

Chemical Hazard Management

PHHS Pathology



Objectives

At the completion of this module, the participant should be able to correctly:

- * Recognize how work procedures/practices, engineering controls, and PPE act as protection against chemicals
- * Understand the importance of MSDSs and labeling
- * Identify engineering controls in the laboratory and the role of PPE components
- * Discuss chemical waste disposal and spill management

Chemical Hazard Management


Pathology is one of the largest users of hazardous chemicals in the hospital. The goal of this module is to inform Pathology employees of specific risks and ways to protect themselves.



Chemical Hazards in your Lab

- * Chemicals can pose a significant hazard. They should be limited to the use under a properly working fume hood. Chemicals can release hazardous fumes which not only harm the environment, but they can be a major health threat. They must be handled carefully and disposed of properly.
- * Protection against chemicals is a combination of work procedures/practices, engineering controls, and PPE. Let's look at each of these!

Chemical Work Procedures/Practices



Types of Hazards

Chemicals have both physical and health hazards

Physical Hazards:

- * Flammables and combustibles (formaldehyde, xylene)
- * Corrosives and oxidizers (strong acids and bases)
- * Compressed gasses (helium, CO₂)

Health Hazards:

- * Irritants
- * Toxins
- * Carcinogens
- * Corrosives
- * Neurotoxins
- * Nephrotoxins
- * Hepatotoxins



Protecting yourself

Protecting oneself includes:

- * Understanding the risks
- * Use of appropriate engineering controls and personal protective equipment (PPE)
- * Adherence to approved safety practices
- * Proper storage and transport of chemicals
- * Emergency preparedness



Employee Responsibilities

Each employee is responsible for:

- * planning and executing each procedure according to approved protocol
- * completing mandatory training activities
- * being attentive to all labels and warning signs
- * seeking clarification when unsure of proper safety practice
- * reporting unsafe conditions to supervisor/safety officer.

Lab management is responsible for:

- * selection of least-hazardous alternatives
- * risk assessment and mitigation
- * education of staff using hazardous chemicals.

Labeling

It is important to know as much about a chemical as possible. The most dangerous substance is the one that has no label. Communicating information is essential in the science field.

8.100 - 10/10/11



Labeling

SUBSTANCE IDENTITY (AS SHOWN ON MSDS)

<input type="checkbox"/>	HEALTH HAZARD
<input type="checkbox"/>	FIRE HAZARD
<input type="checkbox"/>	REACTIVITY
<input type="checkbox"/>	PERSONAL PROTECTIVE EQUIPMENT

PERSONAL PROTECTION

<input type="checkbox"/> SAFETY GOGGLES	<input type="checkbox"/> BOOTS
<input type="checkbox"/> FACE SHIELDS	<input type="checkbox"/> NO SMOKING
<input type="checkbox"/> APRON	<input type="checkbox"/> POISON
<input type="checkbox"/> DUST MASK	<input type="checkbox"/> FLAMMABLE
<input type="checkbox"/> VAPOR RESPIRATOR	<input type="checkbox"/> CORROSIVE
<input type="checkbox"/> SELF CONTAINED AIR RESPIRATOR	<input type="checkbox"/> EXPLOSIVE
<input type="checkbox"/> GLOVES	

TARGET ORGAN

<input type="checkbox"/> BLADDER	<input type="checkbox"/> LYMPHATICS
<input type="checkbox"/> BLOOD	<input type="checkbox"/> PANCREAS
<input type="checkbox"/> BRAIN	<input type="checkbox"/> PROSTATE
<input type="checkbox"/> EYES	<input type="checkbox"/> SKIN
<input type="checkbox"/> GALL BLADDER	<input type="checkbox"/> SPLEEN
<input type="checkbox"/> LIVER	<input type="checkbox"/> HEART
<input type="checkbox"/> LUNG	<input type="checkbox"/> INTESTINES
<input type="checkbox"/> STOMACH	<input type="checkbox"/> KIDNEY
<input type="checkbox"/> UTERUS	
<input type="checkbox"/> CARDIOVASCULAR SYSTEM	
<input type="checkbox"/> CENTRAL NERVOUS SYSTEM	
<input type="checkbox"/> RESPIRATORY SYSTEM	

Labeling is also required for chemicals that are in a secondary container. When labeling the secondary container the following information must be included:

- * Identity of the hazardous chemical
- * Appropriate hazard warnings
- * The necessary PPE required when handling the chemical

MSDS or SDS

- * In addition to labeling, the next most important type of communication regarding hazards is the Material Safety Data Sheet (MSDS) or Safety Data Sheet (SDS).
- * MSDSs (or SDSs) are located in every laboratory and intranet at MSDS-Hazsoft.
- * MSDSs have vital information about specific hazards, proper handling precautions, disposal instructions, and what to do if a spill occurs.

MATERIAL SAFETY DATA SHEET

BES, Free acid

(N,N-Bis(2-Hydroxyethyl)-2-Aminoethanesulfonic Acid)

I IDENTIFICATION:			Ingestion: Wash mouth with water, GET MEDICAL ATTENTION.
BioShop Canada Inc. 4060 Fairview St Unit #6-8 Burlington, Ontario L7L 4Y8 1-800-234-1179			V FIRE AND EXPLOSION HAZARDS:
Emergency Telephone No.: 905-466-3832 Chemical Name: (N,N-Bis(2-Hydroxyethyl)-2-Aminoethanesulfonic Acid) Catalog Number: BES201 Molecular Formula: C6H15NO5 Molecular Weight: 213.17 WHMIS Classification: N/A TSCA Status: LISTED			Flammable: No Flash Point: N/A Extinguishing Media: Water, dry chemical, chemical foam or alcohol resistant foam. Explosion Data: Not available
II COMPOSITION/ INGREDIENTS:			VI REACTIVITY:
Bes	CAS # 10191-18-1	% 99+	Stability: Stable under normal temperatures and pressures Conditions to avoid: generation of dust. Incompatibility: Strong oxidizing agents Hazardous Decomposition Products: Nitrogen oxides, carbon monoxide, sulfur oxides, sulfur dioxide, carbon dioxide. Hazardous Polymerization: Will not occur
III HAZARDS/TOXICOLOGICAL PROPERTIES:			VII PHYSICAL DATA:
Potential Health Effects Target Organs: None known Eyes: May cause eye irritation. Skin: May cause skin irritation. Inhalation: may cause irritation. The toxicological properties of this substance have not been fully investigated. Ingestion: May be harmful if swallowed. May cause irritation of the digestive tract. The toxicological properties of this substance have not been fully investigated.			Physical State: Solid Appearance and Odor: white powder. No odor Melting Point: 152-154°C Boiling Point: N/A Specific Gravity: N/A Vapor Density: N/A Solubility: Soluble in water pH: N/A
CHRONIC HEALTH HAZARDS: Not available			VIII PREVENTIVE MEASURES:
Exposure Limits: LD50 / LC50: Not available.			Personal Protection: Wear appropriate protective gloves and clothes to prevent skin exposure. Ventilation: Local exhaust systems. Respiratory protection: Use NIOSH/MSHA approved full face-piece respirator. Leak and Spill Procedures: Wear appropriate protective equipment. Sweep up then place into a suitable container for disposal. Waste Disposal: Follow local disposal regulations. Storage Conditions: Store in a cool, dry place. Store in a tightly closed container. Label Hazard Warning: Irritating to eyes, respiratory system and skin. May cause heritable genetic damage. Shipping Information: Not available
Epidemiology: No data available Teratogenicity: No data available Reproductive Effects: No data available Neurotoxicity: No data available Mutagenicity: No data available Carcinogenicity: Not listed by ACGIH, IARC, NTP, or OSHA			IX PREPARATION OF MSDS:
IV FIRST AID MEASURES:			Prepared By: M. Kienlewiecz Date: Dec 8/05 Phone: (800) 234-1179
Eyes: Flush eyes with plenty of water for at least 15 minutes. Skin: Flush area immediately with plenty of soap and water while removing contaminated clothing and shoes. Inhalation: Remove victim to fresh air. If not breathing give artificial respiration. If breathing is difficult give oxygen and GET MEDICAL ATTENTION.			The information provided on this Material Safety Data Sheet is furnished in good faith and without warranty of any kind. The above information is believed to be correct and should be used only as a guide. BioShop Canada Inc. shall not be held liable for any damage resulting from the handling or from the contact with the above product. Observe all federal, provincial and state laws concerning health, safety and pollution.

Importance of MSDS

- * **Why is a MSDS important?** When you know characteristics of a substance, it can aid in the precautionary measures taken when using the substance. Also, if there is a spill either on a surface or on your skin, the MSDS can supply you with the information needed for first aid.
- * The MSDS to every chemical in your lab must be available to you. It may be in a notebook in your lab. Make sure you find the location of the MSDSs in your lab.

Chemical Hazard Safety

Follow approved safety procedures:

- * Lab procedures will specify safe handling instructions for any hazardous chemical. Read procedures and safety precautions thoroughly before beginning any new procedure and follow all instructions.
- * When new chemicals are introduced, lab management is responsible for assessing the risk, providing all appropriate protective measure, and employee training prior to implementation.



Cylinder Storage & Transportation

- * **All Plastic Mesh should be removed** from all medical gas cylinders.
- * Store cylinders in a well-ventilated area away from heat or ignition sources.
- * Fasten cylinders to a wall or cylinder stand during use, transit, or storage.
- * Valve-protector caps should always be left in place unless the cylinder is in use.
- * The number of cylinders of flammable gas at each workstation shall not exceed one extra cylinder for each cylinder actually connected for use.
- * If possible, keep empty and full cylinders separated. Empty cylinders must always be labeled “**Empty**”.



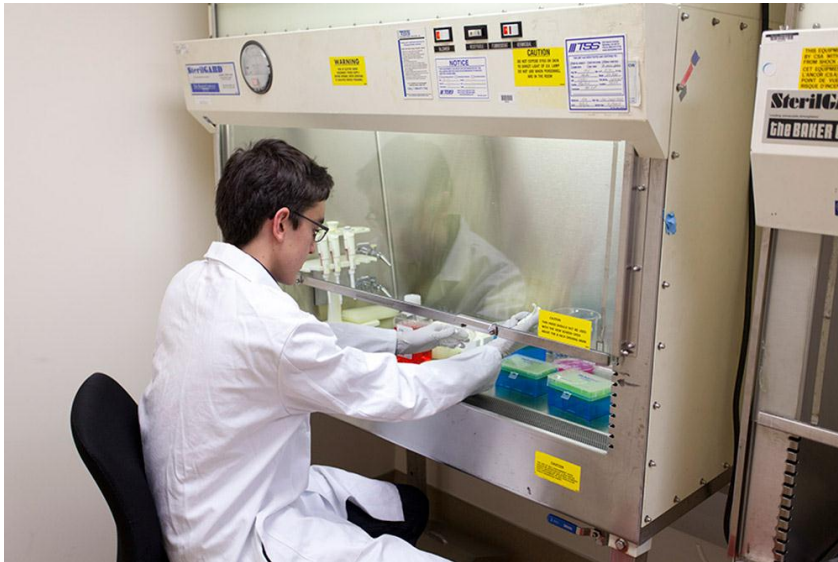
Chemical Engineering Controls and PPE

Engineering Controls for Chemicals

- * Chemical usage poses a variety of hazards. They can be flammable, corrosive, even toxic just to name a few. Taking all precautions to avoid physical and/or health problems is the number one goal. **You can never be too cautious!**
- * Some examples of Engineering Controls are:
 - * Fume hoods
 - * Pipettes
 - * Storage cabinets




Fume Hoods



- * The fume hood is used with chemicals.
- * The main function is to exhaust the vapors and gases that are generated in the hood to the outside.
- * The hood is designed to minimize your exposure to airborne contaminants.
- * It is not to be used with biohazardous materials.
- * Your safety officer/supervisor will orient you to the locations and use of these safety devices

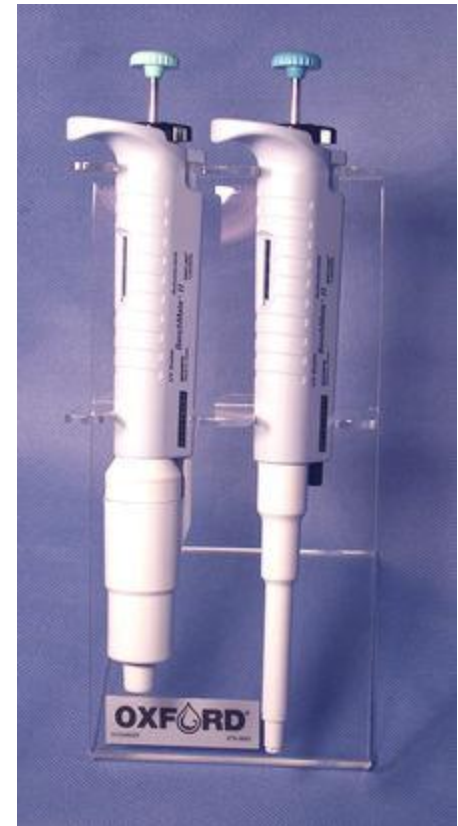
Fume Hood Use

- * When using the fume hood you first need to make sure the exhaust blower is operating and air is entering the hood.
- * Remember, do not put your face inside the hood!
- * Minimize storage of chemicals in the hood
- * Clean spills immediately 
- * Work with the sash at the proper operating level as indicated by the arrows



Mechanical Pipettes

- * Mechanical pipettes shall be used for manipulating all liquids including:
 - * blood
 - * body fluids
 - * chemicals
 - * reagents in the laboratory



Chemical Storage Cabinets

- * Store chemicals according to type and compatibility. Check MSDS for incompatibilities with other chemicals.
- * Do not store chemicals in a fume hood.
- * The total volume of flammable or combustible liquids outside of an approved safety cabinet may not exceed 10 gallons per 5,000 square feet.
- * Store flammable liquids > 1 quart in an approved flammable container.



Chemical Storing and Transporting



- * Store acids, bases, and flammables separately.
- * Bottle carriers are used for transporting glass bottles of hazardous chemicals > 500 ml.
- * Plastic bottles are preferred to glass, whenever compatible with the chemical contents.

Chemicals & PPE

- * When chemicals are being used, there is always the possibility of splashing. The proper PPE is available and must be used when the MSDS or lab protocol specifies.
- * Proper PPE may include:
 - * Safety glasses
 - * Face shield
 - * Gloves
 - * Lab coat or apron
 - * Respirator (Depending on the agent and whether or not an aerosol is created)



Chemical Disposal & Spill Management

Chemical Disposal

Waste can be classified as either hazardous or biohazardous.

Hazardous Waste - any waste which contains the characteristics of being any of the following:

- * Toxic
- * Corrosive
- * Ignitable
- * Flammable
- * Oxidizer



Biohazardous Waste - any waste that is considered infectious and/or because of its biological nature it can cause physical or health hazards in humans, animals, plants or the environment.

Waste Disposal

Hazardous and biohazardous waste have special guidelines for proper disposal. It is important to properly dispose of waste to ensure human and environmental health.

- * Waste containers must be labeled with contents and hazard designations
- * Obtain a copy of the MSDS and attach to chemical being discarded
- * Transport waste chemicals to designated storage location in the Dock A flammable room pending removal.
- * Refer to Pathology Safety Manual protocol 5-10 for detailed instructions about chemical waste disposal

Emergency Preparedness



- * Think ahead, assemble all safety supplies and equipment items before handling hazardous chemicals.
- * Test fume hoods for proper function before use.
- * Be prepared with fire safety strategies when working with flammable, combustible and reactive hazards.

Chemical Spill or Exposure

The **first priority** is to **help the injured**:

- * Remove victim to a safe place
- * Notify a supervisor immediately
- * Seek medical attention if needed
- * First aid charts are posted in all lab areas



The **second priority** is **containing and cleaning up the spill**:

- * Spill kits area available wherever hazardous chemicals are used
- * New employees are trained on containment of chemical spills
- * The Dock A flammable liquid room has large bags of vermiculite available for containing larger spills

Chemical Spills or Exposure

If spill or exposure occurs:

- * Know who to call for help with a chemical spill
 - * HazMat Response Team 2-8104
- * Report all chemical spills to a supervisor.



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