PPS School District Chemical Hygiene Plan

Portland Public School District

November 2020

Contact Information

- **Emergency 911** (If spill is highly dangerous, has large flame, or there is significant injury)

- **National Poison Center** 1-800-222-1222

- **Herb Wagner** - PPS Programs Manager- contact when any spill occurs or to pick up Hazardous Chemicals at your school
  - During school hours:
    - Direct line: 503-2000 ext 74277
    - Cell: 503-522-5095
  - After hours:
    - 24 hours/ after hours call - Facility Asset Management (FAM) at 503-730-9682. When reporting, be specific about the nature of the involved material and exact location.

- **Terra Wheeler** - PPS Environmental Health & Safety Associate - 503 916-6503

- **Joe Crelier** - PPS Risk Management Services Director **-** 503 916-3204

- **Dr. Susan Holveck -** PPS Program Administrator for Science 503-916-3538

- **Andrea Leech** - PPS Science TOSA

This safety plan was created by the following teachers:

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Introduction

A chemical hygiene plan (CHP) is a written program stating the policies, procedures, and responsibilities that will serve to protect Portland Public School District employees and students from the health hazards associated with hazardous chemicals that are used in our schools.

The objective is to ensure that the proper procedures, training and written chemical hygiene plan are in compliance with 29 CFR 1910.1450 Occupational Exposure to Hazardous Chemicals in Laboratories. It is important to follow safety procedures for two primary reasons. First, the health and welfare of both students and staff are protected during the instructional activity. Second, utilizing safety procedures in the everyday activities of the lab, classroom, and other physical facilities provides students with information and a model upon which they will build their own practices outside of school activities.

All students, teachers, staff, volunteers, and administrators in the specific areas covered by the material in the handbook are expected to adhere to the guidelines and directions as outlined. Appropriate training will be provided to acquaint all staff members with the contents of the Chemical Hygiene Plan and to assist staff members in carrying out the provisions of the handbook.

The Teacher's Responsibilities

Upkeep of Laboratory Equipment

- Conduct regular inspections of safety and first aid equipment as often as requested by the administration or per manufacturer guidelines. Record the inspection date and the inspector's initials on the attached equipment inspection tag. This includes:
    - First aid kits
    - Chemical spill kits
    - Eye wash stations
    - Fire extinguishers
    - Safety showers
    - Fume hoods

  See "Recommended Laboratory/Storeroom Equipment section" below for details
- Notify administration of any hazardous condition or malfunctioning equipment.

Incident reporting

Report all laboratory incidents.

- If there is minor injury, attend to injured personnel and call the school office number.
- If no nurse on duty, report student injury using an **online incident form** under "Student or Visitor Related Incident and Claim Reporting"
- Report the incident to Risk Management by filling out a *Property Theft and Damage* **online incident report**: https://www.pps.net/Page/2710

Safety and Emergency Procedures

Be familiar with each experiment protocol, including how to use the equipment, the hazards of the chemicals being used, and procedures for accidents. It is highly recommended that

demonstrations and experiments are tried out by the teacher in advance of carrying them out in the classroom full of students.

Once a science teacher has this information, the next step is to promote a culture of safety in the chemistry classroom. Instructors should lead by example by wearing appropriate personal protective equipment and enforce safety rules, procedures, and practices.

- Educate students on the location and use of all safety and emergency equipment prior to laboratory activity.
- Know what steps to take in the event of a spill or fire.
- Provide students with verbal and written safety procedures to follow in the event of an emergency/accident.
- Know the location of and how to use all safety and emergency equipment (i.e., eyewash, first- aid kit, fire blanket, fire extinguishers and mercury spill kits).
- Keep a list of emergency phone numbers near the phone.
- Conduct appropriate safety and evacuation drills on a regular basis.

Maintenance of Chemicals

- Perform regular inventory inspections of chemicals.
- Store all chemicals by their compatible characteristics.
- Update the chemical inventory at least annually.
- Keep both a physical and electronic copy of the chemical inventory for local emergency responders.
- Do not store food and drink with any chemicals. Signs should be placed on refrigerators stating NO food, beverages or ice for human consumption.
- If possible, keep all chemicals in their original containers.
- Make sure all chemicals and reagents are labeled and dated with the date of purchase.
    - If purchase date is not know, label with the date the chemical was found. If possible, dispose of chemicals with an unknown purchase date.
- Do not store chemicals on the lab bench, on the floor, or in a fume hood.
- Ensure chemicals not in use are stored in a locked facility with limited access.
- Know the storage, handling, and disposal requirements for each chemical used.
- Make certain chemicals are disposed of properly. Consult the label and the Safety Data Sheets (SDS) for disposal information and always follow appropriate chemical disposal regulations. Contact the Facilities department for questions regarding disposal.

Preparing for Laboratory Activities

- Before each activity in the laboratory, weigh the potential risk factors against the educational value.
- Review the Safety Data Sheets (SDS) for any chemicals you will be using. These can be found via the Flinn Chemventory program.
- Have an understanding of all the potential hazards of the materials, the process, and the equipment involved in every laboratory activity.
- Inspect all equipment/apparatus in the laboratory before use.
- Instruct students on all laboratory and safety procedures (see “Laboratory Safety Practices and Techniques” section below)
- Inform students a class period in advance of potential hazards and materials that will be used during lab activities

Ordering Chemicals and Equipment

If you need a chemical, material, or piece of equipment, speak to your building's Chemical Safety Coordinator. Have quantities, concentrations, and any other relevant information ready.

The Students' Responsibilities

Working with chemicals can be dangerous if important safety steps are not followed. Each school year should begin with an orientation and demonstration of safety equipment and a review of expected laboratory conduct. Each experiment should begin with specific guidance, including information about the chemicals used and any required or special handling (see "Laboratory Safety Practices and Techniques" section below).

General lab safety

- Do not engage in practical jokes or boisterous conduct in the laboratory.
- Never run in the laboratory.
- The use of cell phones or other personal items during labs is prohibited. This is to limit chemical contamination of your items and to limit your exposure to chemicals.
- Do not sit on laboratory benches.
- Leave all equipment, chemicals and experiment products in the laboratory.
- Store coats, bags and backpacks in a place designated by your teacher. Keep them out of walkways to prevent tripping that can cause accidents in the laboratory.

Protective equipment and precautions

- Wear proper safety equipment as instructed by the teacher.
- Always remove gloves and wash hands before handling any personal items or before leaving the lab. Do not touch doorknobs, handles, water fountains, water faucets or anything else that might expose someone to the chemicals on gloves.
- Wear closed-toe and closed-heel shoes.
- Wear clothing that covers the legs, arms and torso. Remove any loose clothing, jewelry and tie back long hair.
- Keep gloved hands away from skin, eyes and mouth while using chemicals. Never eat, drink or apply makeup in the laboratory.
- Synthetic finger nails are not recommended in the laboratory; they are made of extremely flammable polymers which can burn to completion and are not easily extinguished.
- If possible avoid wearing contact lenses during laboratory experiments. They are gas permeable and can trap toxic vapors against the eye.

Chemical safety

- Unauthorized experiments and improvised experiments are strictly forbidden.
- Never taste, smell or touch any chemicals unless specifically approved by the teacher.
- Immediately report any spills, accidents or injuries to a teacher. Do not attempt to clean chemical spills yourself.
- Never leave experiments that are in progress, especially lit Bunsen burners.
- Make sure no flammable solvents are around when lighting a flame.

Laboratory Safety Practices and Techniques

Be prepared to demonstrate laboratory safety practices **each time students do a lab activity.** Although reviewing these practices repeatedly may seem unnecessary, it is common for students to forget basic safety rules and procedures. Therefore, it is best practice to review safe practices before each activity in which students will be using chemicals.

Outline the safety requirements for each experiment, including any *special precautions*. Examples may include but are not limited to:

- Use proper personal protective equipment for each experiment.
- Remove gloves, goggles, and lab coat if you need to leave the room.
- Always label containers with substances that will be used during the lab. Ensure no old labels are on containers to avoid confusion.
- Never use volatile squeeze bottles near open flames.
- Make sure hose connections between burners and gas outlets are protected from pinching or from being disconnected.
- Always handle dry ice with insulated gloves and wear eye protection.
- Handle glass wool and steel wool carefully to avoid getting splinters in the skin or eye.
- Tabletops should be protected from extreme heat by using insulation underneath burners or heated objects.
- Never remove objects from a hot plate with your hands. Never “test” how hot something is by touching it. Always use tongs or a heat-resistant glove.
- When using thermometers, do not leave them in containers that are being heated. Remove the thermometers in between measurements.
- Do not heat test tubes with rubber stoppers on them.
- Dispose of chemical waste in designated containers unless told otherwise.
- Properly dispose of broken glassware and other sharp objects such as syringe needles in designated sharps containers.

Be familiar with safety practices described throughout this plan. Other useful information can be found in the NIOSH publication *School Chemistry Laboratory Safety Guide:* http://www.cdc.gov/niosh/docs/2007-107/pdfs/2007-107.pdf

Handling Chemicals

- Never pour chemicals or chemical waste into sinks or wastebaskets. Always place in properly labeled waste containers.
- Wear appropriate chemical-resistant gloves when handling chemicals.
- For dry chemicals, remove only the amount needed. Do not return the excess to the original container.
- Use a spatula or scoopula to remove a solid reagent from a container.
    - Use a separate spatula/scoopula for each chemical.
    - To avoid explosions, never use a metal spatula when working with peroxides.

- Use a hot-water bath to heat or evaporate flammable liquids. Never heat or evaporate directly with a flame. Carry out procedure in a fume hood.
- Use the fume hood when there is a possibility of generating toxic vapors, dust or gases, especially volatile gases.
- Respond to and clean up all spills properly and promptly. Discourage students from handling chemical spills.
- When diluting acids, ***always pour acids into water, never the reverse***. Combine the liquids slowly while stirring to distribute heat buildup throughout the mixture.

Creating Solutions and Dilutions

Use proper procedures when creating solutions or diluting chemicals. When in doubt, consult the Chemical Safety Coordinator for your building. All new solutions must be correctly labeled, dated, and include the name of the person who made the solution. Add any solution that will be stored to the chemical inventory list.
Use a Flinn Calculator to determine appropriate measurements:
https://www.flinnsci.com/flinn-freebies/molarity-and-solution-calculators/acid--base-molarity--normality-calculator/

Recommended Laboratory/Storeroom Equipment

The following safety and emergency equipment is recommended:

- Eyewash stations
- Safety Showers
- Fire extinguishers (dry chemical, class B -for gas or oil fires- and carbon dioxide, class C -for electrical fires, but not wood or paper-)
- Sand bucket
- Fire blankets
- Emergency signs and placards
- Fire detection or alarm system with pull stations
- First-aid kits
- Spill control kit (chemical and mercury)
- Acid cabinets (made of **wood only** to prevent corrosion)
- Flammable cabinet (does not need to be vented, if room is vented)
- Fume hood (checked each year)
- Container for broken glass and sharps
- Standardized Safety Data Sheets (SDS) for all chemicals which can be accessed via SafeSchoolsSDS site: http://hsd.or.safeschoolssds.com/
- Emergency telephone numbers
- Room needs to be vented. The venting system needs to be independent of the lighting system. Venting needs to occur 24 hours a day, year-round.

Eye Wash Stations

Eye wash stations are necessary in case of a chemical exposure incident. They are considered a first-aid measure, rather than a preventative one. They are required in science instructional laboratories and storerooms where hazards from chemical splash or chemical mist/vapor may be encountered. The eye wash stations should be located within 10 seconds

distance from work areas. The path to the eyewash must be unobstructed and cannot require opening doors or passing through obstacles unless others are always present to help the exposed person. An eye wash fixture should provide a soft stream or spray of aerated water for an extended period (15 minutes). Water should be tepid, as temperature extremes can pose a health hazard. Elevated water temperatures may accelerate adverse chemical reactions. Eyewashes should be inspected (flushed for about three minutes) per the manufacturer's recommendations to clear out sediments, biological contaminants, etc. A written flush log is to be posted next to each eyewash containing the date of flush and person doing the task, as well as the option to record comment or issue. Eyewash must flow at .4 gallons per minute to ensure both eyes are well flushed.

Factors to be evaluated in a hazard assessment

A. **Chemical Properties** - The physical state, concentration, pH (acids with a pH less than 2.5 and alkalis with a pH greater than 11.0 require immediate flushing to prevent damage), temperature, etc.
B. **Chemical-use Patterns** - How employees work with chemicals during handling, transfer, use, or disposal, including frequency and duration of use, and quantity of chemicals. Units must be provided in fixed work areas or stations when a hazard assessment or any other information indicates that an employee may reasonably be exposed to a substance that can cause corrosion or permanent tissue damage to the eyes.

Report non-compliant eye washes to Terra Wheeler EHS Associate 503-916-3503, (twheeler@pps.net)

Here are eye wash guidelines for your school.

A. Valves must remain open and operate hands-free to allow an individual to use both hands to hold their eyes.
B. Solution/squeeze bottles: Used as a substitute for water must be properly tested and maintained and replaced prior to expiration date. They cannot be used as a sole means of protection nor a substitute for plumbed or self-contained equipment
C. All eyewashes should be activated weekly to flush the supply and line and to verify proper operations. Self-contained units should be maintained in accordance with the manufacturer's instructions

Safety Showers

An acid shower is necessary In case of exposure to materials that are highly corrosive or highly toxic by skin absorption They should be in locations where occupants are provided direct access. Routine testing should be done by science staff or the building safety team to ensure the valve is operable and to remove any debris in the system. Showers must be tested annually. (every 6 months is preferred). Flowrate must reach 15 gallons/minute. The shower must be capable of drenching the person immediately and should be large enough to accommodate more than one person. It should have a quick opening valve requiring manual closing.

Fire Extinguishers

In the event of a fire, assisting students and staff to evacuate safely is the top priority. Pull the closest fire alarm and notify office immediately. If possible, here are additional measures that can be taken:

- Stop adding reagents
- Extinguish all burners and heaters
- Use the following NFPA “PASS” approach when working with a fire extinguisher:

  P – Pull the pin Most extinguishers use locking pin to prevent inadvertent operation. Pulling the pin unlocks the operating level to allow discharge operation.

  A - Aim low Point the extinguisher nozzle at the base of the fire.

  S - Squeeze the lever A lever below the handle or some other type of triggering device must be engaged to release the extinguishing agent.

  S - Sweep from side to side Use a sweeping motion across the base of the fire and continue discharging the extinguishing agent until the fire appears to be out. Be certain to watch the fire area; if the fire reignites, repeat the process.

  Additional fire safety and fire extinguisher training can be obtained by logging into SafeSchools Training site and taking the Fire Extinguisher Safety course. http://hsd.or.safeschools.com/login

Fire Blankets

Can be helpful in smothering small fires. A fire blanket should be used only as a last measure to extinguish clothing fires. Never wrap a standing person in a fire blanket. This can create a “chimney effect” and can increase the severity of burns. A fire blanket is useful as a first aid measure for the prevention of shock. Clothing fires should be extinguished immediately by dropping to the floor and rolling or using a safety shower if available.

Spill Kits

A chemical spill kit should be available to handle small spills in the laboratory. Large spills and leaks require evacuation and the immediate contact of the local fire department. A spill kit should include:

- Spill control pillows
- Neutralizing agents for acid spills (sodium hydrogen carbonate)
- Neutralizing agents for alkali spills (sodium hydrogen sulfate)
- Pick up equipment such as brush, broom, pail, dust pan
- Personal protective equipment
- Inert absorbents such as sand or kitty litter

Fume Hoods

A fume hood is an engineering control that provides local exhaust ventilation. It usually has a moveable front sash or window with safety glass. All fume hoods should be inspected annually and tested for flow rates. OSHA recommends between 60-100 lfm. A sticker or sash stop should be placed on the hood at approximately 100 linear feet per minute flow rate.

Hood safety hints:

- Use the hood to remove airborne chemicals, such as aerosols, dust, fumes and vapors
- Hoods are not for storage. Keep them clean of chemicals, lab ware, etc.
- Place apparatus as far back to the rear of the hood for efficient air flow
- Make sure only necessary materials are under the hood during an operation
- Avoid having students work opposite a fume hood
- Always keep the sash between the face and experiment with the sash lowered
- Check the air flow before and during the operation
- Never block air flow into or inside the hood
- Do not use the hood as a waste disposal device for organic chemicals

Recommended Personal Protective Equipment (PPE)

The following personal protective equipment (PPE) should be available in every laboratory space. Guidelines for usage will be clearly communicated to the students by the teacher prior to each laboratory experience.

- Safety goggles with side protection
    - Must be worn for any laboratory activity.
    - Safety goggles should not be worn outside of the laboratory area.
    - Eye protection when working with chemicals must meet the requirements of the American National Standards Institute (ANSIP Z87.1-1989).
- Gloves
    - Protective gloves should be selected on the basis of the hazards involved.
    - Nitrile gloves protect against most chemicals and infectious agents.
    - Rubber gloves protect against mild corrosive material.
    - Neoprene gloves protect against most solvents, oils, and mild corrosive materials.
    - Avoid latex gloves as many people are allergic or develop allergies to this material.
    - Don't wear gloves when touching common surfaces that may be touched without gloves by others.
- Lab apron or coat
    - Should be worn when working with corrosive or toxic chemicals
    - Can be worn to protect clothing from damage and stains
- Face shield
    - Full face shields should be worn when working with glassware under reduced or elevated pressure and with glass apparatus used in combustion or other high temperature operation.

- **Contact Lenses** - All teachers and students should be aware that contact lenses pose a special safety hazard. Gases and vapors can be concentrated under such lenses and cause permanent eye damage. In the event of a chemical splash into an eye, it is often nearly impossible to remove the contact lens to irrigate the eye because of involuntary spasm of the eyelid. Person attempting to irrigate the eyes of an unconscious victim may not be aware of the presence of contact lenses, thus reducing the effectiveness of such treatment. Soft lenses can absorb solvent vapors even through face shields and, as a result, adhere to the eye. It is strongly recommended that the wearing of contact lenses

in the laboratory be discouraged. If the teacher permits contact lenses to be worn, protection by non-vented goggles should be required. Wearing only safety glasses or vented goggles over contact lenses should not be permitted since there is a possibility that chemicals may infuse under the contact lenses and cause eye damage.

Chemical Storage Rooms

Proper storage is essential to the safe operation of any laboratory. Every storage room should have the following characteristics (see Appendix C for sample *Lab Safety Checklist*).

- The area is clean and orderly
- A telephone is readily available
- A current list of emergency telephone numbers is posted
- Emergency procedures are up-to-date and posted
- An appropriate first-aid kit is available
- An appropriate spill kit is available
- Safety equipment and supplies (goggles, aprons, face shields, fire blanket, fire extinguisher, eyewash, spill pillow, and, if appropriate, deluge shower, safety shields, and fume hood) are available and functional
- Only chemicals that are used are stored (assuming chemicals not needed have already been disposed of)
- Chemicals on hand will be consumed within the next one to three years (see Appendix D for *End of Year Safety Measures*)
- Chemicals are stored in compatible groups
- Chemicals are properly labeled with Date of Purchase and/or Preparation, Preparer's name, and Concentration for solutions
- A Standardized Safety Data Sheet (SDS) is on file for each chemical that is received in the normal course of the school year and is made accessible to teachers and students for review
- There is a continually updated inventory of all chemicals, including quantity, location, date of purchase, shelf life, and projected disposal date
- No chemicals are stored above eye level
- No chemicals are stored on the floor
- Shelves or cabinets are secured firmly to the walls
- Earthquake lips or barriers are in place on storage shelves
- A storage cabinet for acids
- A storage cabinet for bases
- A storage cabinet for flammables
- Poisons are secured
- The storeroom door is self-closing and is locked
- Non-reactive waste receptacles are made of plastic or crockery
- The chemical storage room should have a minimum flow rate of four room air changes per hour when the storage area is unoccupied (nights and weekends) and 8 air room changes per hour when the room is occupied during school hours.

Chemical Storage

Chemicals ***should not*** be stored alphabetically. For example, acetic acid and acetaldehyde could be adjacent neighbors on a shelf and are an incompatible pair (see Table 1 for list of

Incompatible Chemicals and Table 2 *"Dirty Dozen"*)

- Flammable liquids should be stored in flammable liquid storage cabinets
- Corrosive chemicals such as acids and bases should be stored in separate appropriate chemical acid storage cabinets
- Nitric acid should be stored separately from acetic acid in a separate cabinet
- Lithium, potassium and sodium metals should be stored under dry mineral oil
- All peroxide-forming chemicals (e.g. ethyl ether) should be monitored for age and removed after recommended shelf life
- Chemicals can be separated into organic and inorganic families, and then into compatible and related groups. Compatible groups can be separated using different shelves. Only store chemicals alphabetically within a related and compatible group (for additional information on storage pattern for Organic and Inorganic chemicals see *NIOSH publication School Chemistry Laboratory Safety Guide*: http://www.cdc.gov/niosh/docs/2007-107/pdfs/2007-107.pdf

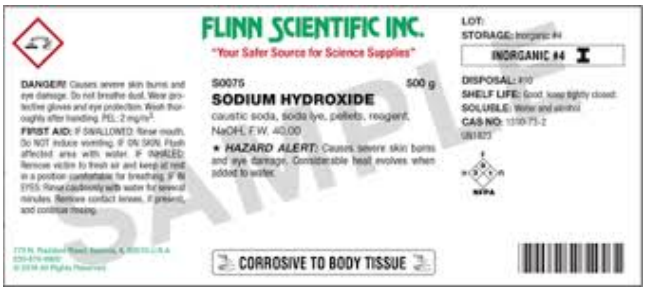
Chemical Labeling and Pictograms

OSHA has adopted new hazardous chemical labeling requirements as part of its recent revision of the Hazard Communication Standard, 29 CFR 1910.1200 (HCS). Labels, as defined in HCS, are an appropriate group of written, printed or graphic information elements concerning a hazardous chemical that are affixed to, printed on or attached to the container of a hazardous chemical. For a comparison of NFPA 704 and HazCom 2012 labels please visit https://www.osha.gov/Publications/OSHA3678.pdf

Labels for a hazardous chemical must contain: *(See next page for sample labels and pictogram)*

- Name, address and telephone number of manufacturer
- Product Identifier
- Signal Word
- Hazard Statement
- Precautionary Statement
- Pictogram

Hazcom Sample Label

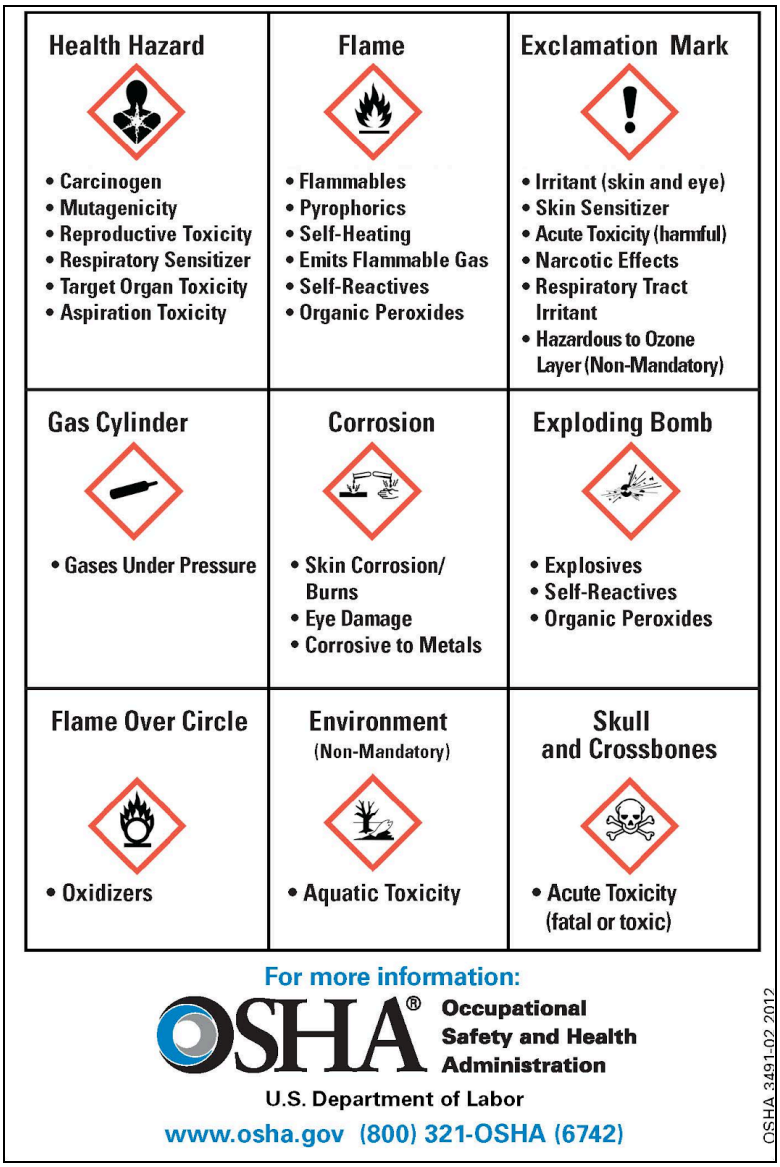


Safety Data Sheets (SDS)

The Hazard Communication Standard (HCS) (29 CFR 1910.1200) requires that the chemical manufacturer, distributor or importer provide Safety Data Sheets (formerly MSDS or Material Safety Data Sheets) for each hazardous chemical. The information contained in the SDS is

largely the same as the MSDS, except now the SDSs are required to be presented in a consistent user-friendly 16-section format. In an effort to help streamline our SDS sheets and make it easier for Staff to update and access SDSs we are using a web based service. All SDSs can be accessed by visiting the SafeSchoolsSDS site at http://hsd.or.safeschoolssds.com/

Hazcom Sample Pictograms



SDS Sections

Hazard Communication Safety Data Sheets

Section 1, Identification includes product identifier; manufacturer or distributor name, address, phone number; emergency phone number; recommended use; restrictions on use.

Section 2, Hazard(s) identification includes all hazards regarding the chemical; required label elements.

Section 3, Composition/information on ingredients includes information on chemical ingredients; trade secret claims.

Section 4, First-aid measures includes important symptoms/effects, acute, delayed; required treatment.

Section 5, Fire-fighting measures lists suitable extinguishing techniques, equipment; chemical hazards from fire.

Section 6, Accidental release measures lists emergency procedures; protective equipment; proper methods of containment and cleanup.

Section 7, Handling and storage lists precautions for safe handling and storage, including incompatibilities.

Section 8, Exposure controls/personal protection lists OSHA's Permissible Exposure Limits (PELs); Threshold Limit Values (TLVs); appropriate engineering controls; personal protective equipment (PPE).

Section 9, Physical and chemical properties lists the chemical's characteristics.

Section 10, Stability and reactivity lists chemical stability and possibility of hazardous reactions.

Section 11, Toxicological information includes routes of exposure; related symptoms, acute and chronic effects; numerical measures of toxicity.

Section 12, Ecological information*
Section 13, Disposal considerations*
Section 14, Transport information*
Section 15, Regulatory information*

Section 16, Other information, includes the date of preparation or last revision.

*Note: Since other Agencies regulate this information, OSHA will not be enforcing Sections 12 through 15 (29 CFR 1910.1200(g)(2)).

Materials Disposal

Chemical Disposal

Chemicals are to be disposed of or recycled using environmentally safe procedures.

- **Follow SDS guidelines** for appropriate chemical disposal.
- Check with your school chemical safety coordinator or PPS risk management with questions.
- Place used chemicals or products in containers designed and **labeled** for that purpose.
- **Label the container** with appropriate chemical information including content, volume or mass. Waste disposal companies cannot dispose of unknown materials, so their field chemist will have to test the contents. This is an expensive process that is avoidable in a well-run laboratory.
- Keep container closed unless filling.
- Submit a Facilities work order through the Origami program or contact Herb Wagner in Risk Management (503) 916-2000 (ex. 74277) or Terra Wheeler (503) 916-6503 Environmental Health and Safety to arrange for removal.
- Label chemical wastes with the words 'Hazardous Waste' and the type of hazard it presents (e.g., Flammable, Corrosive, Toxic) on each container. Segregate waste chemicals based on their hazards in the same way that chemical products are stored in the stockroom.
- Don't dispose of **volatile organic compounds** by evaporating them in a fume hood.

- Some laboratory waste can be treated prior to disposal. Evaporate the water from **aqueous metals solutions** prior to disposal. Insert a large slide-locking plastic bag into a large beaker. Label the large plastic container with the words “Hazardous Waste – Toxic Metals.” Open the bag and fold the edges over the rim of the beaker. Place the beaker inside a secondary containment tray. Pour the metal-contaminated aqueous solution into the bag and let it evaporate. As the liquid level drops, add more liquid. Eventually the bag will fill with dried sludge. Once the bag is mostly full, zip it closed and place the bag into a large plastic container with a tight-fitting lid. Then put a new bag in the beaker and repeat the process. When the large plastic container is mostly full, attach the lid securely and dispose of it as hazardous waste. Be sure to keep the log sheet with the container to show exactly what it contains. Once the hazardous waste collection container is mostly full, contact the chemical safety coordinator or PPS risk management to arrange for proper disposal.

Broken Glass Disposal

Collect broken glass in designated, well labeled containers. Containers should be accessible to lab spaces, but out of the way. Steps should be taken to prevent any person from opening or accessing the contents of the containers. When containers are full, let the building Chemical Safety Coordinator know and they will contact Herb Wagner about proper removal and disposal container replacement. Lab glassware can be replaced as needed.

Biological Materials Disposal

Miscellaneous Disposal

If any equipment is damaged or outdated and needs to be removed, alert the building Chemical Safety Coordinator.

Food Labs

- Be vigilant about food-based allergies and inform students in advance when food-based materials will be used for lab activities
- Any glassware and equipment that comes in contact with food must be clearly labelled as “Food Safe”
- Food Safe glassware and equipment should never come into contact with laboratory chemicals
- Food Safe glassware and equipment must be stored separately
- Materials used in food-based lab activities needs to be stored separate from chemicals in clearly labelled, airtight containers
- Surfaces need to be thoroughly cleaned before food-based activities
- It is best practice to cover surfaces and equipment with disposable products such as butcher paper, aluminum foil, wax paper, etc.
- If non-food safe equipment contacts food items, the food item must be disposed of, or relabelled as “Not Food Safe”

Tables

Table 1- List of Incompatible Chemicals

The following list is only a guide; it is not a complete list of all incompatible chemicals. For specific incompatibilities, please consult the Standardized Safety Data Sheets (SDS) for each chemical in use.

Chemical	**Incompatible with**
Acetic acid	Oxidizing agents (e.g., chromic acid, nitric acid, hydroxyl compounds, ethylene glycol, perchloric acid, peroxides, permanganates)
Acetone	Nitric acid and sulfuric acid; other oxidizing agents
Acetylene	Chlorine, bromine, copper, fluorine, silver, mercury
Alkali and alkaline earth metals (such as powdered aluminum or magnesium, calcium, lithium, sodium, potassium)	Water, carbon tetrachloride, other chlorinated hydrocarbon compounds, carbon dioxide, halogens
Ammonia (anhydrous)	Mercury (e.g., in manometers), chlorine, calcium hypochlorite, iodine, bromine, hydrofluoric acid
Ammonium nitrate	Acids, powdered metals, flammable liquids, chlorates, nitrites, sulfur, finely divided organic or combustible materials
Aniline	Nitric acid, hydrogen peroxide
Arsenical materials	Reducing agents
Azides	Acids
Bromine	See *chlorine*
Calcium oxide	Water
Carbon (activated)	Calcium hypochlorite, other oxidizing agents
Chlorates	Ammonium salts, acids, powdered metals, sulfur, finely divided organic or combustible materials
Chlorine	Ammonia, acetylene, butadiene, butane, methane, propane (or other petroleum gases), hydrogen, sodium carbide, benzene, finely divided metals, turpentine
Chlorine dioxide	Ammonia, methane, phosphine, hydrogen sulfide

Chromium trioxide (chromic acid)	Acetic acid, naphthalene, camphor, glycerol, alcohol, flammable liquids
Copper	Acetylene, hydrogen peroxide
Cyanides	Acids
Flammable liquids	Ammonium nitrate, chromic acid, hydrogen peroxide, nitric acid, sodium peroxide, halogens
Hydrocarbons (e.g., butane, propane, benzene)	Fluorine, chlorine, bromine, chromic acid, sodium peroxide, other oxidizing agents
Hydrocyanic acid (anhydrous)	Alkali
Hydrofluoric acid	Potassium permanganate, sulfuric acid
Hydrogen sulfide	Metal oxides, powdered copper, oxidizing gases
Hypochlorites	Acids, activated carbon, ammonia
Iodine	Acetylene, ammonia (aqueous or anhydrous), hydrogen
Mercury	Acetylene, fulminic acid, ammonia
Nitrates	Powdered metals and nonmetals, metal sulfides, flammable/combustible liquids
Nitric acid	Acetic acid, aniline, chromic acid, hydrocyanic acid, hydrogen sulfide, flammable liquids and gases, copper, brass, heavy metals, alkalis
Nitrites	Ammonium salts, amides, phosphides, reducing agents
Nitroparaffins	Acids, bases, amines, halides
Oxalic acid	Silver, chlorites, urea
Oxygen	Oils, grease, hydrogen, and other reducing agents, including flammable liquids, solids or gases
Perchlorates	See chlorates
Perchloric acid	Reducing agents such as acetic anhydride, bismuth and its alloys, alcohols, paper, wood, grease, oils
Phosphorous (white)	Air, oxygen, alkalis, halogens, halogen oxides, oxidizing agents
Potassium	Carbon tetrachloride, carbon dioxide, water

Potassium permanganate	Glycerol, ethylene glycol, benzaldehyde, other reducing agents, sulfuric acid
Sodium	Carbon tetrachloride, carbon dioxide, water
Sodium peroxide	Ethyl and methyl alcohol, glacial acetic acid, acetic anhydride, benzaldehyde, carbon disulfide, glycerin, ethylene glycol, ethyl acetate, methyl acetate, furfural
Sulfides	Acids
Sulfuric acid	Permanganates, water, aqueous solutions, reducing agents, chlorates, perchlorates, nitric acid
Water	Acids (Remember to add acid to water, not vice versa.)

Table 2- "Dirty Dozen"

Even in the most sophisticated secondary school science classrooms, there are materials whose hazards far outweigh the education benefits that they might bring to the high school science lab classroom.

The following list is not designed to be all-inclusive however by removal and proper disposal of the "Dirty Dozen" you can provide an excellent starting point in the development of a safe inventory of your science laboratory chemicals.

1. **Metallic Potassium:** The yellow substance encrusting your supply of potassium metal is a violent shock sensitive explosive that can turn a lab into an inferno. Ignition can be spontaneous, and it can be extremely difficult to extinguish. Purchase only in small amounts and use it within three years.
2. **Metallic Sodium:** Reacts exothermically with moisture of body tissue causing both thermal and chemical burns. It is spontaneously flammable in air when heated. Purchase only in small amounts and use it within three years.
3. **White Phosphorous:** Reacts violently and can create severe burns when exposed to body tissues. It is spontaneously flammable at slightly higher than room temperature.
4. **Phosphorus Trichloride:** Fuming Sulfuric Acid, Fuming Nitric Acid, and Iodine Chloride. They can react explosively with many reducing agents, and will also react with water to produce heat and toxic/corrosive and flammable vapors.
5. **Carbon Tetrachloride, Benzene, Chloroform, Chlorobenzene, Etc.:** Vapors from these materials have a narcotic effect, and exposures to strong concentrations can cause unconsciousness. If the exposure is not terminated, death can occur from respiratory failure. Prolonged exposures to lesser concentrations can cause kidney and liver damage. These hazardous chemicals should not be found in a school laboratory.
6. **Mercury:** Mercury is an extremely dangerous cumulative poison, and because of its difficulty in handling, great care should be taken when handling this material. It is extremely important that spilled mercury be cleaned up as soon as possible, utilizing specially designed mercury spill kits. **Note**: Possession of Mercury in Oregon K-12 education facilities is prohibited

according to Oregon Law. Here is the link to the PPS Administrative Directive 3.30.084-AD for Mercury Elimination.

7. **Picric Acid:** Picric Acid, also known as Trinitrophenol, is very similar in chemical structure to TNT, and becomes highly explosive, shock sensitive and unstable with age. A large enough quantity could destroy an entire building. We should have none of this remaining in PPS, but in the event that you find some, do not touch it! Immediately contact the Health & Safety office (Herb Wagner 503-522-5095) and he will arrange disposal with the Bomb disposal squad. Disposal will occur during after school hours or on a weekend at a school to avoid disruptions and allow for the Bomb Squad to schedule the pick up and disposal.
8. **Asbestos:** Exposures to asbestos fibers can cause respiratory problems. In all situations, asbestos should be handled so as to avoid dusting the fragments into the air.
9. **Carbon Disulfide:** This highly flammable material also has a toxic effect on the central nervous system. The anesthetic effect is much more powerful than chloroform, and death can occur in cases of acute exposure.
10. **Ethyl Ether:** Ethyl ether vapors are highly flammable. With age, this material decomposes to form highly explosive peroxides. Crystallized ethyl ether is also very shock sensitive. We should have none of this remaining in PPS, but in the event that you find some, do not touch it! Immediately contact the Health & Safety office (Herb Wagner 503-522-5095) and he will arrange disposal with the Bomb disposal squad. Disposal will occur during after school hours or on a weekend at a school to avoid disruptions and allow for the Bomb Squad to schedule the pick up and disposal.
11. **Potassium Chlorate (Including Chlorates, Perchlorates, and Permanganates):** These materials mixed with combustible materials may form explosive mixtures.
12. **Hydrofluoric Acid:** Hydrofluoric acid is extraordinarily corrosive to the skin. It is an extremely dangerous substance. Its chemical reaction neatly works clear to the bone. Saline solution should be kept on hand, in large quantities, to immediately wash the chemical burn.

Table 3- Storage Patterns for Chemicals Where Space is Limited

https://www.hazwastehelp.org/educators/documents/SafelyStoringChems.pdf

A proper chemical storage system separates materials according to chemical compatibility and hazard class. Many schools try to use the excellent chemical storage system found in Flinn Scientific's catalog. Unfortunately, many school stockrooms are too small to provide 23 separated locations for classes of chemicals. Here are some tips for creating safer chemical storage rooms:

- Complete an inventory of the chemical compounds in each stockroom.
- Do not store chemical containers above eye level if possible.
- Separate inorganic compounds from organic compounds.
- Store solids above and liquids below.
- Storage cabinets for acids, bases and flammables are meant for liquids, not dry solids.
- Acid cabinets need to be made of **wood** to prevent corrosion.
- Store concentrated sulfuric acid on one shelf of the acid cabinet and concentrated hydrochloric acid on another.
- Store nitric acid in a secondary container with other inorganic acids or a separate cabinet.
- Do not vent flammable liquid storage cabinets unless you're using an explosion-proof fan that is carrying the vapors out of the building.
- Glacial acetic acid is a flammable liquid; store it in a dedicated organic acid cabinet or in the flammable liquids cabinet.
- Flammable liquids like alcohols must not be stored in conventional refrigerators.

The chart below combines categories of chemicals that have similar hazardous characteristics. An estimate of the amount of shelf space is commonly needed for each category is also given.

Inorganic Nitrates (I-3) *EXCEPT Ammonium Nitrate* Nitrates, Azides ~5% of shelf space	**Inorganic Salts (I-2)** Chlorides, Bromides, Iodides, Sulfates, Phosphates, Acetates, Oxalates, Phthalates, Halogens ~30% of shelf space	**Organic Acids, Anhydrides (O-1)** Citric Acid, Lactic Acid, Amino Acids ~5% of shelf space
Inorganic Oxidizers (I-6, I-8) Chlorates, Bromates, Iodates, Peroxides Borates, Chromates, Manganates, *Ammonium Nitrate* <5% of shelf space **Inorganic Toxins (I-5, I-7)** Sulfides, Nitrides, Carbides Arsenates, Cyanides <5% of shelf space **Inorganic Nonmetals (I-10)** Sulfur, Phosphorus <5% of shelf space		**Organics (O-3, O-4, O-5, O-6, O-7,O-8)** Epoxies, Isocyanates Peroxides, Azides Sulfides, Nitriles Phenols, Cresols <5% of shelf space (Most Science Departments can do without any of these.) **Organic Dyes (O-9 Dry)** Dyes, Stains, Indicators <5% of shelf space
Inorganic Oxides, Hydroxides, Carbonates (I-4 Dry) Oxides, Hydroxides, Carbonates, Silicates, Carbon, Silicon ~10% of shelf space		**Organic Alcohols (O-2)** Alcohols, Sugars, Amines ~10% of shelf space
Inorganic Metals (I-1) Alkali Metals, Hydrides Powdered/Granular Metals, Toxic Metals ~10% of shelf space		**Organic Miscellaneous** Foods, Medicines (*Lab use only*) ~10% of shelf space

CORROSIVE BASE CABINET (METAL): **Inorganic Hydroxides (I-4 Liquids)** Sodium Hydroxide Potassium Hydroxide Calcium Hydroxide Ammonium Hydroxide	**CORROSIVE ACID CABINET (NON-METAL):** **Inorganic Acids (I-9 Liquids)** Hydrochloric Acid, Sulfuric Acid Nitric acid stored separately in this or another cabinet.	**FLAMMABLES CABINET (METAL):** **Organics (O-2, O-3, O-4, O-8 Liquids)** Alcohols, Hydrocarbons Ethers, Phenols **Organic Acids (O-1 Liquids)** Glacial Acetic Acid, Formic Acid

Dilute solutions at or below 1.0 molar can be stored on shelves rather than in cabinets. Segregate inorganic and organic compounds. Check containers annually for condition of containers, labels and contents. Replace degraded lids, dropper tops and solutions. Store in smallest bottles that are practical for the quantities used.	*To prevent release of corrosive vapors, avoid storing pipettes holding acids or bases in test tubes taped to the side of bottles. Wrap fritted glass stoppers on acid bottles in parafilm to reduce evaporation. Store Iodine crystals in a sealed plastic bag to monitor degradation of the container's cap and reduce indoor air pollution.*	

Appendices

Appendix A: Sample Student Science Safety Agreement

(Modify as needed for your classroom)
Portland Public Schools
Science Safety Agreement

Science is a hands-on laboratory class. Many laboratory activities require the use of hazardous chemicals, materials, and equipment. Safety in the science classroom is the number one priority for students, teachers, and parents. To ensure a safe science classroom, a list of rules has been developed and provided for you in this science safety agreement. These rules must be followed at all times! Please read through these rules carefully. After reviewing the rules, please have the agreement signed by both you and a parent or guardian and return to your science instructor.

General Safety Guidelines

- Perform only those experiments and procedures authorized by the instructor.
- Be properly prepared to conduct all experiments. Pay attention to laboratory safety instructions and be sure you understand what you are doing before you proceed. Know the location of the SDS and be familiar with what the sheets indicate for the hazardous chemicals being used.
- Conduct yourself in a responsible manner at all times. No horseplay, or other fooling around should ever occur in the laboratory.
- Wear appropriate eye protection, as directed by the teacher, whenever working in the laboratory or in field experiments such as rocket launches. Safety goggles must be worn during hazardous activities involving caustic/corrosive chemicals, heating of liquids, and other activities that may injure the eyes.
- Keep hands away from face, eyes, and clothes while using solutions, specimens, equipment, or materials in the laboratory.
- Splashes and fumes from hazardous chemicals present a special danger to people who wear contact lenses. Therefore, it is preferable for students to wear regular glasses (inside splash- proof goggles, when appropriate) rather than contact lenses during all class activities or purchase personal splash-proof goggles and wear them whenever exposure to chemicals or chemical fumes is possible.
- Gloves must be worn at all times. Students with open skin wounds on hands must wear gloves or be excused from the laboratory activity.
- Know the locations of fire extinguishers, gas shutoff, fire blanket, eyewash, safety shower, and first aid kit. Emergency exits and aisles must be kept clear at all times.
- Confine or securely tie hair that reaches to the shoulders. Roll long sleeves above the wrist. Long, hanging necklaces, bulky jewelry, and excessive or bulky clothing should not be worn in the laboratory.
- Do not eat food, drink beverages, or chew gum in the laboratory area.
- Work areas and equipment should be kept clean and tidy at all times. Bring only materials specified by your instructor to the work area. Other items such as books, purses, backpacks, etc. must be stored in an area designated by the instructor.
- Dispose of laboratory waste as instructed by the teacher. Use separate, designated

containers (not the wastebasket) for the following:
    - Matches, litmus paper, wooden splints, toothpicks, etc....
    - Broken and waste glass
    - Rags, paper towels, or other absorbent materials used in the cleanup of flammable solids or liquids
    - Hazardous/toxic liquids and solids
- Read chemical labels very carefully. Make sure that you have the correct substance in the correct concentration. Check the label twice before removing any of the contents. Follow the instructor's safety instructions for handling hazardous materials.
- Do not return chemicals to their original containers unless you are specifically instructed to do so.
- Always work in a well-ventilated area when using volatile substances or hazardous vapors.
- Handle all chemicals with care. Never taste a chemical. Check odors when instructed to do so by gently wafting some of the vapor toward your nose by hand.
- Never take chemicals, supplies, specimens, or equipment out of the laboratory without the knowledge and consent of the instructor.
- Never work alone in the laboratory without adult supervision.
- Do not enter the laboratory stockroom(s) or storage areas without specific permission from your instructor.
- Transport chemicals, materials and equipment properly as directed by the instructor.
- Human body fluids pose potential dangers and can only be used under strict teacher supervision.
- Always clean the laboratory area before leaving.

Accidents and Injuries

- Report any accident (spill, breakage, etc.) or injury (cut, burn, etc.) to the instructor immediately. Never handle broken glass with bare hands; use a counter brush and dustpan.
- Water spills on the floor need to be cleaned up immediately.
- If a chemical should splash in your eye(s) or on your skin, immediately flush with running water from the eye wash station or safety shower for at least 15 minutes. Notify the instructor immediately.
- Treat burns immediately by putting the burned area under cold water.

THE PURPOSE OF THE AGREEMENT IS TO MAKE THE STUDENT AWARE OF HIS/HER RESPONSIBILITY FOR LABORATORY SAFETY!

I will:

Follow all instructions given by the teacher
Protect eyes, and protect face, hands, and body when involved in science experiments.
Carry out good housekeeping practices and keep my laboratory work area neat and orderly.
Know the location of first aid, eyewash and fire extinguisher.
For my own safety and the safety of others, conduct myself in a responsible manner at all times.
Report potentially hazardous conditions and behaviors.

I, _____, have read and agree to follow all the safety guidelines set forth. I will closely follow all instructions provided by the teacher.

Date _____ Student Signature_____

Date _____ Parent Signature _____

List of allergies or other medical problems that could endanger my safety in the laboratory.
1.

2.

3.

4.

5.

Appendix B: Science Laboratory Safety Checklist

A. FIRE PROTECTION

- ❑ Fire Extinguisher
- ❑ Signage directing to fire extinguisher
- ❑ Quality Assurance tag on fire extinguisher up to date
- ❑ Evacuation map posted
- ❑ Master cut-off labeled and accessible
    - ❑ Gas
    - ❑ Water
    - ❑ Electricity

B. PERSONAL PROTECTIVE EQUIPMENT

- ❑ Safety goggles
- ❑ Face shields
- ❑ Mechanism to clean glasses/shields
- ❑ Gloves
- ❑ Lab coats
- ❑ Aprons
- ❑ Masks

C. VENTILATION

- ❑ Fume hood
    - ❑ Air flow checked
    - ❑ Maintenance checks

D.HOUSEKEEPING

- ❑ Waste receptacles
    - ❑ Glass
    - ❑ Mercury
- ❑ Receptacles properly marked
- ❑ Spill procedures
- ❑ Waste disposal procedures
- ❑ Unlabeled containers discarded

E. FIRST AID/EMERGENCY

- ❑ First aid kit
- ❑ Fire blanket
- ❑ Eye wash station
- ❑ Safety shower
- ❑ Emergency telephone numbers
- ❑ Signage identifying all safety and emergency equipment

F. ELECTRICAL

- ❑ Properly grounded
- ❑ Cords, plugs, connections in good repair
- ❑ Extension cords out of aisle
- ❑ Cords are away from water/sink
- ❑ No multiple plug adapters

G. MISCELLANEOUS

- ❑ Metal alcohol burners
- ❑ Red alcohol thermometers
- ❑ Gas cylinders secure
- ❑ No food/drink stored in lab refrigerator
- ❑ Biohazard awareness

H. STORAGE

- ❑ Chemicals properly labeled
- ❑ Proper storage cabinets
- ❑ Compatible chemical storage
- ❑ Safety containers for hazardous or flammable liquids
- ❑ Storage room marked
- ❑ Food storage containers

Inspected by	
Date	

Correction(s) needed	
Correction(s) made	

Appendix C: End of Year Procedures and Safety Measures Checklist

- ❏ Inventory all chemicals. Remove all substances that are outdated, deteriorated, potentially dangerous, and unlikely to be used. Pack them in separate boxes by compatibility category and clearly mark the boxes “Chemicals for disposal.” Attach a list of contents to each box. Contact Herb Wagner (hwagner@pps.net) for chemical removal

- ❏ Dispose of diethyl ether older than one year and ethers in containers that are partially used. Only unopened, recently received containers of ethers that were dated on receipt and can be verified as less than one year old by the time of their use in fall laboratory activities may be retained and should be locked in the school district’s standard flammable-liquids cabinet during the summer break. **Recommendation**: Order only those supplies of ether necessary for the current school year.

- ❏ Be certain all gas cylinders in high school laboratories are capped and properly secured for the summer.

- ❏ Clean out, defrost all refrigerators during the summer break. Turn-off all ice machines.

- ❏ Unplug all electrical items, such as isolated wall clocks, timers, personal table clocks/radios, hotplates, aquarium pumps, computers*, terminals, microscope lights, oscilloscopes, and any other electrically powered science instructional item (*check with Business Manager or administrator regarding summer procedure for computers).

Appendix D: Chemical Safety Coordinator Responsibilities (May 21, 2019)

Each school should designate a **Chemical Safety Coordinator** who will be paid for extended responsibilities for the following work. By contract, this is not a mandatory position, but it is highly suggested that each high school have one. Chemical Safety Officers agree to do the following duties:

1. Update staff information in the Chemical Safety Plan, annually.
2. Coordinate and/or create the initial chemical inventory. This work is beyond the scope of the extended responsibility. Extended hours will be paid to teachers who help create initial chemical inventory (approx 30 hours).
3. Annually update the chemical inventory.
    a. Central Office will purchase the Flinn Chemical Inventory System - Chemventory for each HS (with support of time for departments to work on it within the school day)
    b. This system will have Chemical Safety Sheets for all inventoried chemicals.
4. Coordinate an organized and safe chemical store room(s) in your school.
    a. Annual inspection of chemical containers
    b. Chemicals organized on shelves into organic and inorganic families, and then into compatible and related groups
5. Annually update Chemical Spill Response Plan and Whom to Call list.
    a. Review the Chemical Spill Response Plan with science staff.
    b. Chemical Spill Kit for every classroom + kitty litter
    c. Provide safety training to staff who need it.
6. Train new staff to the Chemical Safety Plan.
7. Coordinate weekly eyewash testing.
8. Coordinate chemical disposal and sharps.
9. Review orders of new chemicals before procurement, mostly to look for banned chemicals or to suggest less toxic or safer alternatives.
10. Optional - 7-Hour Flinn Safety Training for HS science teachers (Chemical Safety Officers paid extended contract to do this, with extended contract - looking into funding for any science teacher to complete this)

Appendix E: Spill Protocol Template and Chemical Spill Plan

Post by phone in every classroom that uses chemicals

CHEMICAL SPILL PROTOCOL - POST THIS NEAR A PHONE

The following are the locations of:

1.Spill Containment and Security Equipment:	
2. Personal Protective Equipment (PPE):	
3. Chemical Safety Data Sheets (SDS):	

When a Large Chemical or Emergency Spill has occurred:

- Remove students (if present) and other adults, including yourself.
- If possible, the individual discovering the spill should vacate the affected area at once and seal it off to prevent further contamination of other areas. Isolate the area of spill by shutting doors or use of other means.
- If the nature of the spill threatens other building occupants (fire conditions, toxic/acrid vapors or fumes), activate the building alarm to signal an evacuation, walk quickly to the nearest marked exit.
- **If spill is highly dangerous, has large flame, or there is significant injury, call 911**
- Immediately notify **Herb Wagner**, Programs Manager - HazMat Safety
    - During school hours:
        - Direct line: 503-2000 ext 74277
        - Cell: 503-522-5095
    - After hours:
        - 24 hours/ after hours call - Facility Asset Management (FAM) at 503-730-9682 When reporting, be specific about the nature of the involved material and exact location.
- Do not attempt to clean the spill unless trained to do so. If it is safe to do so, contain the spill with available equipment (e.g., pads, booms, absorbent powder, fire blanket etc.).
- If there is minor injury, attend to injured personnel and call the school office number. Send to school nurse (if you have one and they are on duty).
- If no nurse on duty, report student injury using this **online incident form**. https://www.pps.net/Page/12905
- Report the incident to Risk Management by filling out a *Property Theft and Damage* **online incident report**: https://www.pps.net/Page/2710
- If you have a safety or environmental hazard concern in your classrooms or preprooms - you can report it here - https://www.pps.net/Page/13677

When a Small Chemical Spill has occurred:

- Notify the Chemical Safety Coordinator and/or supervisor. Name_____
- If toxic fumes are present, secure the area (with caution tapes or cones) to prevent other personnel from entering.

- Deal with the spill in accordance with the instructions described in the Safety Data Sheet.
- Small spills must be handled in a safe manner, while wearing the proper personal protective equipment.
- Review the general spill cleanup procedures.

If there is any exposure or injury involved, complete a injury report

Follow-up: Investigate all spills and take appropriate steps to prevent similar spills

Date___/___/___

CHEMICAL SPILL PLAN

Generally speaking, spills of common chemicals less than 1 Liter in volume are mitigated by those personnel trained and knowledgeable with the use of the chemical in the first place. However, any chemical spill (of certain volumes or chemical/physical properties) beyond the capabilities of trained users or other internal response providers is classified as an “emergency spill.”

Whenever you spill a laboratory chemical or discover a spill or release, tell your colleagues and laboratory director-no matter how small or insignificant the spill or release appears. In order to assess a spill's risks and to obtain advice on cleanup procedures, it always helps to solicit the advice of others. Even a small spill can result in a harmful exposure to you or others or can result in hazards that are not obvious; therefore, notification of regulatory officials may be required.

A. Evaluate the Risks

The first step in evaluating whether a spill is "simple" is to estimate the risks created by the spill. In spill response, the key risks of concern are human health effects, property damage, and environmental damage.

Human Health Effects

Potential health effects is the most important hazard category to consider when deciding whether or not to attempt a spill cleanup. Some chemical releases may result in health hazards such as fires or explosions. Other chemical releases may present health threats because of their ability to spread rapidly and enter the body readily. A spill is not "simple" if it presents these risks.
If the potential for fire or explosion exists, seek outside assistance from trained emergency responders. Releases of flammable chemicals (liquid or solid) can present significant fire and explosion risks when one or more of the following is present:

- volatile vapors,
- water reactive or air reactive chemicals,
- ignition sources,
- oxidizers, and
- significant quantities of combustible materials.

Toxic vapors and dust are also hazardous. Avoid direct contact with such hazards because they spread quickly, are easily absorbed through the skin, and may damage tissue.
A chemical spill is not a health risk if it has a low toxicity (especially if it is not volatile or a dust), is not highly corrosive, and is not a strong oxidizer. Such spills may be considered "simple" only if physical damage or environmental factors are absent. When a spilled chemical's toxicity is unknown, treat the spill like a potential human health hazard by avoiding exposure and seeking outside assistance.

When a spill occurs, you and others should move well away from the area when determining the appropriate response. There are two types of spills: simple spills, which you can clean up

yourself, and complex spills, which require outside assistance. A simple spill is defined as one that

- does not spread rapidly,
- does not endanger people or property except by direct contact, and
- does not endanger the environment.

Three basic steps should be taken to determine whether a spill is simple or complex: (A) evaluating the spill's risks; (B) evaluating quantities; and (C) evaluating the spill's potential impact.

B. Evaluate Quantities

The next step to take when determining whether a spill is "simple" is to evaluate the quantity of material released. If a spilled chemical is not hazardous, its cleanup (without the assistance of an emergency response team) is dependent on the ability to control the spill, as well as the availability of sufficient spill control materials (e.g., an absorbent for liquids). Factors that may complicate a cleanup effort (such as the unique characteristics of a spill's surroundings or the restricted access to a spill) must be determined on a case-by-case basis.

If the spilled chemical is hazardous, the threshold quantity for a simple spill cleanup depends on the spilled chemical's physical properties and hazards. This quantity depends on situational factors such as

- the training and experience of laboratory personnel,
- the availability of spill control materials,
- the availability of personal protective equipment, and
- the physical layout of the spill location.

The more toxic, corrosive, or flammable a material is, the less likely that the spill can be defined as "simple". Thresholds for flammable liquids and solids, as well as volatile toxics, should be relatively low. Spills of reactive chemicals should only be managed by trained responders (who may be in-house). In general, simple spill thresholds for liquids will be lower than the thresholds for solids. Additionally, simple spill thresholds for volatiles will be lower than the thresholds for non-volatiles.

C. Evaluate Potential Impacts

The third step to take when deciding whether a spill can be managed as a simple spill is to evaluate the potential broader impacts of the spill. A chemical spill in an area where its potential risks are magnified by specific situations (such as physical situations or the presence of a large number of people) should not be managed as a simple spill. For instance, the presence of boxes, chemicals, and other ignition sources would magnify the impact of a one-gallon release of acetone. Since acetone is highly flammable and volatile, this situation would be immediately dangerous to both human health and property, and cleanup should be handled by an emergency responder. Other factors that may magnify a spill's impact and require emergency response are

- the possibility that hazardous vapors or dusts might enter the building's ventilation system (and be distributed to other areas);
- the possibility that spilled liquids might flow into other areas, thus expanding the threat of harm (such as reaching ignition sources, exposing other people, damaging delicate equipment);

- the presence of incompatible chemicals;
- the proximity of classrooms or offices containing people who could be harmed by the spill's consequences; and
- spills in sinks that might be connected to other sinks through the plumbing system.

When evaluating potential impacts, a prompt response can minimize adverse consequences. On the other hand, an inappropriate response can turn a simple spill into a complex situation.
To determine whether a spill is simple or complex (which is often the hardest part of spill response), you need to know (1) the hazard(s) posed by the spilled chemical and (2) the spill's potential impact. Both these factors are, in large part, determined by the spill's size. The following information will help you determine whether you have a simple spill:

- the type of chemical(s) spilled,
- the amount,
- the hazardous characteristics of the spilled chemical(s),
- the location,
- the proper method for cleaning up the spill,
- the personal protective equipment available, and
- the training of the laboratory's personnel.

D. General Response Guidelines

For simple spills, emergency responders do not need to be notified. However, you should contact the environmental health and safety office or other responsible person within your facility. Most importantly, before cleaning up a simple spill, be sure that you can do so safely. You must have the right personal protective equipment, including, at a minimum, appropriate eye protection, protective gloves, and a lab coat. Additional protective equipment may be required for spills that present special hazards (such as corrosive or reactive spills or spills that have a splash potential). As a rule of thumb, if you need a respirator, you should request outside assistance because you do not have a simple spill.

The following steps should be taken during spill cleanup.

1. Prevent the spread of dusts and vapors.If the substance is volatile or can produce airborne dusts, close the laboratory door and increase ventilation (through fume hoods, for example) to prevent the spread of dusts and vapors to other areas.
2. Neutralize acids and bases, if possible. Spills of most liquid acids or bases, once neutralized, can be mopped up and rinsed down the drain (to the sanitary sewer). However, be careful because the neutralization process is often vigorous, causing splashes and yielding large amounts of heat. Neutralize acids with soda ash or sodium bicarbonate. Bases can be neutralized with citric acid or ascorbic acid. Use pH paper to determine when acid or base spills have been neutralized.
3. Control the spread of the liquid. Contain the spill. Make a dike around the outside edges of the spill. Use absorbent materials such as vermiculite, cat litter, or spill pillows.
4. Absorb the liquid.Add absorbents to the spill, working from the spill's outer edges toward the center. Absorbent materials, such as cat litter or vermiculite, are relatively inexpensive and work well, although they are messy. Spill pillows are not as messy as other

absorbents, but they are more expensive. Note that special absorbents are required for chemicals such as hydrofluoric and concentrated sulfuric acids.

5. Collect and contain the cleanup residues.The neutralized spill residue or the absorbent should be scooped, swept, or otherwise placed into a plastic bucket or other container. For dry powders or liquids absorbed to dryness, double bag the residue using plastic bags. Additional packaging may be required before the wastes can be transported from your laboratory. For spills of powders or solid materials, you may need to add a dust suppressant. Be sure to place descriptive labels on each container.
6. Dispose of the wastes. Keep cleanup materials separate from normal trash. Contact your environmental health and safety officer for guidance in packaging and labeling cleanup residues. Promptly place cleanup wastes in an appropriate hazardous waste receptacle.
7. Decontaminate the area and affected equipment. Ventilating the spill area may be necessary. Open windows or use a fan unless the area is under negative pressure. In some instances, your environmental health and safety officer can test the air to ensure that hazardous vapors are gone. For most spills, conventional cleaning products, applied with a mop or sponge, will provide adequate decontamination. If you have any question about the suitability of a decontaminating agent, seek expert advice.

E. Special Precautions

The following precautions apply to chemicals that have hazardous characteristics. Note that some chemicals may exhibit more than one characteristic.

1. Flammable Liquids Remove all potential sources of ignition. Vapors are what actually burn, and they tend to accumulate near the ground. Flammable liquids are best removed through the use of spill pillows or pads. Spill pads backed with a vapor barrier are available from most safety supply companies. Because flammable liquids will probably be incinerated, avoid using inert absorbents such as cat litter. All used absorbent materials should be placed in heavy-duty poly bags, which are then sealed, labeled, and disposed through your facility's hazardous waste management program. Before resuming work, make sure the spill area has been adequately ventilated to remove flammable vapors.
2. Volatile Toxic Compounds Use appropriate absorbent material to control the extent of the spill. Spill pillows or similar absorbent material usually work best because they do not have the dust associated with cat litter, vermiculite, or corn cobs. Place all used absorbent materials in heavy-duty poly bags. Seal the bags, label them, and hand them over to your facility's hazardous waste management program. Again, make sure the spill area has been adequately ventilated before resuming work.
3. Direct Contact Hazards Carefully select suitable personal protective equipment. Make sure all skin surfaces are covered and that the gloves you use protect against the hazards posed by the spilled chemical. Often it is a good idea to wear two sets of gloves: one as the primary barrier, the second as a thin inner liner in the event the primary barrier fails. When the cleanup is completed, be sure to wash hands and other potentially affected skin surfaces.
4. When a mercury spill occurs, first cordon off the spill area to prevent people from inadvertently tracking the contamination over a much larger area. Generally, a special

mercury vacuum cleaner provides the best method of mercury spill cleanup. DO NOT use a regular vacuum cleaner, because you will only disperse toxic vapors into the air and contaminate your vacuum cleaner. If a special mercury vacuum is not available, first use an appropriate suction device to collect the big droplets, then use a special absorbent (available from most laboratory supply vendors) to amalgamate smaller mercury droplets. Ideally, mercury spills should be prevented in the first place. Examine all uses of mercury to see if substitutes are available. If substitutes are not available, use trays or other equipment to provide spill containment. Spilled mercury often accumulates in sink traps. Be prepared to contain the mercury when servicing such facilities.

F. Documentation

After cleaning up a spill, a simple write-up should be prepared to document what happened, why, what was done, and what was learned. Such documentation can be used to avoid similar instances in the future. Major incidents are almost always preceded by numerous near misses.

Laboratories seeking to minimize and prevent spills should consider the possible results of their choices and procedures. Such consideration should focus on reducing the likelihood of spills, as well as minimizing spill damage. Experimental plans should only involve chemicals that are actually needed for the desired results. Ideally, laboratories should only store chemicals that will be used within a reasonable period of time. Additionally, correct chemical and experimental equipment choices must be made. Finally, the laboratory worker must not settle for inappropriate laboratory arrangements.

*Eyewash Flush Chart - Please flush your eyewashes **WEEKLY** per OSHA guidelines. Flow rate must equal .4 gallons per minute.*

Date	Initials	Issues?		Date	Initials	Issues?

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