



UH JABSOM EHSO

Laboratory Safety Training

STEP UP Workshop
JABSOM Kaka'ako

JABSOM EHSO



What We'll Cover

- Regulatory Agencies
- Hierarchy of Controls
- Site-Specific and Task-Specific Training
- Safety Manuals & Plans
- Designation of Responsibilities
- Good lab practices
- Types of hazards, signs and symptoms of exposure
- Standard Operating Procedures
- Personal Protective Equipment
- Material Safety Data Sheets (MSDS)
- Methods of controlling hazards
- Decontamination
- Waste Disposal
- Spill Response
- Emergency Preparedness & Response





Compliance/Oversight & Regulatory Agencies

- Occupational Health
- Biological Safety Program
- Radiation Safety Program
- Fire Safety Program
- Hazardous Materials Management Program
- Dive Safety Program
- Environmental Compliance Program
- Institutional Biosafety Committee
- **EPA** - Environmental Protection Agency
- **HDOH** – Hawaii Department of Health (local EPA enforcement)
- **NIH**
- **CDC**
- **Hi Department of Agriculture**
- **USDA**
- **OSHA** – Occupational Safety and Health Administration
- **HIOSH** – Hawaii Occupational Safety and Health (local OSHA enforcement)
- **C&C of Honolulu**



Compliance & Safety Hierarchy of Controls

- Administrative Controls
 - Developing and Implementing Safety Plans (SOP's), Designation of Responsibilities, Training, Authorization & Security, Signage, Pest Management Plan, Health Surveillance
- Work Practices
 - Prudent Practices, Good Lab Technique, Reporting Incidents/Near Misses, etc.
- Engineering Controls
 - Chemical Fume Hoods, Biosafety Cabinets, Facility Design, HEPA Filters, Centrifuge Safety Accessories, etc.
- Personal Protective Equipment

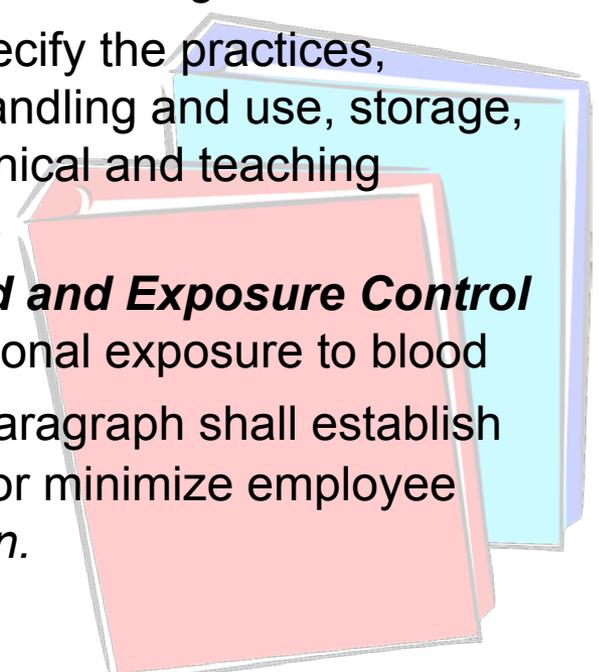


Safety Manuals and Plans

Chemical Hygiene Plan means a written program developed and implemented by the employer which sets forth procedures, equipment, personal protective equipment and work practices that are capable of protecting employees from the health hazards presented by hazardous chemicals used in that particular workplace, per OSHA. *Includes EPA Hazardous Materials Management Plan.*

Biosafety Manual The purpose of this manual is to specify the practices, procedures, and requirements for procurement, safe handling and use, storage, and disposal of biological commodities for research, clinical and teaching activities. *Includes Infectious Waste Management Plan.*

Biological Agents, Bloodborne Pathogens Standard and Exposure Control Plan Each employer having an employee with occupational exposure to blood or other potentially infectious materials as defined by paragraph shall establish a written Exposure Control Plan designed to eliminate or minimize employee exposure. *Includes Infectious Waste Management Plan.*





Training

- General Awareness Training
- Task and Site Specific Training
- Documentation
- Record Keeping

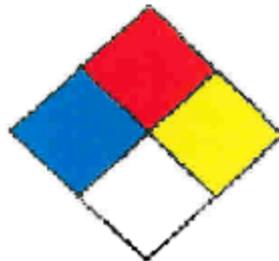
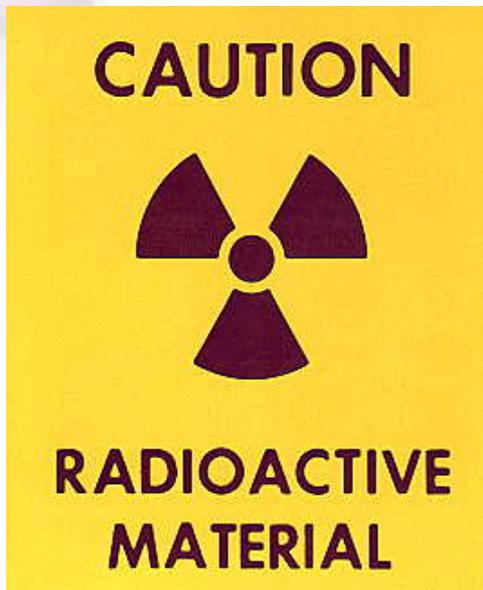


Authorization and Security

- Only those who successfully complete all the required trainings should be allowed to handle hazardous materials in the lab.
- Only those who have demonstrated competency in the lab should be allowed to work unsupervised.
- No unauthorized individuals should be allowed in the laboratories.
- Restrict access to laboratories and areas where hazardous materials are stored.



Signage





General Lab Rules – Prudent Practices

- Read and understand the Safety Manuals, SOPs, MSDSs, etc., and ask any questions or express any concerns before you start to handle hazardous materials.
- Close and lock lab doors when no one is in the lab.
- No children and no pets allowed in the lab.
- No food or drink allowed in the labs or areas designated for laboratory material storage.
- No applying cosmetics, handling contacts, etc. allowed in the labs.
- No mouth pipetting!
- Don't rush; don't run through the labs.
- Wash your hands after you remove PPE and before leaving the lab.
- Observe the “NO PPE outside of the lab” rule.
- Transport hazardous materials safely.



General Lab Rules, cont.

- Maintain an organized and tidy work area.
- Clean up any spilled material immediately.
- Decontaminate as required (work surface, equipment, etc.).
- Properly manage hazardous materials (labeling, hazard communication, inventories, waste preparation, etc.).
- Properly manage hazardous waste.
- Close all chemical and biological containers when you walk away.
- Work with toxic materials in only designated work areas.
- Work with hazardous and volatile chemicals inside a properly operating fume hood.
- Work with infectious agents inside a properly operating biosafety cabinet.
- Report all suspicious or hazardous situations.
- Report all potential exposures, accidents, near misses.

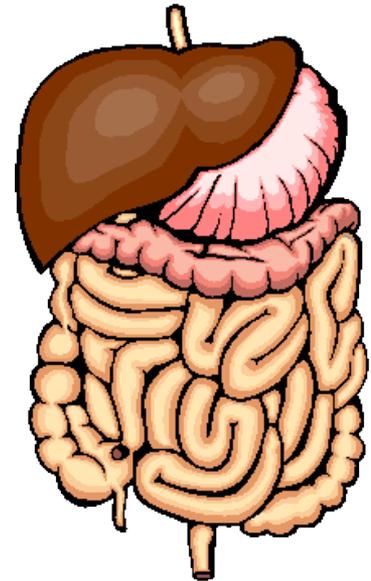
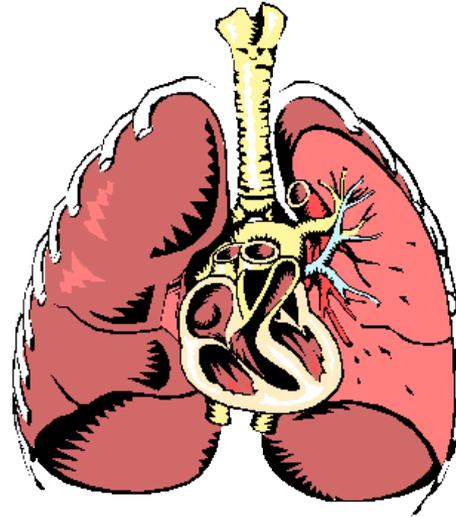


Routes of Exposure
Signs and Symptoms of Exposure



Routes of Entry

- Inhalation
- Ingestion
- Absorption
- Injection/cut, etc.





Health Effects

■ **Acute Effects** –

Immediate damage;
Large amount over
short period of time

- What chemicals can cause acute effects?

■ **Chronic Effects** –

Accumulated damage;
small amount over long
period of time

- What chemicals can cause chronic effects?
- What's the danger with working with these chemicals?

Signs and Symptoms of Exposure

- Skin reactions
- Difficulty breathing
- Dizziness
- Tear development / Burning of the eye
- Exposure monitoring will be conducted when there is reason to believe that exposures are in excess of the action-level or the PEL.
 - **Threshold Limit Value (TLV)** – term used to express air concentration of a material to which an individual can be repeatedly be exposed to day after day, WITHOUT adverse effects
 - **Permissible Exposure Limit – (PEL)** Exposure limit established by OSHA; usually an 8 hour time weighted average air concentration of a material





Types of Hazards Risk Assessments

Types of Hazards 1 of 4





Types of Hazards 2 of 4

➤ Chemical

- Flammable/Combustible
- Acids and Bases
- Oxidizers
- Reactives
- Mutagens
- Carcinogens
- Toxics & Poisons
- Asphyxiants



➤ Biological

- Blood and other Potentially Infectious Materials
- Bacteria
- Viruses
- Recombinant DNA
- Biosafety Level 2 & 3
- Select Agents

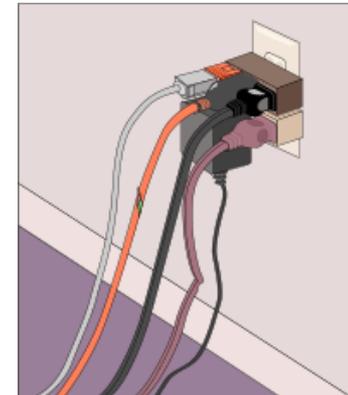




Types of Hazards 2 of 4

Physical & Electrical

- Overloading circuits, extension cords, piggy backing
- SHARPS, Needles, Glass & Pipettes
- Tripping Hazards
- Compressed Gases – Capped when not in use and secured
- Cryogenic Liquids





Types of Hazards 4 of 4

- **Radiological**

- Radioisotopes
- X-Ray
- Lasers





Biohazards & Biosafety



Biohazard

Biohazard

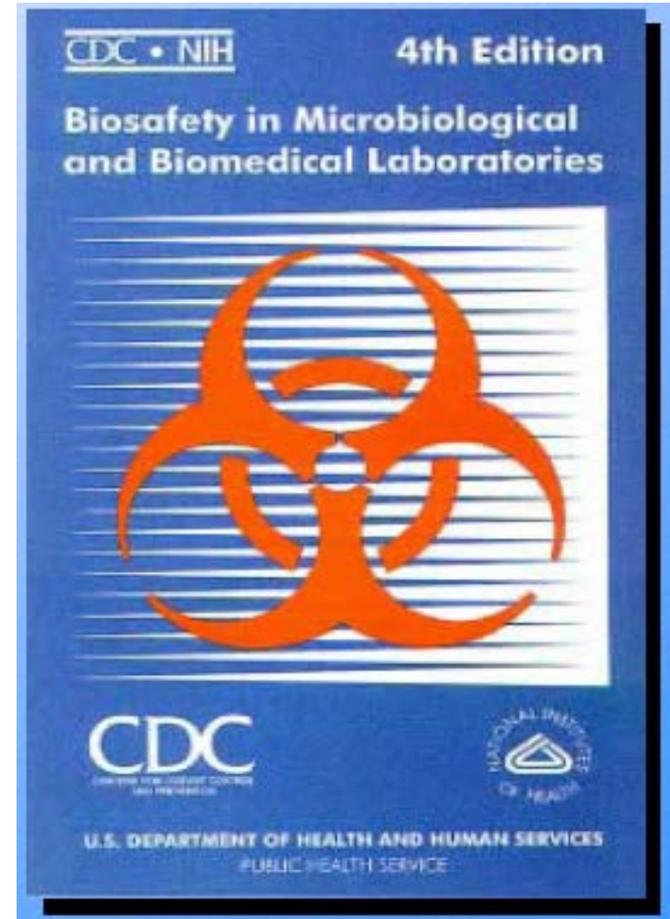
An agent of biological origin that has the capacity to produce deleterious effects on humans, i.e. microorganisms, toxins and allergens derived from those organisms; and allergens and toxins derived from higher plants and animals.





Biosafety Levels

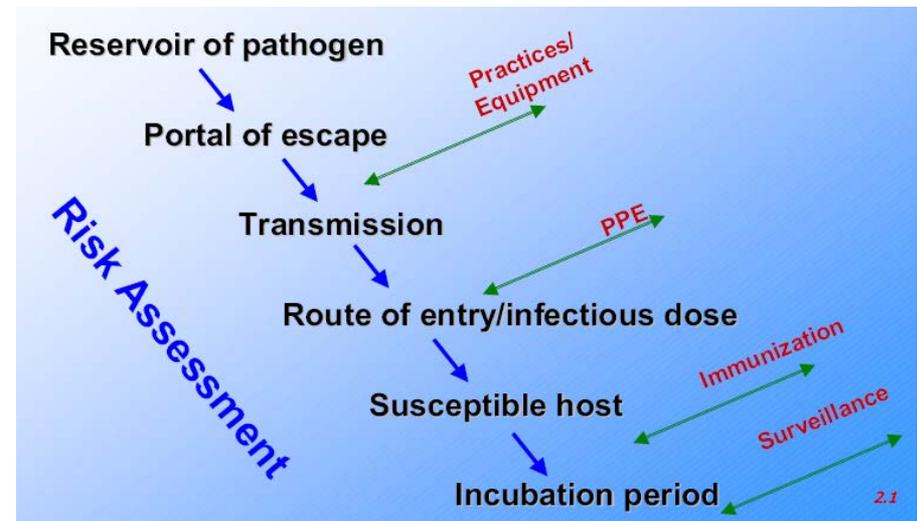
- **BSL1** - agents not known to cause disease.
- **BSL2** - agents associated with human disease.
- **BSL3** - indigenous/exotic agents associated with human disease and with potential for aerosol transmission.
- **BSL4** - dangerous/exotic agents of life threatening nature.





Biosafety – Risk Assessment

- What is the natural host?
- Does the pathogen cross or jump species barriers?
- Is the pathogen a “wild type” or “attenuated” strain?
- Does the agent typically infect normal healthy or immunocompromised individuals?
- What is the mode of transmission?
 - Contact
 - Fomites
 - Mucous Membrane
 - Ingestion
 - Inoculation/Vector
 - Inhalation
- What is the volume manipulated, stored?
- What is the concentration?
- What is the infectious dose?
- How many documented LAI's?
- What is the probability of secondary spread?
- What is the availability of prophylaxis (immunizations, vaccinations, treatment)?





Biosafety Level 1 (BSL1)

BSL1 is suitable for work involving well-characterized agents not known to consistently cause disease in immunocompetent adult humans, and present minimal potential hazard to laboratory personnel and the environment.

- ***Labs are not necessarily separated from the general traffic patterns in the building.***
- ***Work is typically conducted on open bench tops using standard microbiological practices.***
- ***Special containment equipment or facility design is not required, but may be used as determined by risk assessment.***
- ***Lab personnel must have specific training in the procedures conducted in the lab and must be supervised by a scientist with training in microbiology or related science.***

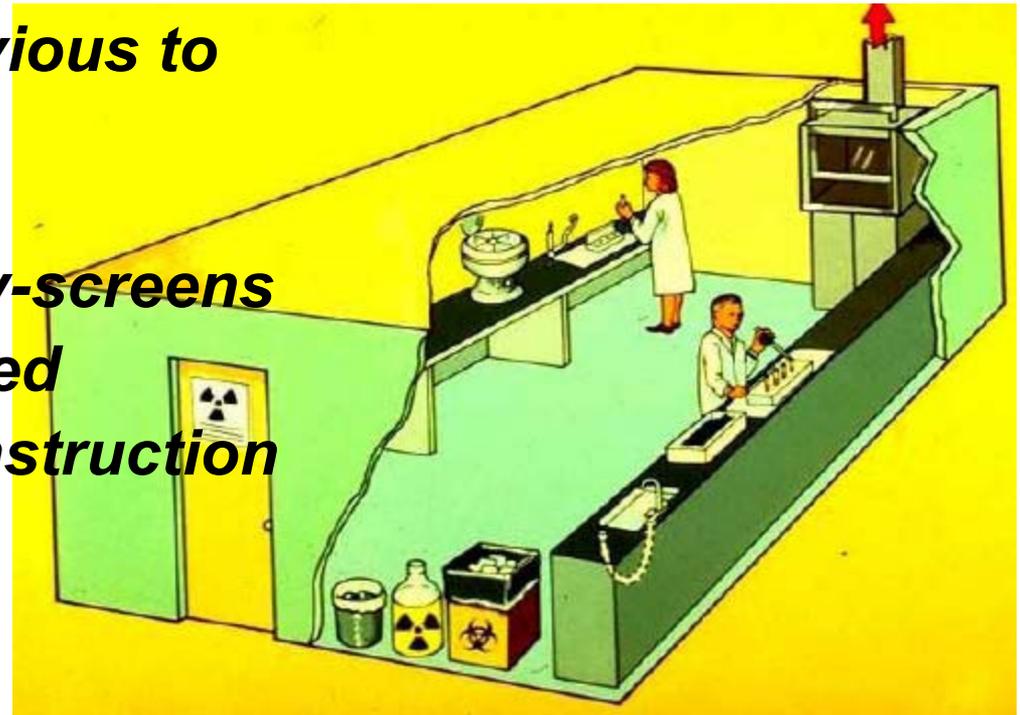




BSL1 Facility Design, Construction (Secondary Barriers)

Requirements:

- **Laboratories have doors**
- **Sink for hand washing**
- **Work surfaces easily cleaned**
- **Bench tops are impervious to water**
- **Sturdy furniture**
- **Windows fitted with fly-screens**
- **Location - not separated**
- **Structure - normal construction**
- **Ventilation - none**





Biosafety Level 2 (BSL2)

BSL2 builds upon BSL1. BSL2 is suitable for work involving agents that pose moderate hazards to personnel and the environment. It differs from BSL1 in that:

1) Lab personnel have specific training in handling pathogenic agents and are supervised by scientists competent in handling infectious agents and associated procedures

2) Access to the lab is restricted when work is being conducted

3) All procedures in which infectious aerosols or splashes may be created are conducted in Biosafety Cabinets or other physical containment equipment





BSL2 Facility Design & Construction

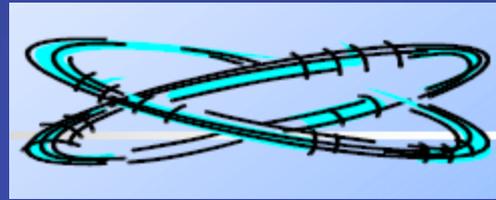
Requirements: (BSL1 Facilities PLUS)

- *Laboratories have lockable doors*
- *Sink for hand washing*
- *Work surfaces easily cleaned*
- *Bench tops are impervious to water*
- *Sturdy furniture*
- *Biological safety cabinets installed as needed*
- *Adequate illumination*
- *Eyewash readily available*
- *Air flows into lab without re-circulation to non-lab areas*
- *Windows fitted with fly-screens*
- *Restricted access when working with pathogens*
- *Autoclave is available*
- *Eyewash station is available*
- *Location - separated from public areas*
- *Structure - normal construction*
- *Ventilation - directional*





Centrifuges



Hazards

- Mechanical failure of machine
- Lab equipment failure (tubes etc.)
- Aerosol generation
- Operator error

Operating Procedure

1. Check tubes for cracks/chips.
2. Use matched sets of tubes, buckets etc.
3. Tightly seal all tubes and safety cups.
4. Ensure that rotor is locked to spindle and bucket seated.
5. Close lid during operation.
6. Allow to come to complete stop before opening.
7. Wait 5-30 minutes after the each run before opening the centrifuge.
8. Remove the rotor and place in a BSC before opening.

Safe Operation

- Use safety cups whenever possible
- Disinfect weekly and after all spills or breakage's
- Do not use rotors that have been dropped
- Balance your samples
- Contact your centrifuge rep for specific information
- Microcentrifuges can be placed in a BSC

Types

Speeds (rpm)

Microcentrifuges

~15,000

Low/high speed

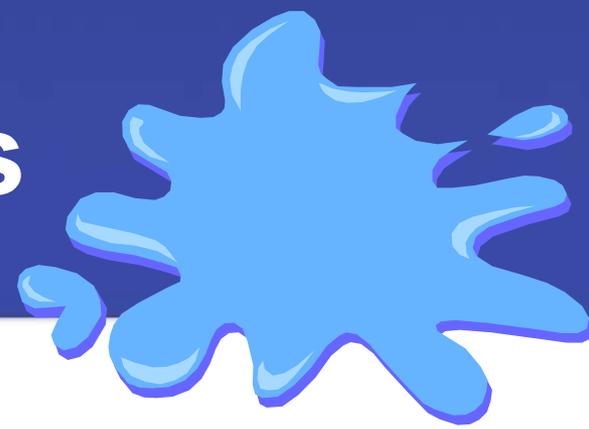
2,000 – 20,000

Ultracentrifuges

~ 120,000



Minimize Aerosols



- Use careful pipetting practices
- Avoid drops onto hard surfaces – cover lab benches with bench protectors
- Wipe up spills promptly with appropriate disinfectant
- Use capped tubes when mixing, blending, or vortexing
- Pour liquids carefully
- Avoid bubbles





Pipetting Techniques

- Never blow out last drop in pipette
- Use pipetting aids with filters
- Discharge liquid down side of container, using tip-to-wall contact
- Deliver as close as possible to contents
- For ejection of liquid from micropipette
 - No blowout
 - No pressure ejection
 - Use wall contact
- Work over plastic-backed absorbent matting (ensure it doesn't slide forward or backward blocking air grill in a BSC)





Biological WASTE

Types

- *cultures, stocks, isolates*
- *materials containing or contaminated with*
- *blood*
- *sharps*
- *pipettes, wrappers, tips*

Disposal

- *puncture-proof, leak-proof, sealable receptacles*
- *avoid over-filling*
- *dispose properly*
- *Never place lab waste into office waste containers*
- *Place sharps into “sharps” container*
- *Line discard containers with autoclave bag*
- *Decontaminate discard pans before they leave the lab:*
 1. Disinfect outside
 2. Label
 3. Tape ends with autoclave tape
 4. Secure for transport to autoclave





Decontamination

Autoclave

- *Hazards*
- *Ensure proper functioning of autoclave*
- *Vessels should not be capped or plugged*
- *Large loads require longer contact time*
- *Excessive amounts of liquid should not be added to load*
- *Quality Control*



Chemical

- *Bleach, 70% Ethanol, Quaternary Ammonium, VHP, etc.*
- *EPA registered disinfectants must be used strictly according to manufacturer label instructions*
- *Agent specific considerations*
- *Contact time*
- *Reactivity*
- *Hazards*

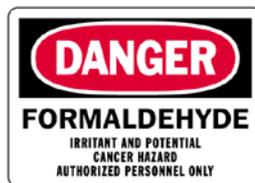


Let's Focus on Chemical Hazards



Chemical Hazards

- **Corrosives, Flammables, Oxidizers, Asphyxiants, Reactives**
- **Carcinogens** or Suspected Carcinogens
 - Examples include commonly found in the lab include Formaldehyde, Benzene, and Methylene Chloride (Dichloromethane)
- **Reproductive Toxins** – Chemical which affect reproductive capabilities including chromosomal damage (mutagenic) and effects on fetuses (teratogenic)
 - Thalidomide, Benzene, Lead
- **Highly Acute Toxins**
 - Cyanide, phosphorus, strychnine, or any other materials with a LD50 and/or LC50
- **When working with carcinogens, reproductive or highly acute toxins, YOU MUST:**
 - Always use the chemicals in a properly operating fume hood
 - Use in a designated area away from commonly occupied lab areas





Material Safety Data Sheets 1 of 2

- MSDSs for each chemical must be readily accessible.
- MSDSs may be available on the computer or as a hard copy in the lab.
- Make sure you know where your MSDSs are located.
- Review the MSDS prior to working with the chemical.



Material Safety Data Sheet

- Refer to the handout
- Aspects
 - Product ID
 - Hazardous Ingredients/ID
 - Physical/Chemical Characteristics
 - Fire/Explosion Info.
 - Reactivity Data
 - Health Hazard Data
 - Safe Handling and Use
 - Control Measures

Section V - Reactivity Data

Stability	Unstable		Conditions to Avoid	N/A
	Stable	X		
Incompatibility (Materials to Avoid)	N/A			
Hazardous Decomposition or Byproducts	NONE			
Hazardous Polymerization	May Occur		Conditions to Avoid	N/A
	Will Not Occur	X		

Section VI - Health Hazard Data

Route(s) of Entry:	Inhalation?	NO	Skin?	YES	Ingestion?	YES
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Health Hazards (Acute and Chronic) NO KNOWN ACUTE OR CHRONIC TOXICITY

MATERIAL SAFETY DATA SHEET

Metal Cleaner

Page: 1



Revision: 11/27/1996

Printed: 12/01/2003

Date Created: 12/09/1996

1. Product and Company Identification

Product Code: DX579
Product Name: Metal Cleaner
Manufacturer Name and Address
Company Name: PPG Industries, Inc.
4325 Rosanna Drive
P.O. Box 9
Allison Park, PA 15101
Emergency Contact 1
Information Contact Emergency Medical/Spill Info: (304)842-1300
Technical Information (614)363-9610
Chemical Family: ACID

2. Composition/Information on Ingredients

Hazardous Components (Chemical Name)	CAS #	Percentage	OSHA TWA	ACGIH TWA	Other Limits
1. Ethanol, 2-Butoxy-	115-762	10.0 - 20.0 %	(S) 25 ppm	(S) 25 ppm	No data.
2. Diethylene glycol monobutyl ether	112-345	10.0 - 20.0 %	Not Estab.	Not Estab.	No data.
3. Phosphoric acid	7664-382	30.0 - 40.0 %	1 mg/m3	1 mg/m3	No data.

3. Hazards Identification

Emergency Overview

Harmful or fatal if swallowed. May be corrosive. This product contains a material which causes skin burns. This product contains a material which causes irreversible eye damage. May be harmful if absorbed through the skin. Vapor and/or spray may be harmful if inhaled. Vapor irritates eyes, nose, and throat. Vapor generated at elevated temperatures irritates eyes, nose, and throat.

Route(s) of Entry: Inhalation? No Skin? No Eyes? No Ingestion? No

Potential Health Effects (Acute and Chronic)

INGESTION: Harmful or fatal if swallowed.

EYE CONTACT: This product contains a material which causes irreversible eye damage.

SKIN CONTACT: May be corrosive. This product contains a material which causes skin burns. May be harmful if absorbed through the skin.

INHALATION: Vapor and/or spray may be harmful if inhaled. Vapor irritates eyes, nose, and throat. Vapor generated at elevated temperatures irritates the eyes, nose, and throat. Repeated exposure to high vapor concentrations may cause irritation of the respiratory system and permanent brain and nervous system damage.

CHRONIC OVEREXPOSURE: Avoid long-term and repeated contact. This product contains an ethylene series glycol ether and/or acetate which has been shown to cause adverse effects on the kidneys, liver, blood and/or blood-forming tissue. This product contains diethylene glycol monobutyl ether (DEGBE). DEGBE consumed in drinking water at low levels by rats for 30 days caused injury to either the liver, kidney, spleen, or testes.

Regulated?

NO

ENTRY OF WATER

DO NOT DRINK

MIX WITH WATER

NEURAL

TAKEN

VENTILATION

RECOMMENDED

REAS:

16 - 491 - 529/45775



Standard or Safe Operating Procedures (SOP)

Elements of SOPs include:

- General Information
 - Hazards (acute & chronic)
 - Exposure Limits
 - Training Requirements
 - Work Hygiene
 - Housekeeping
 - Protective Clothing & Equipment
 - Decontamination Procedures
 - Waste Disposal Procedures
 - Spill Response
- SOPs should be required at a minimum for chemicals that are identified as carcinogens, highly toxic, highly reactive, peroxide forming chemicals, LN₂, flammable or poisonous gases.
 - SOP *templates* are available at the JABSOM Website (go to website).



Chemical Material & Waste Management

Chemical Inventory:

- Must be kept in lab and updated ANNUALLY
- Must include (minimum):
 - Chemical name
 - Amount
 - Storage location
 - Hazard class
- Containers and caps are effective for a limited time so monitor older chemicals and reactive chemicals
- Labels will deteriorate and fade over time so re-label when necessary

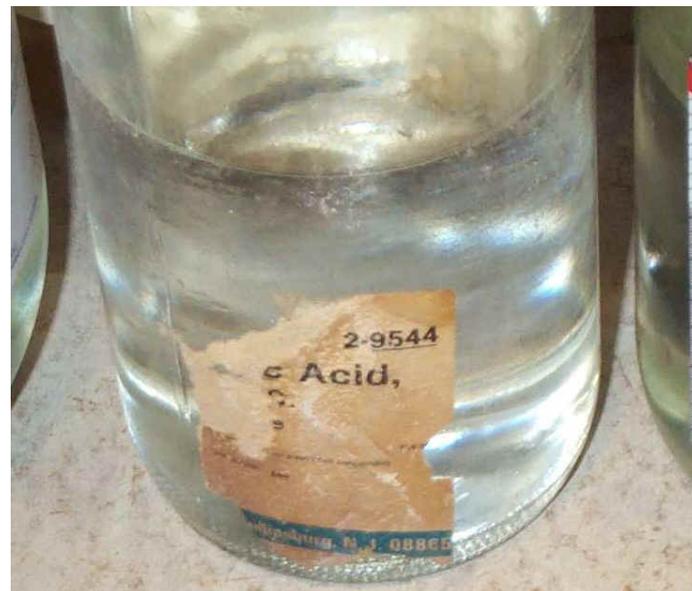


Labels! Labels! Labels!

- ALL chemicals MUST be labeled
- Labels must be in good condition

When you re-bottle chemicals:

- Hazard class identified (flammable, etc.)
- If abbreviations are used, keep to a minimum and clearly identify the contents of the container
- Label with your name and date



Example of a proper label:

70% Ethanol

Flammable

Jayne O.

05-27-09



Chemical Storage

- Reactive chemicals need to be stored carefully
- Segregation of chemicals is critical!



- **Flammable Liquids** must be stored in approved flammable cabinets (only 10gal per lab can be left out)



Chemical Hazard Warnings

- Highly Toxic Chemicals (including carcinogens, mutagens and teratogens)
- Reactive Chemicals (THF, Ether, Picric Acid, Sodium Borohydride, etc.)
- Visual signs of potentially dangerous reactions
- **Look out for these warning signs!**
 - “**Caution! Reproductive Toxin Storage!**”
 - “**Danger! Highly reactive material!**”



Chemical Waste

- Waste containers must be **CLOSED** unless actively added to the containers.
- Containers shall be in Good Condition
- Ethidium Bromide Contaminated Waste:
- Contaminated “lab debris” waste collection containers
- Secondary Containment is required when:
 - When the waste is stored on the floor or in a fume hood which has a cup sink
 - When the waste is stored within four (4) feet of a sink or drain
 - When it's necessary to separate incompatible or high hazard wastes



PPE





Personal Protective Equipment (PPE)

- Goggles, Face Shields, Safety Glasses
- Lab Coat & Long Pants
- Closed-Toe Shoes
- Not all Gloves are Created Equal; know which glove to use (latex, nitrile, etc.)
- Respirators





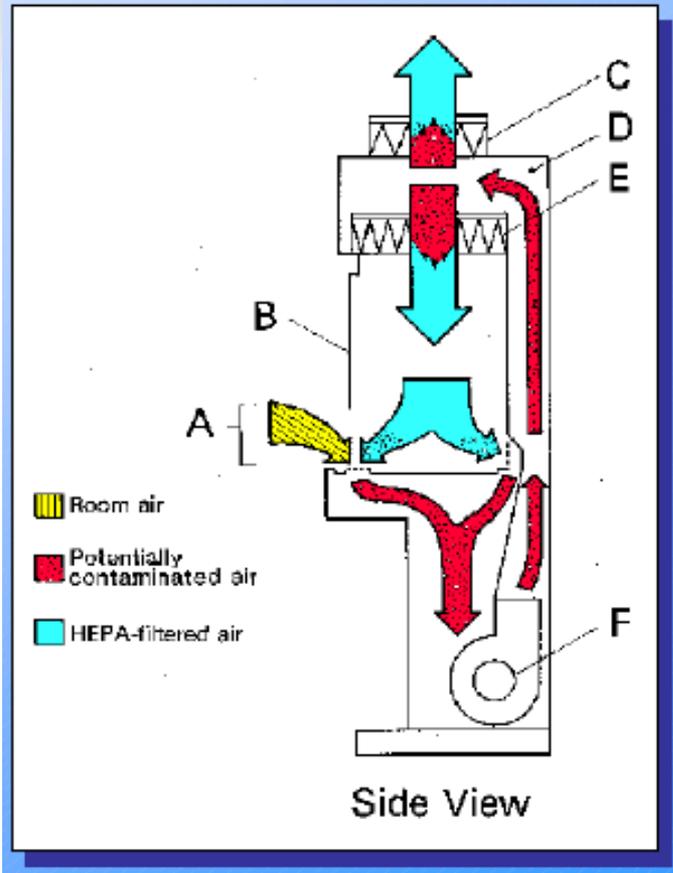
Personal Protective Equipment (PPE)

- PPE provides a barrier against skin, mucous membrane or respiratory exposure to infectious agents during procedures
- Proper donning, use, and doffing PPE can prevent the spread of contamination
- PPE does not eliminate the hazard (only engineering controls or containment devices can eliminate or remove the hazard)
- Integrity wanes with use (i.e. change gloves frequently)
- A risk assessment will determine what PPE is appropriate for the task



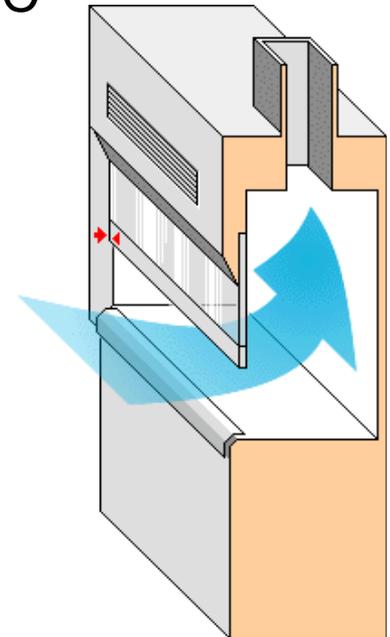
Engineering Controls

Class II Biosafety Cabinets



Class II BSC

- Airflow
 1. Product Protection
 2. Personal Protection
 3. Environmental Protection
- When to use a Class II BSC
- **A BSC is NOT a Fume Hood!**
- When not to use a Class II BSC (volatile chemicals, radioisotopes, carcinogens or toxins)

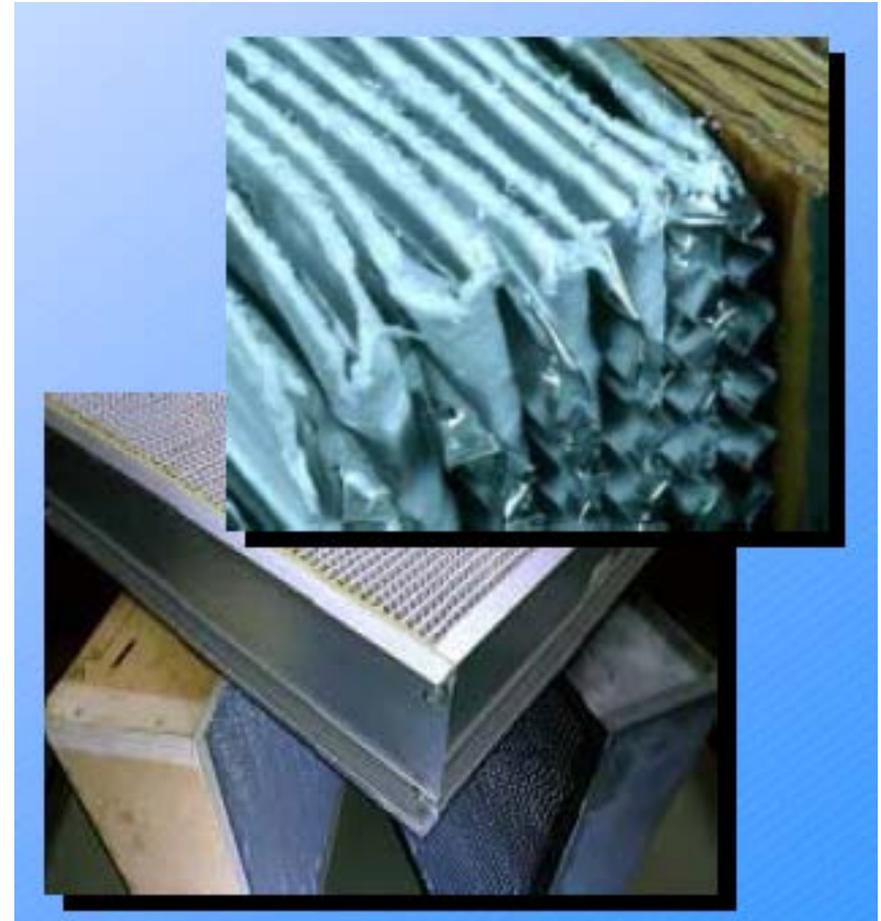




BSC HEPA Filtration

High Efficiency Particulate Air (HEPA) Filtration

- Traps particulates **ONLY**; 0.3 microns in diameter
- 99.5%-99.9% efficient
- Gases and vapors will pass through
- *Continuous sheet of flat filter medium with aluminum separators*
- *Gasket sealed*
- *Adhesive bond between filter pack and frame*





BSC - Preparation

Start-Up:

- Turn off the UV light if in use
- Ensure the sash is set in the correct operating position
- Turn on fluorescent light and cabinet blower
- Check the air grills for obstructions
- Allow the cabinet to operate unobstructed for 15 minutes (purge the BSC)
- Wash hands and arms thoroughly
- Wear long sleeved splash resistant closed front lab coat, gloves either under or over sleeves, double gloving. Use protective eyewear.





BSC - Preparation

Wipe-Down

- Wipe down the interior surfaces of the cabinet with 70% ethanol, or a suitable disinfectant, and allow to dry

Loading Materials and Equipment

- Decontaminate the surfaces of the materials and equipment you bring in to the BSC
- Only load the materials required for the procedure; do not overload the cabinet
- Do not obstruct the front, side, or rear return air grills; large objects should not be placed together
- After loading the cabinet, wait 2-3 minutes to purge airborne contaminants from the work area
- You should never stick your head into the work area





BSC - Technique

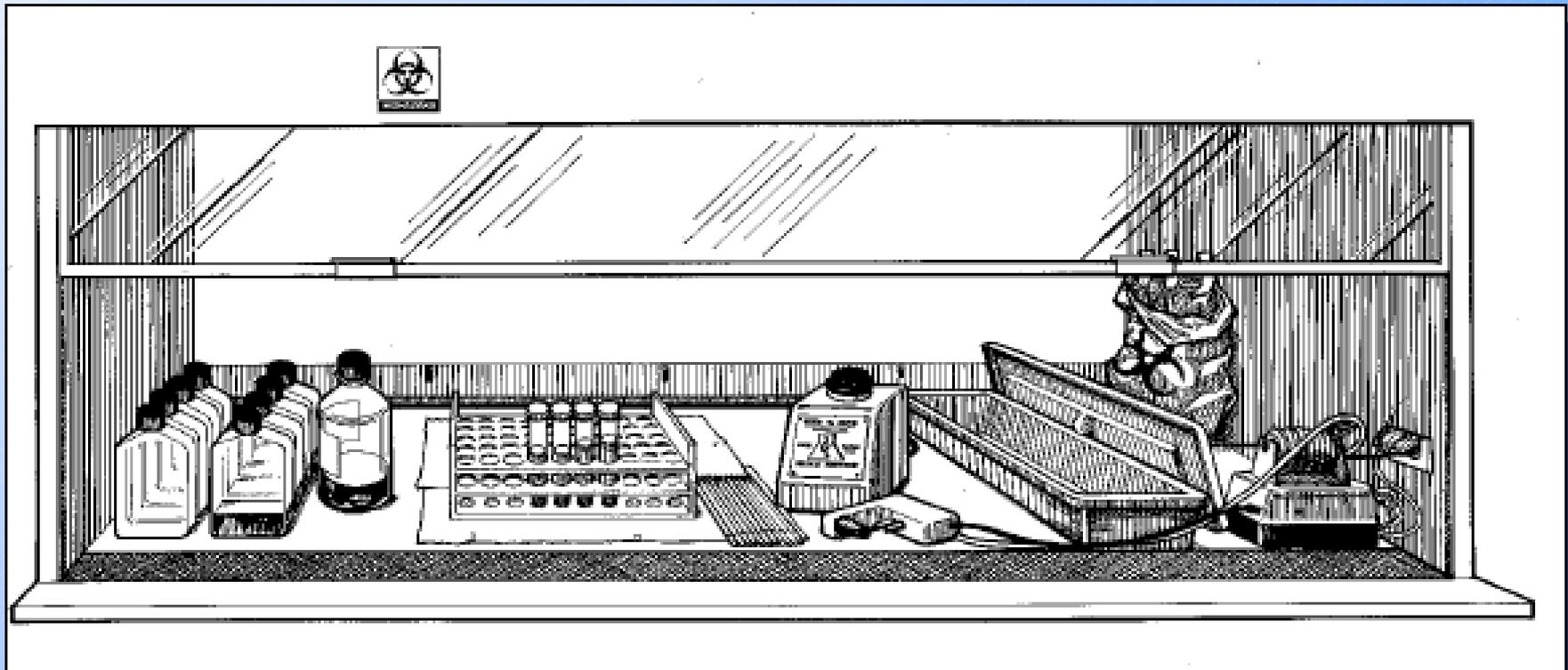
- Keep all materials at least 4 inches inside the sash, and perform all contaminated operations as far to the rear of the work area as possible
- Segregate all clean and contaminated materials in the work area
- Arrange materials to minimize the movement of contaminated items into the clean area
- Keep all discarded contaminated material to the rear of the cabinet
- Avoid moving materials or excessive motion of the operator's hands and arms through the front access during use
- Always enter straight into the cabinet, no sweeping motions
- No open flames allowed
- If there is a spill or splatter during use, all objects in the cabinet should be surface decontaminated before removal
- Thoroughly disinfect the working area while the cabinet is still in operation



BSC Layout

Equipment Layout

Clean (Sterile) → Dirty (Contaminated)

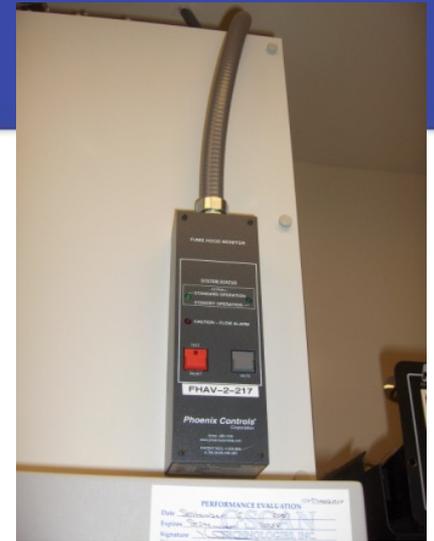




BSC Alarm or Failure

If the BSC alarm sounds or the exhaust fails

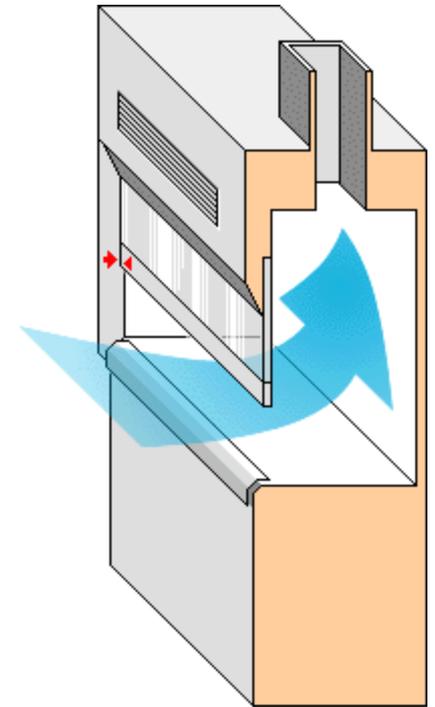
- Stop what you are doing
- Calmly but quickly close all open containers of potentially infectious items and any items that must remain free of contamination
- Close the sash
- Do not continue to work in the BSC until it is operating properly





Chemical Fume Hoods 1 of 3

- The Chemical Fume Hood IS NOT a Biological Safety Cabinet!!!)
 - The CFH provides protection against hazardous chemicals because of the laminar airflow moving from the researcher/room, over the work surface, and out of the building.
 - A BSC may not be used to manipulate toxic or volatile chemicals.
 - A BSC provides a sterile environment for biological manipulation and the exhaust is HEPA filtered.





Chemical Fume Hoods 2 of 3

General Use and Safety

- Before beginning work, learn about the hazards of the materials being used. Understand and use safety precautions stated in MSDSs or in the SOPs.
- Know the location of the nearest exits, emergency showers, eyewashes, and fire extinguishers. Ensure the pathways to these areas are unobstructed.
- Verify that the exhaust system is operating properly before working in the hood. This may be done by holding a piece of paper or ribbon at the face of the hood.
- Conduct all operations which may generate hazardous or potentially hazardous vapors or releases inside a hood.
- The sash is also designed for use as a safety shield in case of a spill. Adjust the sash at or below the point indicated on the certification sticker. Keep the sash at this mark to maintain face velocity.



Chemical Fume Hoods 3 of 3

- Keep your head out of the hood.
- Avoid rapid movements at hood face when the sash is open-it may create sufficient turbulence to disrupt the face velocity.
- Keep laboratory doors closed unless you are in a lab that is required by design to keep its doors open.
- Do not store chemical waste containers in a fume hood for long term storage. Store hazardous chemicals and hazardous waste in designated areas. Materials stored in the hood may disturb the air flow pattern (especially when blocking the baffles) and reduce available working space.
- Do not place electrical receptacles or other spark sources inside the hood when flammable liquids or gases are present.
- Raise hot plates, microcentrifuges, and other bulky items one to two inches above the work surface to allow air to flow underneath them.
- Keep all items at least six inches behind the face of the hood.



Needles & Sharps

Needles & Sharps Precautions

- *Use sharps containers*
- *DON'T break, bend, re-sheath or reuse syringes or needles*
- *DON'T place needles or sharps (glass, plastic pipets, anything that will puncture a bag) in the regular trash*
- *DON'T touch sharps with hands, use forceps, scoops, etc.*



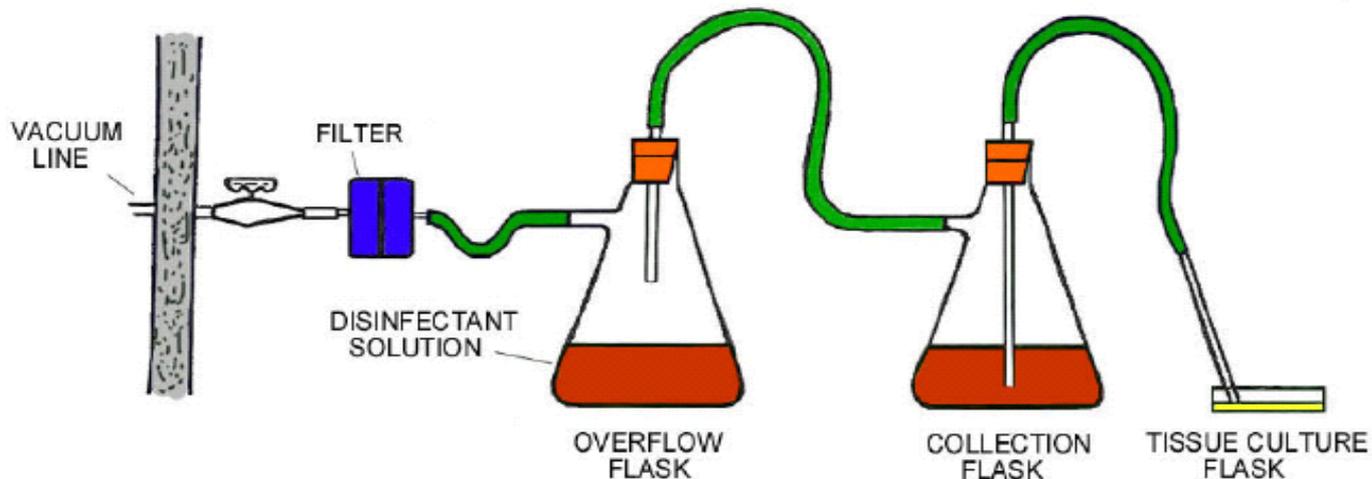
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Vacuum Lines – HEPA Filters

- Central vacuum lines must be fitted with an in-line HEPA filter
- For PI lab equipment such as vacuum pumps, these should also be fitted with HEPA filters and protected with liquid disinfectant traps





Emergency Preparedness

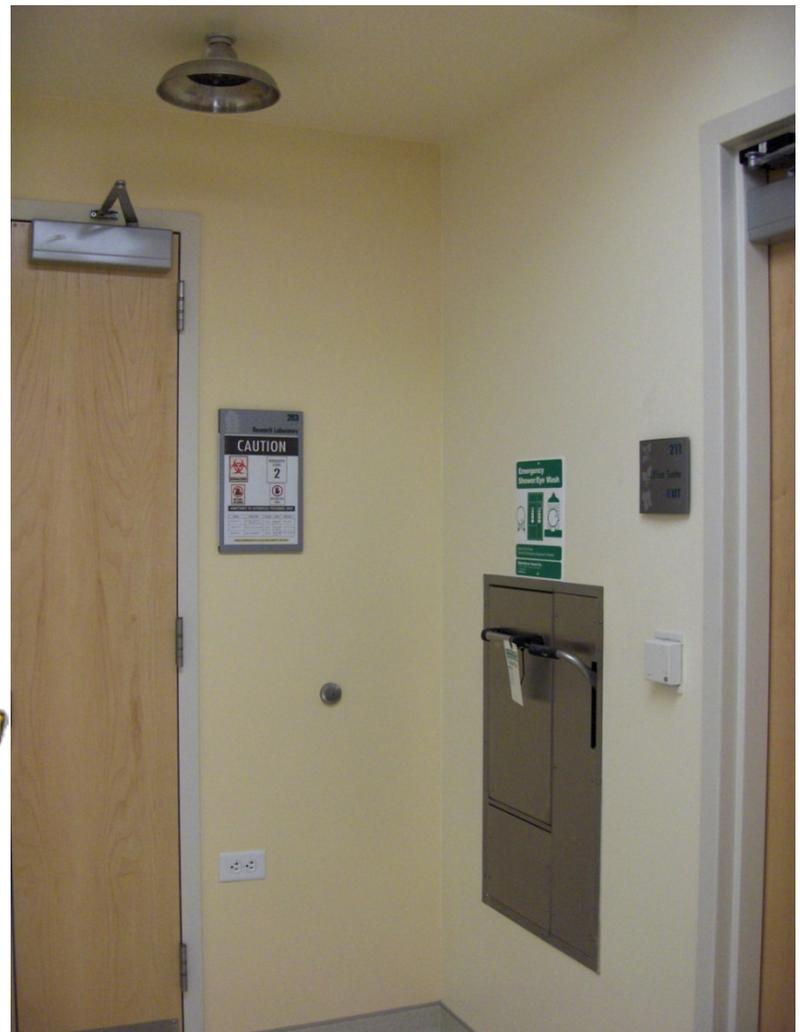
- Know all of the following (minimum):
 - Emergency notification /phone numbers (KEEP CURRENT!)
 - Evacuation routes
 - Fire extinguishers
 - First aid kits
 - Fire alarms





Safety Showers and Eyewashes

- Wall Combination Units
- Sink Eyewashes
- Testing





Exposure Response

Personal Contamination or Exposure

1. Alert co-workers
2. Clean exposed surface with soap/water, eyewash (eyes), or saline (mouth)
3. Apply first aid and treat as an emergency
4. Notify supervisor and EHSO
5. Seek medical attention for treatment/counseling
6. Refer to the BBP ECP for post exposure evaluation and follow-up procedures, forms, record keeping





Biological Spill Response

SPILL Procedures

- 1. Alert co-workers**
- 2. Define/isolate contaminated area**
- 3. Put on appropriate PPE**
- 4. Remove glass/lumps with forceps or scoop**
- 5. Apply absorbent towel(s) to spill; remove bulk & reapply if needed**
- 6. Apply disinfectant to towel surface**
- 6. *Allow adequate contact time (20 minutes)***
- 8. Remove towel, mop up; clean with alcohol or soap/water**
- 9. Properly dispose of materials**
- 10. Notify supervisor & EHSO**



Chemical Spill Response

Chemical Spill Procedures

- All labs MUST have a spill kit, emergency plan, and provide info and training
- All lab personnel should be able to answer **“What would I do if this chemical spilled?”**





Chemical Spill Procedures

- Spill Response Procedures (if it can be done without endangering yourself):
 - Attend to anyone who may have been hurt or contaminated
 - If flammable, turn off all ignition/heat sources
 - Avoid breathing vapors from the spill
 - Alert others in the area
 - Contain the spill if it is small
 - If it is a large spill, immediately leave the area and notify EHSO & Security (secure area before leaving)



A Minor Spill?

- Is one that:
 - Does not spread rapidly
 - Does not endanger people or property except by direct contact
 - Does not endanger the environment
 - Workers are capable of handling safely without assistance



A Minor Spill?

Questions to ask yourself:

- Do I know enough about the properties of the material to be able to select the appropriate PPE?
- Can I clean up the spill safely without over-exposing myself to the material?
- Do I know of an appropriate method of disposal of the contaminated material?



A Minor Spill?

- **If answered YES to ALL:**
- Here is how to clean up the small spill:
 - If not already wearing, put on PPE
 - Select proper spill kit material/absorbent
 - Contain the spill by putting spill kit material/absorbent around the perimeter of the spill.
 - Place absorbent over the center of the spill and let it sit until all liquid is absorbed.
 - Collect all spill clean up material and place in a bucket or chemical resistant container. Do not pick up sharps with your hands (use forceps or scoop with paper)
 - Clean the area of spill (soap/water)
 - Notify JABSOM Health & Safety Office (692-1855) for documentation of spill and proper disposal of materials



Protect Yourself & Others

Following the rules and practicing good lab practices protects:

- You
- Fellow Researchers
- Support Staff (e.g. security, facilities, custodial)
- Visitors
- The Public
- The Environment
- Your Research