Irvine Valley College

Department of Chemistry

Chemical Hygiene Plan

2019

IVC

CHEMICAL HYGIENE PLAN

Department of Chemistry
Irvine Valley College

FOREWORD

All Irvine Valley College (IVC) laboratory personnel who work with laboratory chemicals must know and follow the standard operating procedures outlined in this plan. All laboratory operations must be planned and executed in accordance with the standard operating procedures described in this plan. In addition, each laboratory worker is expected to practice safe personal chemical hygiene habits aimed at reducing exposures to potential hazards, to avoid potential accidents, and to ensure the health and safety of those employees working in the laboratories.

This Chemical Hygiene Plan was created in order to comply with applicable federal and state requirements, and professional standards. This document will be reviewed and evaluated for effectiveness at least annually and updated as necessary. It must be readily available to laboratory employees, their representatives and any regulatory agency inspector during normal working hours.

Dale Carranza - Chemistry Professor, School of Physical Sciences and Technologies; Chemistry Chemical Hygiene Officer
Djian-Luke Ty - Chemistry Sr. Laboratory Technician, School of Physical Sciences and Technologies

IMPORTANT PHONE NUMBERS FOR IRVINE VALLEY COLLEGE

EMERGENCIES

Fire Dial 911 or Campus Police 949-451-5200 (x5200) or Officer On Duty 949-451-5234 (x5234) Medical Emergency Dial 911or Campus Police 451-5200 (x5200)
Chemical Spills 911 and Campus Police 451-5200 (x5200) or North State Environmental (909) 875-9288
Safety Incidents 911 or Campus Police 451-5200 (x5200) Health and Wellness Center 451-5221(x5221) Maintenance Emergency 451-5255 (x5255) Poison Control 1-800-876-4766

Anonymous Hazard Reporting: To anonymously report a hazard or health and safety concern, call Campus Police 451-5200. If you are concerned about the caller ID system, consider using a pay phone.

1.0 Scope of Operations

This Chemical Hygiene Plan (CHP) applies to all personnel handling hazardous chemicals in chemical laboratories at Irvine Valley College (IVC). The CHP provides written safety procedures for conducting laboratory chemical operations in a manner that protects people from harmful chemical exposures.

2.0 Chemical Hygiene Responsibilities

2.1 Laboratory Supervisor

The Supervisor is the Classified Bargaining Unit Employee (Sr. Laboratory Technician) in charge of each laboratory. The Supervisor is responsible for the health and safety of all personnel under their direction. The Supervisor's duties include the following:

1. Ensure that all laboratory workers under their supervision receive instruction and training to work safely with hazardous chemicals, respond appropriately when chemical accidents occur, and know how to report injury and illnesses associated with occupational exposure to hazardous chemicals.
2. When injuries or illnesses occur at work, the Supervisor must contact the Dean as soon as possible. A Worker's Compensation Packet, available from the department administrative assistant, must be completed within three days of the incident. For non-emergencies, employee injuries and illnesses must still be reported. An Incident Report Form, available on the IVC website, should be completed as soon as possible after the incident. The Supervisor should investigate all accidents and near-misses and take measures to help prevent reoccurrence, with consultation from the Campus Police or Risk Manager's office, if necessary.
3. Seek ways to improve chemical hygiene and laboratory safety.
4. Inform non-laboratory personnel (e.g., maintenance and custodial employees or outside contractors) of potential hazards when non-laboratory personnel are required to work in the laboratory environment. These laboratory hazards must be mitigated to provide a reasonably safe environment for repairs and renovations.
5. Identify hazardous conditions or operations, determine safe procedures and controls, and implement and enforce standard safety procedures.
6. Ensure that engineering controls (e.g., fume hoods, emergency showers and eyewashes) are operable and that personal protective equipment is available and used properly by laboratory staff working with hazardous chemicals.
7. Ensure delegated safety duties are completed on a timely basis.

2.2 Chemical Hygiene Officer

The Chemical Hygiene Officer (CHO) is selected by consensus of the Chemistry Department (management, faculty and staff) to be responsible for ensuring that hazardous chemicals are handled, stored, and disposed of in accordance with this CHP. The Chemical Hygiene Officer shall:

1. Develop standard operating procedures (SOP's) for avoiding lab hazards as needed.
2. Assist with providing and documenting work-unit specific safety training, outside of the courses offered by Keenan and Associates and the Office of Risk Management.
3. Conduct laboratory safety self-assessments as needed.
4. Assist in maintaining the Chemical Inventory Database.
5. Monitor the disposal of chemicals used in laboratory operations.
6. Make recommendations agreed to by the Chemistry Dept. and the Dean, and shall not make decisions unilaterally.
7. Revise the IVC Chemistry Department Chemical Hygiene Plan once per year with the input of the Chemistry Department faculty, staff and the Dean.

2.3 Laboratory Employees & Workers

All persons working with laboratory chemicals, including students and volunteers, must know how to work safely with the chemicals they use and are responsible for following prudent chemical safety practices. If any person is unsure of a chemical hazard or safety procedure, they should consult their supervisor.

3.0 Identification and Classification of Hazardous Substances

Substances in the laboratory have properties that could cause harm to laboratory workers and others if handled improperly. Many lab chemicals are toxic or corrosive, or both. Compounds that are potentially explosive and/or highly flammable pose another significant hazard in laboratories. Treat all compounds as potentially harmful and minimize your chemical exposure. Before starting an experiment using hazardous chemicals, learn about its hazards.

Keep in mind that the hazards of two combined substances may be significantly greater than the hazards of either substance alone (synergistic effect).

3.1 Carcinogens

Carcinogens are chemical or physical agents that cause cancer. Carcinogens are toxic substances causing damage to cells after repeated or chronic exposure. Their effects may only become evident after a long latency period and may cause no immediate harmful effects.

Carcinogens are classified as "Particularly Hazardous Substances" and must be handled using the special precautions described in Section 5. The chemicals currently used or stored in the chemistry department at Irvine Valley College are listed below. A complete list (as of our most current review) is in Appendix A at the back of this document.

List Of Carcinogens or Suspected Carcinogens In Use At Irvine Valley College

Inorganic Compounds :	
*Chromium Metal	CHEM 1A, 3, 4: Density Lab; CHEM 1A: Calorimetry Lab
*Chromium Nitrate	CHEM 1B: Group III Cations, General Unknown
Lead Metal	CHEM 3 and 4: Visual displays of elements Sealed bottles of lead are used for display.
Lead Nitrate	CHEM 1B: Group I Cations, General Unknown, Le Chatlier's Principle Lab
Mercury Metal	CHEM 3 and 4: Visual displays of elements Student handling of mercury is not allowed. Sealed bottles of liquid mercury are used for display.
Nickel Chloride	CHEM 1A: Hydrates Lab; CHEM 1B: Electrochemistry
Nickel Metal	CHEM 1A: Density Lab, Calorimetry Lab
Nickel Nitrate	CHEM 1B: Electrochemistry , Group III Cations, General Unknown
Nickel Sulfate	CHEM 1B: Electrochemistry, General Unknown
Silica, crystalline	Various chemistry labs: used as sand bath media for Chem 12
Organic Compounds:	
Phenolphthalein	Various chemistry labs: used as indicator for acid base titration
Thioacetamide	CHEM 1B: Group II Cations, General Unknown

**Cal/OSHA regulated*

3.2 Suspected Carcinogens

A suspected carcinogen is a substance that may cause cancer in humans or animals but for which the evidence is not conclusive.

3.3 Reproductive Toxins

Reproductive toxins include substances that cause mutations (chromosomal damage) and substances causing teratogenesis (lethal or malformation effects on fetuses). Many reproductive toxins cause damage after repeated low-level exposures. Effects only become evident after long latency periods.

List of Reproductive Toxins and Suspected Reproductive Toxins at Irvine Valley College

Inorganic Compounds:	
Lead Metal	CHEM 3 and 4: Visual displays of elements Sealed bottles of lead are used for display.
Lead Nitrate	CHEM 1B: Group I Cations, General Unknown, Le Chatlier's Principle Lab
Mercury Metal	CHEM 3 and 4: Visual displays of elements Student handling of mercury is not allowed. Sealed bottles of liquid mercury are used for display.
Miscellaneous Organic Compounds:	
Phenol	CHEM 12B: 15.5 Electrophilic Aromatic Substitution Lab
Toluene	CHEM 12A: Recrystallization Lab, Fractional Distillation Lab, Separation and Identification of an Unknown

Information on reproductive toxicity of a specified chemical may be obtained from the Material Safety Data Sheets. Laboratory workers should also consult with their personal physician regarding concerns about reproductive toxins.

3.4 Toxic and Highly Toxic Agents

The California Code of Regulations 8CCR§5194 defines toxic and highly toxic agents as substances with median lethal dose (LD 50) values in the following ranges:

Route of Exposure	**Toxic**	**Highly Toxic**
Oral LD 50 (albino rats)	50-500 mg/kg	<50 mg/kg
Skin Contact LD 50 (albino rabbits)	200-1000 mg/kg	<200 mg/kg
Inhalation LD 50 (albino rats)	200-2000 ppm/air	<200 ppm/air

3.5 Hazardous Substances with Toxic Effects on Specific Organs

Substances included in this category are:

1. Hepatotoxins - substances that produce liver damage (e.g. nitrosamines, carbon tetrachloride).
2. Nephrotoxins - agents causing damage to the kidneys (e.g. certain halogenated hydrocarbons).
3. Neurotoxins - substances that produce their primary toxic effects on the nervous system (e.g. mercury, acrylamide, carbon disulfide).
4. Agents that act on the hematopoietic system - substances that decrease hemoglobin function and deprive the body tissues of oxygen (e.g. carbon monoxide, cyanides).
5. Agents that damage lung tissue - (e.g. asbestos, silica).

3.6 Sensitizers

A sensitizer (allergen) is a substance that causes exposed people to develop an allergic reaction in normal tissue after repeated exposure to the substance. Examples of sensitizers used at IVC labs include chromium, nickel, formaldehyde (biology), and phenol derivatives.

3.7 Irritants

Irritants are defined as chemicals that cause reversible inflammatory effects on living tissue by chemical action at the site of contact. A wide variety of organic and inorganic compounds are irritants and consequently skin contact with all laboratory chemicals should always be avoided.

3.8 Corrosive Substances

Corrosive substances cause visible irreversible destruction of, or visible alterations in living tissue by chemical action at the site of contact. Major classes of corrosive substances include strong acids (e.g., sulfuric, nitric, phosphoric, and hydrochloric acids), strong bases (sodium hydroxide, potassium hydroxide, and ammonium hydroxide), dehydrating agents (sulfuric acid, sodium hydroxide, and calcium oxide), and oxidizers (bromine, chlorine, iodine, hydrogen peroxide, potassium permanganate, and iodine monochloride).

3.9 Flammables and Potentially Explosive Substances

A number of potentially flammable substances are in common use at IVC. Potentially explosive substances are materials that may decompose or undergo other chemical changes irreversibly and rapidly accompanied by a large release of energy, under conditions of mechanical shock, elevated temperature, or chemical action, along with the release of large volumes of gases and heat.

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Storage and Handling of Laboratory Chemicals

1. No flammable materials should be stored outside an approved flammables storage cabinet or flammable storage room B243.
2. Incoming shipments of chemicals should not be opened and transported by school personnel other than qualified science technicians, instructors, or trained aides.
3. If possible, keep certain items in the original shipping package, e.g., acids and bases in the 8Styrofoam cubes.
4. All chemicals should be dated upon receipt.
5. A permanent and perpetual inventory should be maintained.
6. All chemicals should be stored in chemically compatible families.
7. Avoid storing chemicals on shelves above eye level.
8. The storage area and cabinets should be labeled to identify the hazardous nature of the products stored within.
9. Proper type (Tri-Class ABC) and size (minimum 15 pound gross weight) fire extinguishers, in working order, should be in the chemical storage areas.
10. Shelving above any work area, such as a sink, should be free of chemicals or other loose miscellany.
11. Shelving sections should be secured to walls or floor and should be equipped with lips to prevent products from rolling off.
12. Chemicals should not be stored on the floor except in approved secondary or shipping containers.
13. Storage area should be ventilated by at least four changes of air per hour. Isolate the chemical storage exhaust from the building ventilation system.
14. No unlabeled products should be stored anywhere in the science facility.
15. There should be two methods of exiting from a chemical storage area. Exits should be entirely free of the presence of hazardous materials.
16. Personnel must be thoroughly familiar with the hazards and precautions for protection before using any chemical. Study the precautionary label and review its contents frequently before using any chemical product.
17. Know applicable local regulations before disposing of chemicals.
18. Never store chemicals in a standard (non-explosion-proof) refrigerator.
19. Do not store chemicals in a fume hood for long durations.
20. Open ether cans should be drained after use and not stored unless absolutely necessary. Rely on expiration date for dispose of the material to avoid formation of explosive peroxides. When opening a can of ether, indicate date opened on can.
21. Water-reactive products (sodium metal, potassium metal, etc.) should be stored under dry oil.
22. Neutralizing chemicals, such as a spill kit, dry sand, vermiculite, and other spill control materials should be readily available.
23. Establish an annual safety review procedure for your chemical storage areas.
24. Post emergency telephone numbers in the chemical storage areas, near the telephones.
25. An approved eyewash station and fire blanket should be within 25 feet of the chemical storage areas.
26. Keep sources of ignition away from the chemical storage areas.
27. Chemicals should not be stored in the science classroom or laboratory; but rather in a separate, securable and dedicated area.

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Hazardous Chemical Storage

The Manufacturing Chemists Association states: "Chemicals in any form can be safely stored, handled, or used if the physical, chemical, and hazardous properties are fully understood and the necessary precautions including the use of proper safeguards and personal protective equipment, are observed."

At Irvine Valley College (IVC), we use the *Flinn Scientific Catalog/Reference Manual* as a guide for chemical storage recommendations and detailed information on the chemicals. For proper storage of hazardous laboratory chemicals, Flinn recommends:

A. Store minimum quantities
B. Separate and isolate the most serious hazards

Store Minimum Quantities

When possible, store only a two-year supply (or less) of the most serious hazardous chemicals. In order to do this, hazardous chemicals can be ordered in smaller package sizes. Smaller package sizes mean less risk and fresher material. Storing only small quantities of the most serious chemical hazards will prevent many chemical storage problems.

Separate and Isolate the Most Serious Hazards

Chemical compatibility and security are critical. When storing, isolate the two following types of chemical hazards: corrosives (acids, bases, and oxidizers) and flammable liquids. No single group of chemicals found on the entire school premises presents a greater threat to life and/or property. The improper storage of corrosives and flammable liquids is a chemical accident or "event" waiting to happen.

The most effective way to isolate flammable and corrosive hazards is to store them properly in the acid or flammable storage rooms (B242 and B243) or in approved safety storage cabinets. Chemical safety storage rooms and cabinets isolate corrosives and flammable liquids from other incompatible chemicals and from each other, provide a higher level of security against theft and vandalism, and will contain and control the hazards should an "event" occur.

Regulations on chemical storage can be obtained from the Environmental Protection Agency (EPA), The Uniform Fire Code (UFC), The National Fire Protection Association (NFPA), and the Occupational Health and Safety Administration (OSHA).

Secondary Containment

Secondary containment simply means that when a chemical spill occurs, the spill will be contained and controlled in a secondary area which will reduce the risk of chemical exposure, fire, etc. Several regulatory agencies have stated that "secondary containment" must be provided and that spill control procedures be adopted for hazardous chemicals. **The containment system must have sufficient capacity to contain 10% of the volume of containers used to store the material, or the volume of the largest container used for storage, whichever is greater.**

Secondary containment must be provided for all corrosives and flammable liquids once they are removed from their storage rooms or cabinets (rooms B242 and B243 are built as secondary containment areas). Use secondary containment (deep, white trays) with corrosives, flammables, and hazardous waste containers. Use fiberglass trays (low, white trays) in fume hoods and when dispensing small quantities of liquids, to contain small spills. Remember that the green plant trays used for lab preparation <u>are not</u> chemical resistant, and are incompatible with many organic solvents.

Segregated Chemical Storage

Corrosives and flammables should never be stored together. While common sense and the knowledge of chemical reactions tell us this, regulations on segregated chemical storage are quite specific.

Corrosives (Acids, Bases, and Oxidizers)

Corrosive chemicals in a science laboratory are usually strong acids and/or bases and oxidizers. Inhalation of vapors or mists can cause severe bronchial irritation. Corrosive chemicals can severely damage the skin and eyes. OSHA regulation 1910.1450, "Occupational Exposure to Hazardous Chemicals in Laboratories," takes many of its recommendations from the book *Prudent Practices for Handling Hazardous Chemicals in Laboratories* which was published in 1981 by the National Research Council. The following excerpts are taken from this book, page 38: **"Bottles of corrosive liquids should be stored in acid containers ... To ensure that mutually reactive chemicals cannot accidentally contact one another, such substances should be stored in corrosion-resistant secondary containers."**

Fire

While the proper storage of corrosives is important, much more concern has been placed on how flammable liquids should be stored and the best way to reduce the risk of fire.

What is a flammable or combustible liquid? The National Fire Protection Association (NFPA) defines flammable and combustible liquids as follows:

Flammable liquid

- **Class I Flash point below 100 °F (37.8 °C)**

Combustible liquid

- **Class II Flash point above 100 °F (37.8 °C) and below 140 °F (60 °C)**
- **Class III Flash point above 140 °F (60 °C)"**

Flash point is the temperature at which a liquid or volatile solid gives off a vapor sufficient to form an ignitable mixture with the air. Chemical solvents like ethyl alcohol, methyl alcohol, acetone, and isopropyl alcohol are commonly used at IVC and are all considered Class I flammable liquids.

Both the Uniform Fire Code and the National Fire Protection Association have regulations specifying when flammable liquids should be stored in an approved flammables safety storage cabinet. If storing in excess of 10 gallons of flammable/combustible liquids, the law requires they be stored in an approved flammables safety storage cabinet. Flammable storage room B243 meets the requirements for flammable storage.

Notes:

A. Flammable materials and oxidizers (including, but not limited to oxidizing acids, hydrogen peroxide, chlorine, bromine, and iodine) should never be stored together or in the same vicinity. For example, never store hydrogen peroxide in the same flammable storage refrigerator as organic hydrocarbon solvents such as pentane. Store iodine and bromine with the corrosives in the acid cabinet and not with the flammable materials.

B. When setting chemicals on laboratory carts or in the fume hoods for student use, remember to segregate the flammables from the oxidizers by using secondary containers such as green trays.

Chemical Container Labeling

In 1983, OSHA implemented the Hazard Communication Standard (Right-to-know law). This standard gives the employee (technician or instructor) or student the right to know about the hazards associated with the chemicals they are using in the laboratory. The standard requires chemical manufacturers to transmit this safety information to their customers by means of labels and Material Safety Data Sheets (MSDS). When an employee (technician or instructor) or student needs in-depth information, they can refer to the Material Safety Data Sheet.

The best approach to proper chemical container labeling is to list these four items on the label.

1. **Chemical name** - Completely spell out the name correctly. Avoid using abbreviations or chemical formulas, except for labels on small student dropper bottles.

2. **Concentration** - If the chemical is in solution, indicate the solution's concentration (molarity or % strength).

3. **Hazard coding** - For storage purposes, we use the following color coding:

Red – flammability hazard
Red stripe – flammability hazard – DO NOT store with red coded chemicals
Yellow – reactivity hazard such as oxidizers
Yellow stripe – reactivity hazard – DO NOT store with yellow coded chemicals
White – contact hazard (acidic)
White stripe – contact hazard (basic) – DO NOT store with white coded chemicals
Blue – health hazard – toxic if inhaled, ingested, or absorbed through the skin.
Orange – presents no more than a moderate hazard in any of the categories above.

Two colors – chemicals with two hazards, such as flammability plus health hazard, will be coded with both colors. The chemical is to be stored according to the physical hazard first (flammable) and then segregated further in that location (poison section/cabinet).

4. **Date** – indicate date reagent purchased, bottle opened, or solution prepared —very important, especially for those chemicals which either have a limited shelf life or become more hazardous with age.

Remember that this label may need to be on the chemical container for years to come. Avoid using grease pencils and writing directly on the bottle. Always use a permanent marker on label paper that has a good adhesive. Use a label maker, typewriter, or print clearly so everyone can read and understand the label you have prepared. If possible, cover the label with cellophane tape.

Small bottles or vials

In most cases, chemical name and concentration should suffice. The locator tag and color tape will be placed on the tray or larger refill bottle.

Refill bottles

These bottles will have two prepared labels: the top label will list the chemical name and concentration. The lower label, or locator tag, will list the shelf number where the chemical will be stored as well as the storage and hazard codes (see next page for details). They will also have a label that indicates date solution was prepared.

Manufacturer's bottle/jar

When processing these bottles, place a strip of colored tape and a locator tag near the bottom of the bottle. Also stamp with date chemical was received.

Special case: Diethyl ether

When a bottle of diethyl ether (ethyl ether) is opened, write the date opened on the bottle and cover date with cellophane tape. An opened bottle of diethyl ether shall not be stored for more than one year. An unopened bottle of diethyl ether can be stored for up to two years.

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Recommended Procedure for Cleaning Up a Liquid Chemical Spill

For student help and untrained personnel

First, remove all unprotected personnel and students away from spill. If possible, determine what the spill is. If you know that the spill is not hazardous (not flammable, toxic, corrosive or reactive), you may clean it up using the following procedures. If the spill is hazardous or if you are uncertain, leave the area and get help.

For Classified Staff, Faculty, and other trained First Responders[1]

First, remove all unprotected personnel and students away from spill. Determine what the spill is. If you are unfamiliar with the properties of the spilled chemical, refer to the MSDS. If, after reading the MSDS, you are uncomfortable cleaning up the spill or if the spill is liquid mercury, call Campus Safety x5200 or x5234. Meanwhile, if the spilled chemical is volatile, ventilate the area or evacuate. If the spilled chemical is flammable, remove all ignition sources. Wear personal protection equipment such as chemical splash goggles, chemical–resistant gloves and apron.

If the spill is large, and is not mercury (see note below), gently pour sand or absorbent around the spill and onto the spill. This will contain the spill, prevent it from spreading, and also provide traction if you need to walk over it. Next, absorbent (kitty litter, oil absorbent) around the spill and onto the spill. This will absorb the liquid and also begin to contain any vapors. For both the absorbent and sand, it is best to gently drop or sprinkle the spill control material around the spill and then onto the spill to avoid further spreading. Lastly, if the spill is an inorganic acid or base, apply the appropriate neutralizer around the spill and onto the spill. The neutralizer needs to be mixed well with the sand and absorbent to come in contact with all of the spilled chemical—use a plastic broom to mix well. If the spill is small, you may use a spill pillow, located near the DI water cylinders at the north entrance to B225 Chemistry Preproom.

After the spill is controlled, the cleanup begins. If the material is warm or still giving off vapors, ventilate the room and wait before cleaning up. Use a plastic dustpan and plastic broom to sweep up the now solid mess and place it into large, heavy–duty yellow waste disposal bags (in drawer near spill pillows) or plastic garbage bags for disposal. If at any time during the chemical spill containment or cleanup step you don't feel comfortable, leave the area and get help.

Note:
Never respond to a mercury spill unless you are trained and have the proper equipment to do so.

Accidental Release Measures: Mercury/Metallic Mercury

Spill Release Procedures: SMALL SPILL: PICK UP WITH VACUUM EQUIPMENT SPECIFICALLY DESIGNED FOR MERCURY PICK UP OR USE MERCURY SPILL KIT. LARGE SPILL: EVACUATE AND VENTILATE AREA. IF POSSIBLE, STOP LEAK. DIKE TO RETAIN. VACUUM UP FREE LIQUID. DO NOT TOUCH SPILLED MATERIAL.

Neutralizing Agent: NONE

[1]**First Responders (National Incident Management System (NIMS))**
First responders include public safety professionals and trained volunteers who respond to and provide services at emergencies where additional skills and resources may be needed to bring the incident to a safe conclusion. First responders, often the first trained personnel to arrive on scene, usually arrive with standard issue protective and tactical equipment, which may not be adequate for intervention. First responders often provide first detailed scene information to managing authorities and other responding agencies. As the incident evolves, first responders may assist with establishment of structured incident command. They may continue to participate in incident stabilization and mitigation under the direction and supervision of highly trained specialists.

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Goggle Safety

It is our obligation to provide students, faculty and staff with safe, appropriate eye protection.
What is ANSI Z87.1?

The American National Standards Institute (ANSI) is a non-profit association which publishes standards covering a broad range of equipment and industries. The complete title of the current ANSI document pertaining to eyewear is *American National Standard Practice for Occupational and Face Protection,* ANSI Z87.1—1989. This document includes standards for several different styles of safety eyewear ranging from eyeglass-type spectacles to heavy-duty welding helmets. Each style has its own standards. ANSI's objective is to provide basic performance requirements for eye and face protection.

For clarification of the relevance of these standards, it is helpful to understand more about ANSI and Z87.1.

- ANSI is not a federal agency. As an independent association it is not involved in establishing or enforcing the OSHA Laboratory Standard.
- ANSI does not test, inspect or approve eyewear. The eye protection manufacturer can choose to contract an independent testing facility to conduct tests to determine if their products meet ANSI standards.
- There are important factors that are difficult to measure and are not covered in Z87.1 which must not be ignored when choosing eyewear. Among these are durability, comfort, anti-fog performance and chemical splash protection.

Keep in mind that not all eyewear is created equally.

- Eyewear should fit comfortably and securely. Provide the students, faculty, and staff with different styles and sizes to find the right fit.
- Chemical splash goggles should have a soft, pliable flange which seals around the eyes. The hard plastic edge on models lacking a flange becomes extremely uncomfortable.
- Anti-fog performance is affected by temperature and humidity. Experiment with different eyewear styles and features (vents and fog-free lenses) to find the best eyewear for your application.

Chemical Splash Protection

Just because eyewear meets Z87.1 standards does not necessarily mean it provides adequate protection from the dangers of splashed chemicals. Eyewear that does not provide a complete, snug seal around the eyes may be fine for some activities but not when using hazardous chemicals. When vent openings are provided on splash goggles the vents should be indirect, with covers and/or baffles preventing straight-line passage of liquids into the goggle.

ANSI Z87.1 Section 7.3(3)
The teacher must "make a judgement in selection of the appropriate protective equipment so that the protection is greater than the estimated hazards".

Occupational Safety and Health Administration OSHA 1910.1450 (Laboratory Standard)
School laboratories should include "protective apparel compatible with the required degree of protection for substances being handled."

Basic Recommendations

- Will you be using heat, glassware or chemicals in the lab? If so, it is a good policy to use protective eyewear.
- Chemical splash goggles designed to provide a complete, snug seal around the eyes should be worn whenever hazardous chemicals are used.
- The educational laboratory is a unique environment where each student is often surrounded by other students conducting experiments. Hazards could come from any direction. Protective eyewear should provide sufficient angular coverage.
- Contact lenses should not be worn in the laboratory. If wearing contacts is unavoidable, use non-vented chemical splash goggles.
- Face shields which provide added splash protection coverage should not be worn alone. Always wear the appropriate goggle or safety glasses underneath a face shield

Eyewash & Shower Safety

By Chris Bollas
Encon Safety Products Houston, TX

When a corrosive chemical comes in contact with eyes or skin, tissue damage begins immediately. While the rate and extent of this damage depends upon the chemical involved, the most important step in halting the damage is the same: The affected area must be irrigated immediately with copious amounts of water for a minimum of 15 minutes.

When done properly, irrigation improves the medical prognosis and reduces the risk of long-term tissue damage. If delayed or cut short, however, first aid treatment (irrigation) is less effective, and the full extent of the injury becomes problematic.

Proper irrigation is made easier by emergency shower and eyewash equipment. This equipment is specially designed to wash chemicals from the whole body, the eyes and face, or specific areas. Although emergency shower and eyewash stations have been part of the workplace for more than 70 years, it wasn't until 1981 that a comprehensive industry standard was developed. Through the coordinated efforts of the Industrial Safety Equipment Association, industry, labor, government, and the medical community, a consensus standard was approved, culminating in the creation of the ANSI Standard Z358.1, first issued in 1981. This standard is on its newly released third issue and is now referred to as ANSI Standard Z358.1-1998.

The "standard" is valued by planners, hygienists, and safety specialists as the source tool to outline the types of emergency shower and eyewash equipment, provide uniform minimum requirements for equipment performance, and provide information regarding installation, testing, maintenance, and training.

Types of Equipment

Each type of equipment outlined in the standard is designed to perform a specific function; one piece of equipment is not a substitute for another. The types of equipment covered include:

- Emergency showers
- Eyewash stations
- Eye/facewash stations
- Hand-held drench hoses
- Combination equipment

Emergency showers. Emergency showers are designed to provide a deluge large enough to encompass the whole body. Emergency showers should be selected when large volumes of potentially injurious materials are present, i.e., chemical storage areas.

Emergency showers shall deliver a pattern of potable water at least 50.8 cm (20 inches) across, flowing at a rate of at least 75.7 liters (20 gallons) per minute at a velocity low enough so as not to be injurious to the user. The diameter ensures the entire body receives a direct, fresh supply of water.

Emergency showers are not to be considered or used for irrigating chemicals from the face and eyes, due to the delicate nature of these tissues and the potentially high velocity and volume of water an emergency shower may produce.

Emergency eyewash stations. Emergency eyewash stations are specifically designed to provide a controlled flow of water to both eyes simultaneously. To maintain a soft, controlled flow to the eyes, regulation of the volume and pressure from the station is required. Eyewash stations require an uninterrupted, 15-minute supply of water. As a general rule, select a plumbed unit if plumbing is available. Plumbed units are recommended because of the greater volume of water available to the user—between 7.5 and 13.25 liters (2.0 and 3.5 gallons) per minute.

Emergency eye/facewash stations. An enhancement of the eyewash station is the eye/facewash station, designed to irrigate the eyes and face simultaneously. An eye/facewash station delivers a substantially greater volume of water (minimum 11.4 lpm/3.0 gpm) than an eyewash station and does so to irrigate the larger target area. In planning equipment selection, one should recognize the probability that when a chemical splash affects the eyes, it will also affect the face. With this in mind, **eye/facewash stations are strongly recommended when selecting plumbed chemical splash irrigation equipment**.

Drench hoses. Drench hoses have been part of emergency stations for many years. They are particularly common in laboratories and provide first aid capability in **conjunction** with eyewash/eye-facewash equipment. Drench hoses are used:

- to spot drench an affected area when a full shower is not required.
- to irrigate exposures when the victim is unconscious or unable to stand, and
- to irrigate under clothing prior to the removal of clothes.

It is important to note that **drench hoses serve as a secondary piece of equipment to emergency showers and eyewash stations *but do not replace them.***

Combination equipment. Combination equipment refers to multiple-use stations with a common plumbing unit, i.e., combination shower/eyewash. Combinations of shower, eyewash, eye/facewash, and drench hose equipment are available in a variety of configurations. When combination stations are used, the water line must be at least 3.2 cm (1 1/4") in diameter in order to readily supply multiple pieces of equipment. When planning system requirements, it is important to note that it is a standards requirement to be able to operate both shower and eyewash devices simultaneously.

Use of Equipment

Location. The location of the emergency equipment is critical to its ability to successfully serve its purpose. Because of the destructive capability of many chemicals, a recommended location for shower/eyewash equipment is within 10 seconds travel time from the identified hazard.

Specific distance references have been removed from the 1998 standard, and it is incumbent upon the planner to select a location based on the suspected time of travel of a person **with compromised vision**. (To help you develop a frame of reference, the average adult walking four miles an hour can travel 50 feet in 10 seconds. With compromised vision and no assistance the travel distance will be greatly reduced.) Assure there are no stairways, changes in floor levels, potential trip hazards, and doors that could be locked unknowingly between the emergency equipment and the work area. It is also recommended that the equipment should be readily accessible on paths of access and egress from the work area.

Water temperature. The ANSI Z358.1-1998 standard now addresses the subject of temperature. The standard refers to "tepid" temperatures, those being moderately warm or lukewarm. Medical references support tepid temperatures in first aid treatment for a majority of chemical exposures, and providing water at a temperature conducive to use is considered an integral part of providing suitable first aid facilities.

One could reasonably support a "tepid" range from 78 °F to 92 °F. Temperatures above 100 °F, have proven to be harmful to the eyes and can enhance chemical interaction with body tissues.

Controls. Commonly referred to as activation devices, pull rods, and push plates, these controls are required to cause water flow. Key characteristics of activation devices to consider are user visibility and durability. Stay-open valve devices are specified in the ANSI standard, with the purpose of assuring continuous flow while the hands remain free to remove clothing or hold the eyelids open. Actuation of the device shall provide water within one second to meet ANSI requirements.

Visibility. Equipment visibility is an important factor. Locating equipment on normal access and egress paths in the laboratory helps reinforce the location to potential users, who will pass the equipment in day-to-day work. Increasing the recognition factor of emergency equipment can be achieved by various means. The use of high-visibility signs that can be seen anywhere within the area being served by the first aid equipment is required. Another method is to paint the floors, walls, or emergency equipment itself in a bright color contrasting from the environment, but this can be expensive and will require ongoing maintenance. The area around the emergency shower/eyewash station shall be well lit to help the user identify the area and assist in conducting first aid activities.

Water disposal. How to dispose of chemically contaminated water is a growing concern. Can a chemical, even in diluted state, be released into the sewer system without violating local codes? This question can only be answered at each school.

Training. Although the steps involved in training personnel on how to use emergency shower/eyewash stations are quite simple, training is often overlooked. The standard requires personnel to know how, when, where, and how long to use emergency shower/eyewash equipment, and what they should do after the initial irrigation is completed.

Testing, inspection, and maintenance. Testing the equipment regularly is the best preventive maintenance program available. According to the ANSI standard, plumbed emergency equipment shall be tested weekly to verify flow and proper operation. Testing also clears the water lines, allowing any dirt or pipe scale to pass. Broken or worn parts should be repaired or replaced immediately. An annual inspection of emergency equipment is now required per the ANSI standard to assure equipment conformance.

Summary. The purpose of emergency shower/eyewash equipment is to reduce and eliminate chemical incident injuries. Proper equipment selection, location, utilities, training, and scheduled inspections can make the difference in how well first aid is performed.

You hope that emergency shower and eyewash stations are only tested and are never used. But in case of emergency, proper planning can minimize the impact of a chemical exposure and protect the school, teachers and students from unnecessary hardship.

Chemical Demonstration Guidelines from the Professional Association of Chemists

Minimum Safety Guidelines for Chemical Demonstrations

Chemical Demonstrator Requirements:

1. Know the properties of the chemicals and the chemical reactions involved in all demonstrations presented.

2. Comply with all local rules and regulations.

3. Wear appropriate eye protection for all chemical demonstrations.

4. Warn the members of the audience to cover their ears whenever a loud noise is anticipated.

5. Plan the demonstration so that harmful quantities of noxious gases (e.g., NO_2, SO_2, H_2S) do not enter the local air supply.

6. Provide safety shield protection wherever there is the slightest possibility that a container, its fragments, or its contents could be propelled with sufficient force to cause personal injury.

7. Arrange to have a fire extinguisher at hand whenever the slightest possibility of fire exists.

8. Do not taste or encourage spectators to taste any non-food substance.

9. Do not use demonstrations in which parts of the human body are placed in danger (such as placing dry ice in the mouth or dipping hands into liquid nitrogen).

10. Do not use "open" containers of volatile, toxic substances (e.g., benzene, CCl_4, CS_2, formaldehyde) without adequate ventilation as provided by fume hoods.

11. Provide written procedure, hazard, and disposal information for each demonstration whenever the audience is encouraged to repeat the demonstration.

12. Arrange for appropriate waste containers for and subsequent disposal of materials harmful to the environment.

Right to Know Law and Hazard Communication Standard

Purpose

To inform the employee about any unknown hazards associated with the employee's work. The employee has the right to know about all the hazards he/she may be dealing with in the workplace.

1) Material Safety Data Sheets (MSDS)

MSDS are usually the primary way of communicating the hazards of a particular agent to an employee or an employer. This requirement generally states the employer should acquire, update and maintain MSDS for all of the hazardous materials used or stored in the facility and make those MSDS available to the employee for informational purposes.

The minimum standards for MSDS include:

- The MSDS must be written in English
- Chemical name
- Hazardous components
- Physical characteristics (density, flashpoint, etc.)
- Physical hazards (fire, explosion, reactivity)
- Health hazards (both chronic and acute). All signs or symptoms of exposure must be listed. Carcinogens must be identified.
- Primary routes of entry
- Permissible exposure limits or TLV
- Any applicable precautions (gloves, goggles, fume hood, etc.)
- First aid and emergency procedures (chemical splash, spill handling, etc.)
- Date prepared
- Name and address of the manufacturer or MSDS preparer including the phone number

2) Hazardous Materials List

This item consists of a list of all the hazardous agents present in the workplace. In most states this list is kept only by the employer and access is given to the employee on request. Some states require a copy of this list to be given to the fire department or some state agency.

3) Inventory

The hazardous materials list and an up-to-date inventory usually go hand in hand. Both the list and the inventory must be continually updated. An inventory of all hazardous agents is an essential ingredient to most Right to Know laws.

4) Notification

All laws require the employer to notify the employee of any potential exposure or actual exposure to a hazardous substance. This is initially accomplished by posting the Right to Know regulations or poster where it is easily read and noticed by the employee. Notification is also accomplished through training and employee access to MSDS.

5) Training

Some state laws are very detailed and specific in the area of training requirements of employees. Only two states, Rhode Island and Texas, require the training of students as well as staff members. Most states require training to be done on an annual basis or when exposure to a new hazard is anticipated. Some states require this training to be in written form while others allow verbal training or some combination of both types. Training includes:

a) Learning to read labels and MSDS
b) Providing the locations of hazardous materials
c) Learning the hazards associated with the materials in the workplace, both chronic and acute
d) Safe handling of chemicals
e) Use of protective equipment (fire extinguishers, respirators, etc.)
f) First aid and emergency procedures (spills, exposure, splashes, etc.)

6) Labels and Labeling of Hazardous Materials

Most laws state some minimum standard of labeling must be observed. This includes:

- Name of the chemical
- Hazards, both physical and health
- Name and address of the manufacturer

All states indicate that if the product is purchased and the label meets the standard, no further labeling is necessary. All solutions must be labeled with the hazardous ingredients and applicable warnings to meet the minimum standards.

The New Laboratory Standard with the Chemical Hygiene Plan

In May of 1990, the federal government passed an extension of the Hazard Communication Act written specifically for the research and academic laboratory. Enforcement of the new Laboratory Standard began in January of 1991. The Laboratory Standard is very similar in many ways to the original law. The major difference is the requirement to have a Chemical Hygiene Plan and a Chemical Hygiene Officer.

A Chemical Hygiene Plan is basically all of your safety regulations and proper lab procedures written into a manual. Some examples might include: rules on not eating in the laboratory, eyewear requirements, proper evacuation procedures, and the proper handling of flammable materials, to name a few. This listing of rules and procedures are your Standard Operating Procedures. These rules and procedures must be well thought out with the goals of always minimizing the exposure of the employee and the student.

Overview

The various state Right to Know Laws are very similar. The seven major ingredients are always included with only minor changes on who and how to train or to whom you will have to send MSDS and hazardous materials lists. The paperwork requirement (MSDS and reporting lists) can be overwhelming, but is required by the laws. The department's five major steps include:

1) Take an inventory (developing a list of hazards)
2) Acquire, update and maintain Material Safety Data Sheets
3) Label properly
4) Train
5) Develop a Chemical Hygiene Plan

Following these five steps will not only help you comply with your respective state's Right to Know Law, but will also ensure you will be working in a safer place.

Safety F.A.Q.

Do chemical storage cabinets need to be ventilated?

The National Fire Protection Association (NFPA) does not recommend the ventilation of flammables cabinets. (See page 906 of the *Flinn Scientific Catalog/Reference Manual*.) Instead of ventilating individual chemical safety storage cabinets, we suggest you ventilate your entire chemical storage area a minimum of four air changes per hour. This type of ventilation system will provide needed ventilation for all chemicals. The best type of vent fan and how it should be installed can be found on page 958 of the *Flinn Scientific Catalog/Reference Manual*.

Why can't nitric acid and acetic acid be stored together?

Nitric acid, when combined with acetic acid on a tile/concrete floor, will sometimes create a fire. This situation has occurred enough times that we feel nitric acid should be stored in the same cabinet but kept separate from acetic acid. A special nitric acid compartment has been developed to fit into your existing acid cabinet. (See the Safety Storage Cabinets section of our *Flinn Scientific Catalog/Reference Manual*.) This unique secondary containment device will provide ample protection for nitric acid.

Metal in my chemical storage area is rusting. What's happening?

Chemical vapors are attacking the metal. Your chemical storage area is in need of ventilation. Good ventilation, even as little as one air change per hour, would dramatically reduce your corrosion problem. For metal shelf clips the problem is probably very close by. Look for iodine, iodine solutions or concentrated acids. These are usually the culprits. To help reduce corrosion of metal shelf clips, spray them with Krylon® spray once a year. This liquid plastic will greatly reduce the amount of corrosion.

Can I store two or three different chemical compatible families on the same shelf when using the Flinn Suggested Chemical Storage System?

Shelf space is limited. Yes, you can store two or three families on the same shelf. All we ask is that you either physically divide the shelf with a piece of wood or keep 2 inches of space between each family.

Irvine Valley College
Department of Chemistry
Chemical Hygiene Plan

Appendix A

NIOSH Safety and Health Topic: Occupational Cancer NIOSH Carcinogen List

The following is a list of substances NIOSH considers to be potential occupational carcinogens.

A number of the carcinogen classifications deal with groups of substances: aniline and homologs, chromates, dintrotoluenes, arsenic and inorganic arsenic compounds, beryllium and beryllium compounds, cadmium compounds, nickel compounds, and crystalline forms of silica. There are also substances of variable or unclear chemical makeup that are considered carcinogens, coal tar pitch volatiles, coke oven emissions, diesel exhaust and environmental tobacco smoke.

Some of the potential carcinogens listed in this index may be re-evaluated by NIOSH as new data become available and the NIOSH recommendations on these carcinogens either as to their status as a potential occupational carcinogen or as to the appropriate recommended exposure limit may change.

A Acetaldehyde 2-Acetylaminofluorene Acrylamide Acrylonitrile Aldrin 4-Aminodiphenyl Amitrole Aniline and homologs *o*-Anisidine *p*-Anisidine Arsenic and inorganic arsenic compounds Arsine Asbestos Asphalt fumes	**M** Malonaldehyde Methoxychlor Methyl bromide; class, monohalomethanes Methyl chloride Methyl iodide; class, monohalomethanes Methyl hydrazine; class, hydrazines 4,4'-Methylenebis(2-chloroaniline) (MBOCA) Methylene chloride 4,4-Methylenedianiline (MDA)
B Benzene Benzidine Benzidine-based dyes Beryllium Butadiene *tert*-Butyl chromate; class, chromium hexavalent	**N** *α*-Naphylamine *B*-Naphylamine Nickel, metal, soluble, insoluble, and inorganic; class, nickel, inorganic Nickel carbonyl Nickel sulfide roasting 4-Nitrobiphenyl *p*-Nitrochlorobenzene 2-Nitronaphthalene 2-Nitropropane

	N-Nitrosodimethylamine
C Cadmium dust and fume Captafol Captan Carbon black (exceeding 0.1% PAHs) Carbon tetrachloride Chlordane Chlorinated camphene Chlorodiphenyl (42% chlorine); class polychlorinated biphenyls Chlorodiphenyl (54% chlorine); class polychlorinated biphenyls Chloroform Chloromethyl methyl ether bis(Chloromethyl) ether *B*-Chloroprene Chromium, hexavalent [Cr(VI)] Chromyl chloride; class, chromium hexavalent Chrysene Coal tar pitch volatiles; class, coal tar products Coke oven emissions	**P** Pentachloroethane; class, chloroethanes *N*-Phenyl-*b*-naphthylamine; class, *b*-naphthalene Phenyl glycidyl ether; class, glycidyl ethers Phenylhydrazine; class, hydrazines Propane Sultone *B*-Propiolactone Propylene dichloride Proplyene imine Propylene oxide
D DDT (dichlorodiphenyltrichloroethane) Di-2-ethylhexyl phthalate (DEHP) 2,4-Diaminoanisoleo *o*-Dianisidine-based dyes 1,2-Dibromo-3-chloropropane (DBCP) Dichloroacetylene *p*-Dichlorobenzene 3,3'-Dichlorobenzidine Dichloroethyl ether 1,3-Dichloropropene Dieldrin Diesel exhaust Diglycidyl ether (DGE); class, glycidyl ethers 4-Dimethylaminoazobenzene Dimethyl carbomoyl chloride 1,1-Dimethylhydrazine; class, hydrazines Dimethyl sulfate Dinitrotoluene Dioxane	**R-S** Radon Rosin core solder, pyrolysis products (containing formaldehyde) Silica, crystalline cristobalite Silica, crystalline quartz Silica, crystalline tripoli Silica, crystalline tridymite silica, fused Soapstone, total dust silicates
E-G Environmental tobacco smoke Epichlorohydrin Ethyl acrylate Ethylene dibromide Ehtylene dichloride Ethylene oxide Ethyleneimine Ethylene thiourea Formaldehyde	**T** Tremolite silicates 2,3,7,8-Tetrachlorodibenzo-*p*-dioxin (TCDD) (dioxin) 1,1,2,2-Tetrachloroethane Tetrachloroethylene Titanium dioxide *o*-Tolidine-based dyes *o*-Tolidine Toluene diisocyanate (TDI) Toluene diamine (TDA)

Gallium arsenide Gasoline	*o*-Toluidine *p*-Toluidine 1,1,2-Trichloroethane; class, chloroethanes Trichloroethylene 1,2,3-Trichloropropane
H-K Heptachlor Hexachlorobutadiene Hexachloroethane Hexamethyl phosphoric triamide (HMPA) Hydrazine Kepone	**U-Z** Uranium, insoluble compounds Uranium, soluble compounds Vinyl bromide; class, vinyl halides Vinyl chloride Vinyl cyclohexene dioxide Vinylidene chloride (1,1-dichloroethylene); class, vinyl halides) Welding fumes, total particulates Wood dust Zinc chromate; class, chromium hexavalent

Partial List of Chemicals Known to the State to Cause Cancer or Reproductive Toxicity "Prop 65"

STATE OF CALIFORNIA
ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF ENVIRONMENTAL HEALTH HAZARD ASSESSMENT
SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986
CHEMICALS KNOWN TO THE STATE TO CAUSE CANCER OR REPRODUCTIVE TOXICITY
"**PROPOSITION 65 LIST**"
20-Jul-12

The Safe Drinking Water and Toxic Enforcement Act of 1986 requires that the Governor revise and republish at least once per year the list of chemicals known to the State to cause cancer or reproductive toxicity. For easy reference, chemicals which are newly added are shown in underline. Chemicals or endpoints shown in strikeout were placed on the Proposition 65 list on the date noted, and have subsequently been removed. A hyperlink is provided for the basis for removing the chemical.

In the Listing Mechanism column, "AB" denotes authoritative bodies, "SQE" denotes State's Qualified Experts, "FR" denotes formally required to be labeled or identified, and "LC" denotes Labor Code. For those chemicals for which the basis for listing documentation is available electronically, a hyperlink to the documentation is provided. The identification number indicated in the following list is the Chemical Abstracts Service (CAS) Registry Number. No CAS number is given when several substances are presented as a single listing. The date refers to the initial appearance of the chemical on the list. For those chemicals for which a no significant risk level (NSRL) for carcinogens or maximum allowable dose level (MADL) for reproductive toxicants has been adopted, it is denoted in the column, "NSRL or MADL." For those NSRLs or MADLs for which the risk assessment documentation is available electronically, a hyperlink to the documentation is provided.

A Partial List
Based on chemicals stored in the Irvine Valley College Chemistry Department

Chemical	Type of Toxicity	CAS No.	Date Listed
N,N-Dimethylformamide	Cancer	68-12-2	October 27, 2017

Lead	Developmental, female/male	-	February 27, 1987
Lead Compounds	Cancer	-	October 1, 1992
Mercury	Developmental	-	July 1, 1990
Methanol	Developmental	67-56-1	March 16, 2012
Naphthalene	Cancer	91-20-3	April 19, 2002
Nickel (Metallic)	Cancer	7440-02-0	October 1, 1989
Nickel Compounds	Cancer	-	May 7, 2004
Silica	Cancer	-	October 1, 1988
Thioacetamide	Cancer	62-55-5	January 1, 1988
Toluene	Developmental	108-88-3	January 1, 1991

Standard Operating Procedure (SOP)
for
Use of Mercury (I) Nitrate Aqueous Solutions

This SOP covers the use of 0.1 Molar aqueous solutions of mercury (I) nitrate at Irvine Valley College. MSDS for this compound shows it to be toxic to the central nervous system and to cause **irreversible** damage to multiple human organs, up to and including death. In addition, MSDS information confirms that this compound is a **cumulative toxin** for which low level exposure, including exposure at lower than OSHA PEL levels, over time can cause identical toxic effects to those seen in acute exposure of larger amounts of the substance. Due to the substantially dangerous properties of mercury compounds, the following measures will be required to safeguard the technician when dispensing its aqueous solutions and when working in the chemical prep room or student laboratories with solutions containing mercury compounds at Irvine Valley College:

1. Technician must wear gloves impervious to mercury aqueous solutions at all times while handling mercury (I) nitrate.
2. Technician must wear laboratory apron and clothing that completely covers all exposed skin surfaces, including torso, arms and legs.
3. Footwear must be worn that completely covers the feet and ankles.
4. Mercury (I) nitrate aqueous solutions must be dispensed in an approved fume hood. Fume hood approval is to include testing to insure sub-OSHA PEL levels of mercury (I) nitrate are reached inside and outside of the fume hood while in normal operation, unless it is determined that such testing is not needed for aqueous mercury (I) nitrate solutions.
5. Safety goggles must be worn at all times when dispensing mercury (I) nitrate solutions, and all safety protocols found in the MSDS for mercury (I) nitrate solutions must be adhered to.

This SOP may require further updates once more information is made available to the Chemical Hygiene Officer at the conclusion of OSHA PEL testing.

Note: Failure to operate in a manner consistent with all directives found in this SOP will result in all mercury (I) nitrate solution use being suspended. Once operations can be shown to be occurring in a manner consistent with this SOP, the compound may then be re-approved for use.