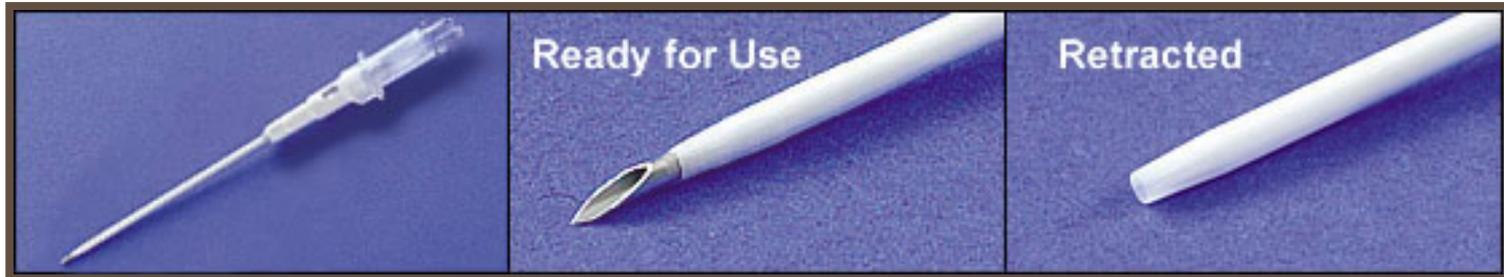
Other Safety Equipment: First Aid Kits

- Accessible – can be in hallways or in labs.
- Maintenance
- Training



Other Safety Equipment: Safety Engineered Sharps

- Can you use safety sharps?



Spill Kits

- Every lab should have one or more spill kits, depending on the nature of the liquid materials being used.
- Spill kits should be readily available, restocked as necessary, and workers should be trained on use of the kits.



(Absorbs 20 litre)



Work Practices are the heart of safety in labs.

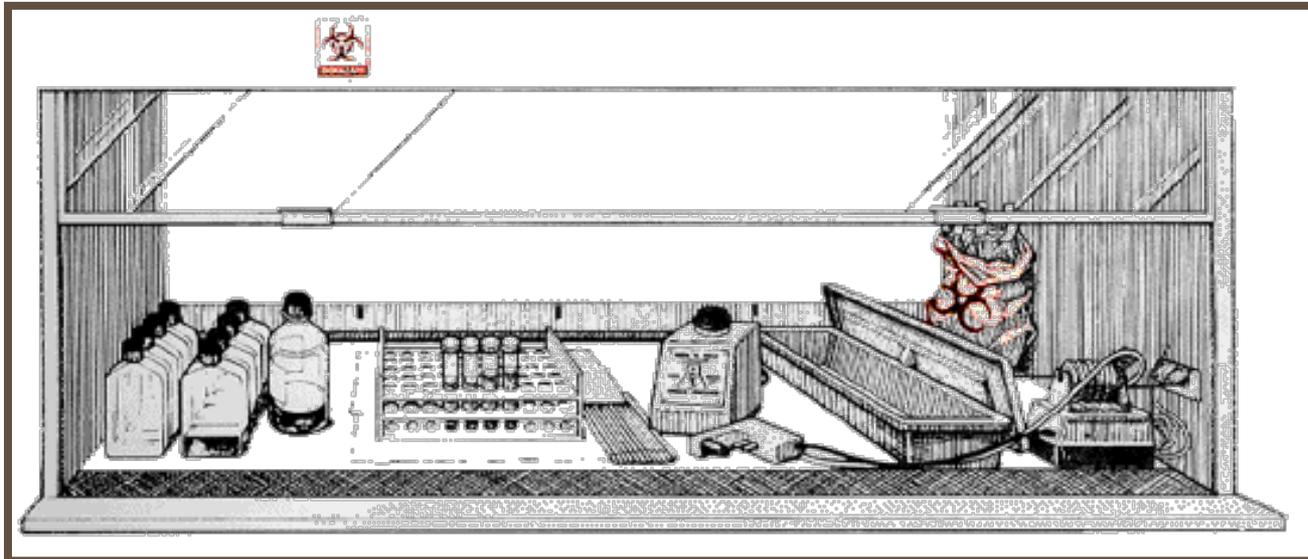
Good work practices promote safety in the lab:

- Organization / planning work in advance: SOPs (standard operating procedures)
- Personal protective equipment
- Safe operation of research equipment
- Hand hygiene



Work Practices: Organize your Work

- Before you start work:
- collect materials
- organize



Don't Rush!

- Work deliberately and efficiently, but not so fast that you begin to make mistakes.
- Avoid distractions when performing tasks involving hazardous materials.



Personal Protective Equipment

- Gloves

Use whenever handling chemical or biological materials.

- Lab Coat

Wear at all times in the lab to protect your clothing and provide a barrier.

- Eye Protection

Potential for splashes or impact?

Gloves



- required for any hand contact with blood, cultures, infected or sick animals, potentially contaminated equipment
- required when handling hazardous chemicals
 - material compatibility?
- required for cleaning spills and handling wastes

More About Gloves...

Discard
appropriately



Remove appropriately

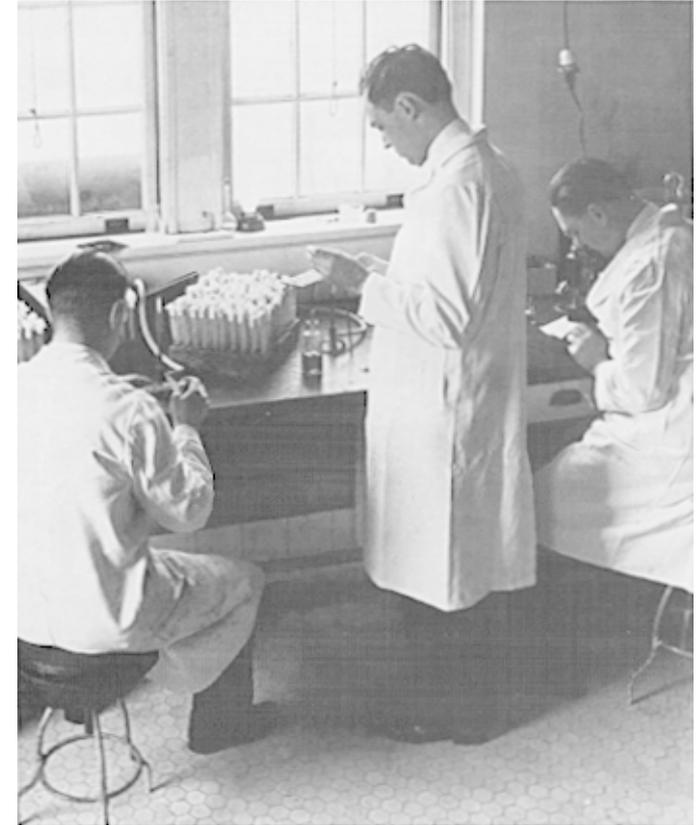


Remove gloves
before leaving the
lab for common-use
areas of the building.

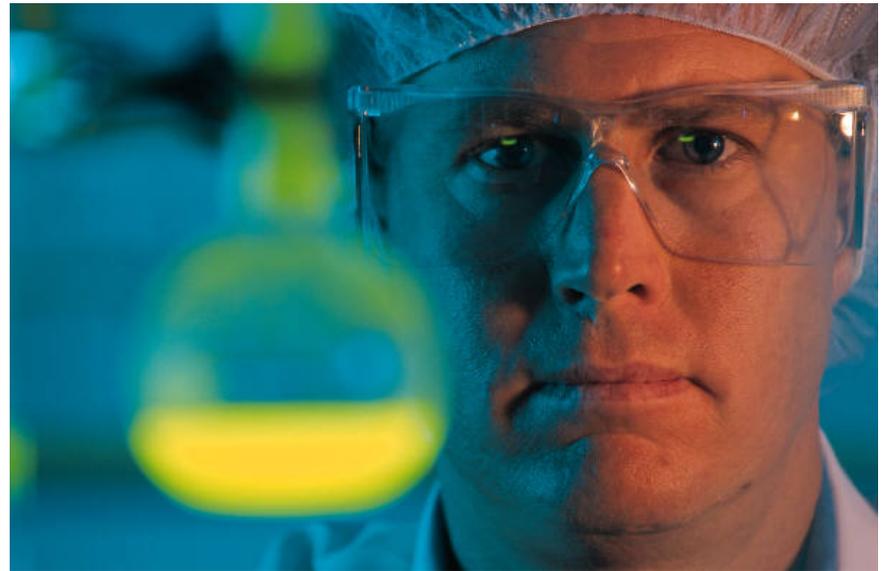
Lab Coats or other Protective Clothing

Lab coat, gown or other protective clothing

- an old-fashioned idea still relevant
- recommended at all times in the lab
- leave in the lab
- laundering considerations



Protect your eyes!



Safe Equipment Use: Centrifuge Safety

- Fatigue, corrosion, mechanical stress, spills, leaks, aerosols
- Clean up hazardous material spills promptly
- Proper loading, operation, maintenance

Manufacturer's instructions

Lab SOP



Safe Equipment Use: Drying Ovens



Manufacturer's manual or summary of instructions should be available

Prepare a Lab SOP that contains:

- Instructions for setup, loading, shut down



Safe Equipment Use: Autoclave Operation

- Potentially hazardous biological wastes must be treated before discard – usually by autoclaving.
- An autoclave is a pressurized chamber filled with steam = very hot.



Safe Equipment Use: Autoclave Operation

- Close the autoclave door securely before starting the cycle.
- When opening the autoclave after use, open slowly to allow steam to escape.
- Use autoclave gloves to remove hot items.



Safe Equipment Use: Gas Cylinder Safety

- Contents identified
- Protective caps
- Provide proper storage, moving and ventilation
 - check for incompatible gases
- **Secured with chain or strap** around upper third of cylinder, or in a storage cage.





Waste Disposal Rules

An important element of safety in labs is proper disposal of hazardous waste materials, both chemical and biological.

Chemical Waste: Rules for Collection and Handling

- Waste containers closed.
- No funnels kept in containers! →
- **Complete the online hazard communication and hazardous waste training!**



Interior Drains: Sanitary Sewer Requirements for Disposal



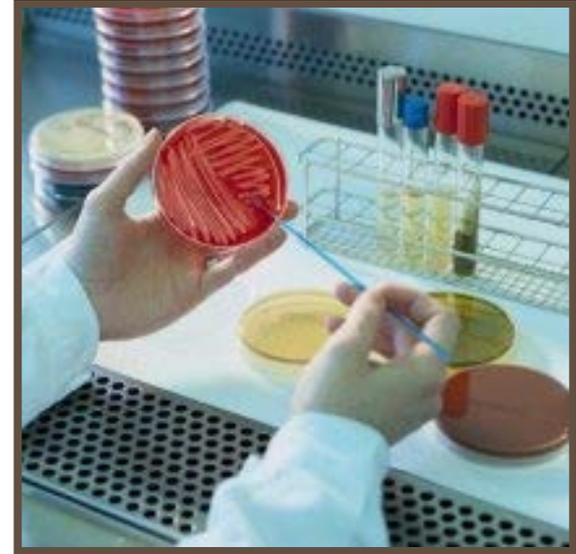
Only certain chemicals can legally be put down the drains.

For specific information, see the OSU Safety Instruction #84 “Wastewater Disposal Guidelines” available at: <http://oregonstate.edu/ehs/safety-instructions>

Biological Wastes

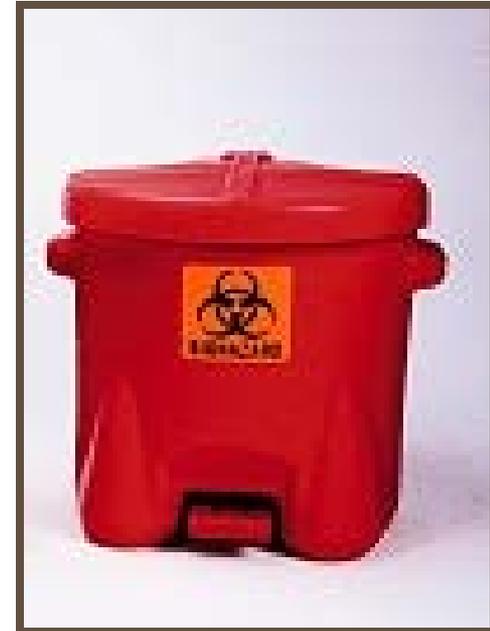
Biological wastes include:

- Microbial cultures, stocks and associated materials
- Used sharps (including syringes without needles)
- Animal carcasses
- Tissue and body parts



Biological Wastes

- Generators (laboratories) must segregate wastes.
- Certain biological materials must be treated (usually by autoclaving) before entering the waste stream; some must be incinerated.



Biological Wastes: Cultures and Stocks

- Collect into autoclavable biohazard bags in hard-sided, leak-proof containers with lids and hazard warning.
- Cultures, stocks and associated wastes must be autoclaved before entering the waste stream.
 - Test tubes, gloves, culture fluids, petri dishes, pipette tips, etc.

Biohazardous Solid Wastes



Incorrect segregation



Correct segregation

Drain Disposal for Biological Materials

Liquid culture wastes, liquids generated during culturing, live or attenuated vaccines may **not** be disposed of via drains prior to treatment by autoclaving.





Be prepared for emergencies.

Know what to do if an emergency situation occurs.

Fires

- When in doubt, call 911, pull a fire alarm, exit the building.
- Small fires can sometimes be extinguished, but can quickly get out of control – especially if there are flammable chemicals involved.
- Fire extinguishers are located in corridors.

Do not put yourself at risk by using a fire extinguisher.

You should not use an extinguisher without training.

Spills

Small spills of hazardous materials can often be dealt with by laboratory personnel.

- Warn others – secure the area
- For volatile hazardous chemical outside a fume hood, evacuate the area and call EH&S.
- Put on/wear personal protective equipment before attempting to clean or contain a spill.
- Use absorbent materials to contain and soak up liquids; if biological, use effective disinfectant.
- Use appropriate containment (bags, etc.) to collect and dispose of absorbed hazardous materials.

Medical Emergencies



For emergencies, dial 911.

- For splashes of hazardous chemical or biological materials into the eyes, nose or mouth, flush extensively with water using an eyewash station; seek medical attention.
- For sharps accidents, cuts or abrasions, cleanse the wound with soap and water, treat with antiseptic from the First Aid Kit, then seek medical attention as necessary.