Guidance Document for the School Laboratory Self-Certification Checklist

Colorado Department of Public Health and Environment

2013

Purpose of this Guidance

This document is intended as general guidance for schools that operate a science laboratory and may generate hazardous waste through their chemistry programs, assisting them in complying with environmental health and hazardous waste regulations. This document gives line-by-line guidance and instruction on how to complete the school self certification checklist. The guidance is not meant to modify or replace the promulgated regulations, which undergo periodic revisions. In the event of a conflict between this guidance and promulgated regulations, the regulations govern. Some portions of the hazardous waste regulations are complex and this guidance does not go into the details of these complex situations.

Phone Numbers for the Hazardous Materials and Waste Management Division

Division Main Number ..... (303) 692-3300
Division toll free number outside of the 303/720 area codes ..... (888) 569-1831
Generator Assistance Program..... (303) 692-3415
Customer Technical Assistance Line..... (303) 692-3320

Phone Numbers for the Division of Environmental Health and Sustainability

Division Main Number ..... (303) 692-3645
Schools Program Manager..... (303) 692-3642

Local Public Health Agency Contacts

El Paso County Department of Public Health and Environment..... (719) 578-3142
Weld County Department of Public Health and Environment..... (970) 304-6415 x 2279

Note: Schools in Alamosa, Conejos, Costilla, Garfield, Grand, Jackson, Mineral, Moffat, Rio Grande and Saguache counties should contact the CDPHE Schools Program at (303) 692-3642.

Other Phone Numbers

National Response Center.....(800) 424-8802
Colorado 24-hour Emergency Spill/Release Reporting Line ..... (877) 518-5608

If you are interested in developing an environmental management system or becoming an **Environmental Leader**, please contact Lynette Myers at (303) 692-3477.

Web Sites

Colorado Department of Public Health and Environment Regulations Download Index (air, water, waste, environmental health):
www.colorado.gov/cdphe/regs

Hazardous Materials & Waste Management Division (including guidance documents):
http://www.colorado.gov/cdphe/hazwaste

Division of Environmental Health and Sustainability – Guidance for Chemical Management in Schools: www.colorado.gov/cdphe/schoolchemicals

Mailing Address

Colorado Department of Public Health and Environment
Hazardous Materials and Waste Management Division
4300 Cherry Creek Drive South (HMWMD-B2)
Denver, CO 80246-1530

Section A - Laboratories and Stockrooms
General

LINE A-1

Have you conducted an inventory of chemicals in your science laboratories and stockroom in the last 12 months?
6 CCR 1007-3, section 262.11
6 CCR 1010-6, section 8-108

Having an accurate and up-to-date chemical inventory is fundamental to properly manage chemicals and control hazards. All chemicals, solvents, and hazardous substances must be inventoried by the school a minimum of once a year. When inventorying chemicals, be sure to identify prohibited or restricted chemicals, assess which chemicals are not used and should be disposed of, and ensure that chemicals have not deteriorated. The inventory should include all chemicals, compounds, products and wastes that are used in science activities and stored in your storeroom.

Plan before you start. You should not work alone unless you are competent and your inventory is in good shape. Do not involve students unless they are fully supervised and their actions structured and controlled. Always wear appropriate personal protective equipment.

Old chemicals may be unstable. Some chemicals form explosive compounds as they age. If in doubt, call for help.

The inventory must include:

- name of the chemical;
- amount of the chemical; and
- date the chemical entered the school.

Other recommended information includes:

- the materials CAS number;
- the manufacturer's name;
- the size and type of container;
- characterization of the contents (i.e., percent solid/liquid, presence of crystals);
- shelf life characterization;
- storage location;
- compatible family designations; and
- identification of restricted chemicals.

Note: Although the scope of this self certification checklist is that of school laboratories and associated stockrooms, the chemical inventory requirement covers arts, crafts, industrial arts, physical sciences, vocational, educational or any activities where hazardous chemicals, hazardous devices or hazardous equipment are used.

LINE A-2

Are hard copies of the inventory maintained with one copy in the stockroom and one copy at a location away from the storage room (e.g. Front office)?
6 CCR 1010-6, section 8-108

A copy of the inventory should be kept in the storeroom, available for reference. A copy must be kept on file in a location away from the areas where the materials are stored such as the front office. This remote copy allows emergency response teams access to the inventory in case of a fire, explosion, or release at the storeroom.

LINE A-3

Have you labeled all your laboratory chemicals properly?
6 CCR 1007-3, section 262.11
6 CCR 1010-6, section 8-103

Whenever feasible, store chemicals in the containers in which they were received and retain the vendor's labels. Containers of chemicals, poisons, corrosive substances and flammable liquids must be clearly labeled with:

- chemical name; and
- date the material entered the school.

Other label information should include:

- necessary handling and hazard information;
- shelf life (or expiration date); and
- restricted chemicals should be labeled "restricted" or marked appropriately.

Prepared solutions should have labels that include:

- chemical name;
- concentration;
- necessary handling and hazard information;
- name of the person who prepared the solution;
- date of preparation; and
- expiration or "use by" date.

When chemicals are spent, expired, or no longer used, they become waste. Colorado Hazardous Waste Regulations recommend that containers that contain hazardous waste be labeled with the words "hazardous waste".

When hazardous wastes are offered for shipment through a registered hazardous waste transport company, Department of Transportation labeling requirements must also be followed. Your hazardous waste transport company usually handles these naming requirements for you.

LINE A-4

Have you organized required Material Safety Data Sheets (MSDSs) in an easy-to-use manner and in a location known to personnel?
6 CCR 1010-6, section 8-109

MSDS's contain information on a chemical's physical data (melting point, boiling point, flash point, etc.), toxicity, health effects, first aid, reactivity, and compatibility. An MSDS will also contain information of proper disposal, protective equipment, and spill-handling procedures.

A current MSDS must be maintained and accessible onsite for all poisonous, toxic, and hazardous substances. MSDS's are intended to provide school personnel and emergency personnel with procedures for handling and disposing of a substance in a safe manner. They are only useful if they are up-to-date and readily available for those who use them.

Material Safety Data Sheets (MSDS) can be obtained from the supplier or manufacturer of the product. There is also free MSDS and/or chemical safety information on the Internet.

LINE A-5

Have you ensured that chemicals in your laboratories are not stored with incompatible chemicals or in potentially incompatible configurations?
6 CCR 1010-6, sections 8-102 and 8-110
6 CCR 1007-3, section 261.5(b)(5)

Some chemicals in a laboratory setting are incompatible with each other, and undergo potentially dangerous chemical reactions when mixed. Incompatible chemical reactions may cause an imminent threat to health and safety through an explosion, fire, or formation of toxic materials. Common incompatible storage scenarios include storing bases next to acids, or flammable materials next to oxidizers.

All chemicals and hazardous wastes in your laboratory and storeroom must be separated by reactive groups. Chemical storage shelves should be labeled with the name of the group. Information on reactivity and compatibility issues can be found on a chemical's MSDS, and may also be labeled on the chemicals container. **Attachment A** provides basic compatibility groups.

LINE A-6

Have you specifically addressed all restricted chemicals in the school's Chemical Hygiene Plan and limited amounts to the allowed quantities where specified?
6 CCR 1010-6, sections 8-113 and 8-105

Restricted chemicals are those chemicals in schools that are restricted by use, and/or quantities. These chemicals are listed in the *Rules and Regulations Governing Schools in the State of Colorado* and are included in **Attachment B** to this guidance document with additional notations of possible hazardous waste determinations. If a chemical is restricted by quantity, the chemical name will be followed by the maximum allowed amount in parentheses.

Chemicals listed as "Demonstration use only" are a subclass in the restricted chemical list that are limited to instructor demonstration. Students may not participate in the handling or preparation of restricted chemicals as part of a demonstration.

If restricted chemicals are present at your school, **each chemical** must be addressed in the school's chemical hygiene plan. A chemical hygiene plan is a document that explains the policies and procedures that will promote the safe operation of the school laboratory. The plan provides specific laboratory practices designed to minimize the exposure of employees and students to hazardous substances. The full list of requirements may be found in the guidance for Line C-1: **Chemical Hygiene Plan Requirements**

Specifically, the hygiene plan must indicate proper storage, handling and disposal procedures for each restricted chemical. In addition, the hygiene plan must state the proper response to and cleanup of a spill involving restricted chemicals. The chemical hygiene plan should be kept as a hardcopy document in the laboratory as well as in a location away from the areas where chemicals are stored (e.g. front office) and must be available upon request.

LINE A-7

Have you ensured that there are no chemicals in your laboratories on the prohibited chemicals list?
6CCR 1007-3, section 262.11
6 CCR 1010-6, sections 8-104

Prohibited chemicals are those chemicals that pose an inherent, immediate and potentially life threatening risk to students and staff due to their toxicity or other chemical properties. **These chemicals are prohibited from use and/or storage** at the school and the school is prohibited from purchasing or accepting donations of such chemicals.

Prohibited chemicals are listed in Chapter 8 of the *Rules and Regulations Governing Schools in the State of Colorado*. **Attachment B** to this guidance document lists prohibited chemicals and possible hazardous waste determinations.

Prohibited chemicals stored onsite at a school are considered wastes because the school is prohibited from using and storing them. Schools must therefore make a hazardous waste determination on these chemicals to determine if they fall under the Colorado Hazardous Waste Regulations. Not all prohibited chemicals meet the criteria of hazardous wastes. In addition, many wastes not found on the prohibited list do meet hazardous waste criteria. It is your school's responsibility to identify what wastes are hazardous.

A waste can be considered hazardous waste if it meets certain physical characteristics such as ignitibility or corrosivity, or if it is listed in hazardous waste regulations. **Attachment C** of this guidance provides some basic principles of how to make a hazardous waste determination. For more information on how to identify hazardous waste, visit the hazardous waste division's website at: http://www.colorado.gov/cs/Satellite/CDPHE-HM/CBON/1251615961696.

The Colorado Hazardous Waste Regulations lay out the requirements for hazardous waste management and disposal in 6 CCR 1007-3, Parts 99, 100, and Parts 262 through 279. The specific requirements that pertain to a generator of hazardous waste are based on the amount of hazardous waste generated

monthly or stored onsite. Most, if not all, schools will fall under the status of conditionally exempt small quantity generator as long as they generate less than 100 kg of hazardous waste and less than 1 kg of acutely hazardous waste each month.

Per hazardous waste regulations, at a minimum, schools MUST:

1) make a hazardous waste determination on all wastes;
2) properly dispose of hazardous waste at a permitted facility (**no** on-site disposal of hazardous waste and **no** disposal of hazardous waste in the trash); and
3) maintain and operate laboratory and storerooms in a manner that minimizes the possibility of a release, fire, or explosion.

Best management practices for hazardous wastes in schools include:

- labeling containers with the words "hazardous waste";
- keeping containers closed;
- maintain containers in good condition;
- separating incompatible wastes;
- following emergency preparedness precautions including naming an emergency coordinator;
- posting emergency contact information; and
- training staff that manage hazardous waste on their responsibilities.

Hazardous wastes can be picked up and transported to a hazardous waste landfill by a registered ("notified") hazardous waste transporter. You may find a list of registered hazardous waste transporters here: www.colorado.gov/cdphe/schoolchemicals. You may also check with your local household hazardous waste program to see if they are able to accept hazardous waste from schools.

Beyond the hazardous waste requirements for handling the waste onsite, additional requirements usually apply to hazardous waste transportation. These include the use of a hazardous waste manifest, and Department of Transportation container requirements and placarding. Your registered hazardous waste transporter is familiar with these requirements and should ensure the waste is shipped in accordance with the requirements.

As standard practice, the division will consider all prohibited chemicals stored onsite to be waste. An exception may be allowed if a school arranges for the prohibited chemical to be accepted by another facility for its intended purpose. The prohibited chemical will then be viewed as a product and not a waste. To meet this exclusion, the school must have an arrangement in place with the receiving facility for the timely removal of the chemical from the school. The school must demonstrate the arrangement through appropriate documentation.

LINE A-8

If prohibited chemicals are present, are they labeled "Not for Use" or clearly marked to ensure they won't be utilized prior to proper disposal?
6 CCR 1010-6, sections 8-104

Prohibited chemicals should be labeled "Not for Use" or clearly marked to ensure they won't be used. If these chemicals meet the criteria for a hazardous waste they should also be labeled "hazardous waste."

LINE A-9

Have you ensured that chemicals in your laboratories are not stored in inappropriate, damaged, leaking, cracked, or corroded containers?
6 CCR 1007-3, section 261.5(b)
6CCR 1010-6, section 8-102

Chemicals must be stored in appropriate laboratory grade containers that are in good condition, not leaking, and that are compatible with the contents of the container. The use of household containers such as plastic milk and soda bottles to store chemicals is strictly prohibited. Chemicals stored inappropriately in damaged, leaking, or incompatible containers that are still in use at the school should be transferred immediately to structurally sound and compatible containers as outlined in the school's **Chemical Hygiene Plan**. (The full list of requirements may be found in the guidance for Line C-1: Chemical Hygiene Plan Requirements)

Chemicals stored in containers that are damaged, leaking, cracked, or corroded may be considered waste and potentially subject to the Colorado Hazardous Waste Regulations.

LINE A-10

Have you ensured that none of the chemicals in your laboratories are past the useful shelf life or expiration date marked on the container label?
6CCR 1007-3, section 262.11

Chemicals that are past the manufacturer's expiration date may become unstable, and are considered waste and subject to hazardous waste regulations.

If you identify a chemical stored past its expiration date, begin managing the material as a waste as outlined in the school's **Chemical Hygiene Plan** (see guidance for Line C-1 for more information). Determine whether or not the waste meets the criteria of a hazardous waste as outlined in **Attachment C**, and if so follow the requirements for your generator status found in the Colorado Hazardous Waste Regulations.

The chemical manufacturer or supplier should provide you with information on the product shelf life. Chemicals with a poor shelf life may degrade quickly and no longer be useful for their original purpose and should be properly disposed of within one year of purchase.

In general, schools should use the following guidelines for shelf life determination:

Shelf Life Description	Timeframe
Poor	Less than one year
Fair	1 to 3 years
Good	3 to 5 years
Excellent	Greater than 5 years

By incorporating shelf-life characterization into the school chemical inventory, schools can better track chemicals with poor shelf life and dispose of them accordingly.

LINE A-11

Have you ensured that chemicals in your laboratories are not partially or wholly crystallized, solidified, or otherwise changed physically or chemically?
6CCR 1007-3, section 262.11

Certain lab chemicals that have crystallized, solidified, or otherwise changed physically or chemically can be unstable, and form explosive compounds. For example, certain prohibited chemicals including dioxane, ether, tetrahydrofuran, and vinyl chloride, among others, may form explosive peroxides as they age. Exposure to air is necessary to form peroxides, so head space within a container should be minimized.

Chemicals that have crystallized, solidified, or otherwise changed physically or chemically such that the chemicals can no longer be used for their original purpose are considered a waste. As such, schools should begin managing the material as a waste as outlined in the school's **Chemical Hygiene Plan** (see guidance for Line C-1 for more information). . Schools must determine whether or not the waste meets the criteria of a hazardous waste as detailed in **Attachment C.** If hazardous wastes are identified follow the requirements for your generator status found in the Colorado Hazardous Waste Regulations. Chemical disposal or removal may create an imminent danger and/or health hazard and should be done only by appropriately trained staff or professionals.

LINE A-12

Have you ensured that no chemicals are present in your laboratories in amounts that cannot be used in a timely manner, or that are no longer needed, or no longer used?
6 CCR 1007-3, section 262.11

All chemicals stored in amounts that cannot be used within their shelf life, or that are no longer used or needed are considered wastes. A hazardous waste determination must be made as outlined in **Attachment C** and if hazardous, the chemical must be managed under the requirements found in the Colorado Hazardous Waste Regulations.

Conducting the required yearly chemical inventories, maintaining the school chemical hygiene plan, and avoiding bulk chemical purchases will help your school from having overstocked, unwanted, or unused chemical in your storerooms.

LINE A-13

Have you ensured that there are no other chemicals stored or configured in any manner that may present a risk to human health or the environment?
6 CCR 1007-3, section 261.5(b)(5)
6 CCR 1010-6, section 8-102, 8-110

All chemicals and materials associated with the laboratory program must be stored in a manner that minimizes the possibility of a fire, explosion, or any unplanned release that may present a risk to human health or the environment. In general, the following guidelines should be followed:

- Chemicals should be stored in a well ventilated room and out of direct sunlight.

- Storage shelves should be secured to the wall or permanent structure and not overcrowded.
- Care should be taken so that chemicals are stored off the floor but below eye level.
- If metal shelving clips and brackets are used, they should be inspected for signs of corrosion. Corrosion could be a sign of poor ventilation in the storage area. Even as little as one air change per hour can help reduce corrosion although it is recommended that ventilation in the chemical storage area provide a minimum of 4 air changes per hour.

Other chemicals or materials that present potential hazards include cleaning or solvent solutions; combustible gases such as methane; liquid propane or butane; and compressed gases such as oxygen. These materials must be stored in a safe manner in containers that are in good condition and compatible with the contents and away from other incompatible materials. Ensure that all gas cylinders are securely fastened and upright.

LINE A-14

Have you made a hazardous waste determination for any materials that have been used to clean up spilled chemicals?
6 CCR 1007-3, section 262.11

You must determine whether or not the materials used to clean up spilled chemicals, such as floor dry, gloves, etc meet the criteria of a hazardous waste as detailed in **Attachment C.** If so, follow the requirements for your generator status found in the Colorado Hazardous Waste Regulations. For example, if you spill a chemical that is a P or U listed waste then all cleanup materials must also be handled as a hazardous waste. If you spill a chemical that is a characteristic waste then the cleanup media may need to be regulated as a hazardous waste.

LINE A-15

If you have waste chemicals, including waste chemicals per questions 7 – 12 above, have you identified those that could be hazardous waste?

A waste can be considered hazardous waste if it meets certain physical characteristics such as ignitibility or corrosivity, or if it is listed in hazardous waste regulations. Please see **Attachment C** of this guidance for a summary of how to make a hazardous waste determination. For more information on how to identify hazardous waste, visit the hazardous waste division's website at http://www.colorado.gov/cs/Satellite/CDPHE-HM/CBON/1251615961696.

LINE A-16

If you have waste chemicals, including waste chemicals per questions 7 – 12 above, have you arranged for legal disposal of those chemicals (hazardous wastes via hazardous waste requirements; solid wastes via solid waste requirements)?
6 CCR 1007-3, section 262.11

Disposal requirements for wastes are governed by how the waste is characterized and how it will be disposed.

1. **Solid Waste**
   Solid waste can be disposed of in your school's municipal solid waste landfill with minimal restrictions. Solid waste haulers are able to pick up this waste and transport it to a municipal solid waste landfill with minimal paperwork. Under the solid waste regulations liquid waste cannot be disposed in the trash. Any non-hazardous liquid wastes must first be solidified by r adding a solidifying agent, as allowed.

2. **Hazardous Wastes**
   First, determine whether or not the waste meets the criteria of a hazardous waste as detailed in **Attachment C** and if so follow the requirements for your generator status found in the Colorado Hazardous Waste Regulations.

   Per hazardous waste regulations, at a minimum, schools MUST:
   1) make a hazardous waste determination on all wastes;
   2) properly dispose of hazardous waste at a permitted facility (no on-site disposal of hazardous waste and no disposal of hazardous waste in the trash); and
   3) maintain and operate laboratory and storerooms in a manner that minimizes the possibility of a release, fire, or explosion.

   Best management practices for hazardous wastes in schools include:
   - labeling containers with the words "hazardous waste";
   - keeping containers closed;
   - maintain containers in good condition;
   - separating incompatible wastes;
   - following emergency preparedness precautions including naming an emergency coordinator;
   - posting emergency contact information; and
   - training staff that manage hazardous waste on their responsibilities.

   Hazardous wastes can be picked up and transported to a hazardous waste landfill by a registered ("notified") hazardous waste transporter. You may find a list of registered hazardous waste transporters here: www.colorado.gov/cdphe/schoolchemicals. You may also check with your local household hazardous waste program to see if they are able to accept hazardous waste from schools. Beyond the hazardous waste requirements for handling the waste onsite, additional requirements usually apply to hazardous waste transportation. These include the use of a hazardous waste manifest, and Department of Transportation container requirements and placarding. Your registered hazardous waste transporter is familiar with these requirements and should ensure the waste is shipped in accordance with the requirements.

3. **Water Quality**
   Water quality regulations cover the discharge of waste to the publically owned treatment works (POTW's), storm water, or surface bodies of water. Most commonly a laboratory might discharge wastes down the drain. Contact your local POTW to determine your discharge restrictions and if you require a discharge permit.

LINE A-17

If you have waste chemicals, including waste chemicals per questions 7 – 12 above, have you ensured that waste chemicals have not been stored in your laboratories longer than 12 months?

If any waste chemicals have been in storage at your school longer than 12 months, CDPHE may consider the waste chemical to be stored in lieu of proper disposal, potentially subjecting your school to enforcement. The department recommends that waste chemicals are properly disposed of within 12 months of identification.

Section B – Flammables and Corrosives

LINE B-1

Does each classroom, storage room, and/or vocational area that stores 10 gallons or more of flammable chemicals have an appropriate flammables cabinet?
6 CCR 1010-6, section 8-110

Flammable cabinets are required if the school has more than 10 gallons (38.75 L) of flammable or combustible materials within a given room or area. The flammables cabinet should have appropriate labeling indicating it meets NFPA Standard 30 and indicate the maximum amount of chemicals, in gallons, that can be stored in the cabinet.

LINE B-2

Are acids and other corrosive chemicals stored in an appropriate corrosives cabinet?
6 CCR 1010-6, section 8-110

Corrosive chemicals should be stored in a dedicated corrosive chemicals cabinet with an interior made of corrosion-resistant material. Containers of corrosive chemicals must be stored so that any spills or leaks will be contained and isolated from other chemicals. If a wood corrosives cabinet is used, the shelves must be lined with polypropylene. If metal corrosive cabinets are used, the cabinet should be in good condition and free from signs of rusting/oxidizing.

Storing acids and bases together in one corrosives cabinet is acceptable if they are physically separated on different shelves or isolated from one another. Bottles may become covered with ammonium chloride from hydrochloric acid and ammonia fumes.

Nitric acid should be stored separately from acetic acid. Acetic acid is both a corrosive and flammable liquid. Nitric acid is a corrosive and a strong oxidizer. When nitric acid and acetic acid are combined, a flash fire will sometimes erupt. Some cabinets have a separate plastic compartment to store nitric acid.

Section C – Chemical Hygiene Plan and Laboratory Procedures

LINE C-1

Does the school have a written and complete chemical hygiene plan in place?
6 CCR 1010-6, section 8-101, 8-105, 8-112, 8-113, 8-114

A chemical hygiene plan ("the plan") promotes the safe operation of laboratories for students, faculty and staff and promotes a culture of safety within the school. The plan is comprised of three required sections:

I. General Operating Instructions, Regulations and Procedures;
II. Chemical Storage, Handling, and Disposal Procedures; and
III. Spill Response Plan and Cleanup Procedures.

These sections are outlined below**.**

I. General Operating Instructions, Regulations and Procedures

This section should include standard laboratory rules and procedures relevant for the protection of students engaging in any activities where hazardous chemicals, hazardous devices or hazardous equipment are used. Recommended subsections include:

i. General Laboratory Safety Rules

The school should develop and adopt safety rules that address:

- conduct in the lab;
- general work procedures;
- housekeeping;
- appropriate apparel and protective equipment use;
- hygiene practices;
- emergencies; and
- chemical handling.

Additional guidance may be found in **Laboratory Safety for Students** in **Attachment D**. All students should be familiar with safety rules prior to participating in laboratory activities.

ii. Chemical Procurement

Controlling what chemicals are used within your school is critical to ensuring that only products that have been reviewed and approved for use are brought into the school environment. This section should establish the protocol for evaluating, approving, and ordering school chemicals. The evaluation should factor in:

- educational value,
- health and safety hazards,
- environmental concerns,
- storage requirements,
- quantity needed, and

- product disposal costs.

In addition, prior to ordering any chemicals or accepting a donation of chemicals, the list should be reviewed against the prohibited list (see **Attachment B**). These chemicals are prohibited from use and/or storage at the school and the school is prohibited from purchasing or accepting donations of such chemicals.

To create a safer school environment, consider implementing measures to reduce the amount and hazardous nature of chemicals entering the school. Purchasing chemicals in bulk should be avoided. Instead, only purchase what can be used during the current school year, especially if the chemical has a poor shelf life. For chemicals that have a shelf life of 3 years or longer, only order the amount that can be fully consumed under planned use within the shelf life of the product. Other options to minimize hazards include performing small-scale or microscale chemistry or substituting experiments which use chemicals that have a lesser impact on human health and the environment.

iii. Fume Hood Use, Operation and Testing

Laboratory fume hoods are designed to protect teachers and students by preventing contaminants, such as chemical vapors, dusts, mists and fumes, from escaping into the laboratory environment. Sufficient fume hood capacity ventilation must be provided and used for any activity producing hazardous, toxic, or noxious gases, mists, vapors, or dusts. Hoods must exhaust directly to the outside and be located a minimum of 10 feet from any building air intakes or building openings.

Face velocity is the rate of flow of air moving into the laboratory hood entrance, usually expressed in feet per minute (fpm). A minimum face velocity of 100 fpm for general laboratory hoods must be provided. All hoods should have documentation of annual testing and a sticker designating the maximum safe sash height that achieves a face velocity of 100 fpm.

It is important to remember that face velocity is not the only factor contributing to hood performance. Work practices and make-up air also affect performance. Schools should adopt best work practices for safe fume hood use including, but not limited to:

- Conduct all operations that generate irritating or hazardous air contaminants inside a fume hood. Substitute less hazardous materials when possible.
- Minimize sources of turbulence at the hood face (e.g. foot traffic, equipment, fans, moving arms in and out).
- Do not store chemicals or apparatus in the hood. Store hazardous chemicals in an approved safety cabinet.
- When working with open chemicals, reduce the sash as much as possible to maximize hood performance.
- Keep all apparatus and chemicals at least **6 inches back** from the front face of the hood.
- Do not use the hood as a waste disposal method (e.g. to volatilize chemicals).
- Keep the sash closed completely when the fume hood is not in use.

II. Proper Storage, Handling and Disposal Procedures

Proper and responsible chemical management is essential to minimize a variety of environmental, health and safety risks within any school.

i. Storage Procedures

Describe chemical storage procedures that the schools will follow. In general, the procedures should include the following requirements and guidelines:

- Secure storage areas against unauthorized removal of chemicals by students or others.
- Maintain clear access to and from storage area.
- Chemicals must be stored according to their compatibility group in a single safe and practical storage configuration. All staff members should understand and follow the storage configuration and chemical storage shelves should be labeled accordingly.
- All chemicals and solutions should be properly labeled.
- Do not store food and drink with chemicals. Any food
- Chemicals should be protected from direct heat and sunlight to prevent the degradation of chemicals and the deterioration of containers and labels.
- Shelving should be secured to the wall or floor. Shelving with a two-inch lip is preferred. If you use shelving with metal brackets, inspect the clips and brackets annually for corrosion and replace as needed.
- Storage shelves should be organized and not overcrowded.
- Only chemicals that are used should be kept in storage, Chemicals should be appropriately disposed of when their shelf-life has expired or when no longer in use.
- Avoid storing chemicals on shelves above eye level or on the floor.
- Assure that chemical storage cabinets are locked when not being accessed for laboratory use
- Maintain a complete chemical inventory. Ensure that you have an MSDS on file for each stored chemical.
- Use NFPA-approved storage cabinet for flammable chemicals. Flammable cabinets are required if the school has 10 gallons or more within a given area.
- Acids and corrosive chemicals should be stored in an approved corrosives cabinet. Nitric acid should be stored in a separate plastic compartment.
- Strong oxidizers should be kept separate from metals, acids, and organic materials. Preferably, isolate oxidizers from flammable cabinet by 25 feet.

ii. Chemical Handling

In general, the procedures should include the following requirements and guidelines:

- Appropriate personal protective equipment should be used by all persons performing laboratory activities and those persons in dangerous proximity.
- Transfer chemicals only to approved and secure storage vessels.
- Use a spatula or scoop to remove a solid reagent from a container. Do not directly touch any chemical with your hands.
- Water should never be added to concentrated acids. To dilute acids, add the concentrated acid to water, stirring constantly.
- Cap all containers before transporting.
- Properly label all secondary containers and solution preparations.

- Use the laboratory hood for solution preparations and demonstrations when there is a possibility of release of hazardous chemical vapors, mist or dust.
- When transporting chemicals place the immediate contained in a secondary container or bucket (rubber, metal or plastic) designed to be carried and large enough to hold the entire contents of the chemical.
- Never handle bottles that are wet or too heavy for you.

iii. Disposal Procedures

This section should address procedures for waste identification and proper disposal.

Schools must make a hazardous waste determination on all wastes. A waste can be considered hazardous waste if it meets certain physical characteristics such as:

- ignitibility
- corrosivity
- reactivity
- toxicity

In addition, chemicals can be hazardous waste if it is specifically listed in Colorado Hazardous Waste Regulations. Please see **Attachment C** of this guidance for a summary of how to make a hazardous waste determination.

Teachers must be aware of the appropriate method of disposal for any chemical used in the school laboratory. When in doubt, refer to the MSDS, a disposal manual, or the supplier of the chemical. Do not pour chemicals down the drain unless authorized by local waste water treatment authority.

Best management practices for hazardous wastes in schools include:

- labeling containers with the words "hazardous waste";
- keeping containers closed;
- maintain containers in good condition;
- separating incompatible wastes;
- following emergency preparedness precautions including naming an emergency coordinator;
- posting emergency contact information; and
- training staff that manage hazardous waste on their responsibilities.

Contact professional, licensed hazardous waste hauler/transporters that will ensure proper disposal. A list of registered transporters may be found at: www.colorado.gov/cdphe/schoolchemicals

III. Spill Response Plan and Cleanup Procedures

A chemical spill is defined as the uncontrolled release of a chemical, either as a solid, liquid or a gas. Major or complex spills and leaks require evacuation and the immediate contact of the local fire department's hazmat team. All emergency numbers should be posted in each laboratory.

The spill response plan and cleanup procedures should detail the initial steps to take when a spill occurs and include:

i. Staff Roles and Responsibilities

Describe the roles and responsibilities of the school staff and administration for both spill prevention and spill response and cleanup. Identify staff trained to respond to spills.

ii. Spill Prevention

Describe spill prevention practices that the school will implement to prevent and minimize spills. Spill prevention practices include, but are not limited to, the following examples:

- Maintaining a neat and organized work area.
- Ensuring shelving is sturdy, securely fastened to the wall or floor, and not overcrowded with chemicals.
- Storing chemicals within easy reach and no higher than eye level. Chemical containers should not be stored directly on the floor where they might be knocked over.
- Regularly inspecting chemicals to ensure there are no leaking or deteriorating containers.
- Ensuring that all gas cylinders are securely fastened and upright.
- Storing chemicals only in lab-grade containers.
- Keeping reagent containers sealed or closed at all times when not removing contents.
- When transporting large, heavy, or multiple containers use a cart suitable for the load with high edges or spill trays.
- Carrying glass containers in bottle carriers or another unbreakable, leak resistant secondary container.
- Regularly inspecting glassware for cracks and defects.
- Replace mercury thermometers with alcohol thermometers.

iii. Protective Equipment and Spill Cleanup Materials

In advance, assess the need for personal protective equipment and spill cleanup materials based on the school chemical inventory. The Department recommends that a chemical spill kit be available on-site to handle minor spills in the laboratory. In this section, list all protective equipment and cleanup materials available on-site and their proper use.

iv. Spill Hazard Severity

Some spills may be minor and can be managed and cleaned by trained teachers and staff. Identify factors to assist in determining the severity of the spill. For example: the amount spilled, the hazards of the material spilled, the location of the spill, the availability of trained staff, and the need for outside assistance.

v. Evacuation Plan and Procedures

For major spills, which present an immediate danger to health and safety, develop an evacuation plan and procedures for the room and building as appropriate. Teachers and staff should be familiar with the evacuation plan in advance.

vi. First Aid Procedures

In the case of chemical exposure (including skin & eye contact as well as ingestion) develop first aid procedures that will be implemented.

vii. Spill Containment and Cleanup Procedures

When a chemical spill occurs, personnel at the spill scene must act quickly to reduce the consequences of the spill. The appropriate actions will depend on the magnitude, complexity, and degree of risk associated with the spill. Identify procedures for containing and cleaning up a spill. If restricted chemicals are on-site, specific procedures for those chemicals must be included.

viii. Disposal
Schools must properly dispose of cleanup materials, including residues, and contaminated clothing. Cleanup materials from hazardous substance spills may be regulated as hazardous waste and a hazardous waste determination is necessary for all cleanup residues and debris.

Schools should periodically review and update these procedures and ensure that any staff member who uses chemicals or who might assist during spill cleanup be familiar with the plan

LINE C-2

Is glassware designed for its intended use, in good condition and handled and stored in a safe manner?
6 CCR 1010-6, section 8-116

All chemicals should be stored in appropriate laboratory grade containers. Transfer of chemicals to containers other than appropriately designed glassware is prohibited and can cause spills if chemicals erode the container. The use of household containers such as plastic milk and soda bottles to store chemicals is strictly prohibited. Periodically inspect glassware for cracks, chips and defects, replacing when necessary to avoid leaks and spills.

Section D – Ventilation and Fume Hood Use and Design

LINE D-1

Are the rooms where chemicals are stored actively ventilated?
6 CCR 1010-6, section 8-201

All areas shall be adequately ventilated so that exposures to hazardous or toxic materials are maintained at a safe level. An open window or non-mechanical venting is considered passive ventilation, which is not acceptable.

The department recommends installing a fan that does not create an explosion hazard and mounting it to an exterior wall of the chemical storeroom venting directly outside. Avoid having a ventilation system for the storeroom that is tied in with the rest of the school's ventilation system as this can result in chemical vapors being distributed into other areas of the school. Because most organic vapors are heavier than air, the air should be ventilated by drawing it from the floor level. A minimum of four air changes per hour is recommended.

LINE D-2

Are fume hoods used for experiments, solution preparations and demonstrations that produce hazardous, toxic or noxious gases, mists vapors or dusts?
6 CCR 1010-6, section 8-201 and 8-203

Sufficient fume hood capacity ventilation shall be provided and shall be used for any activity producing hazardous toxic or noxious gases, mists, vapors or dusts. The school chemical hygiene plan should describe when and for what purposes the fume hood should be used.

LINE D-3

Are fume hoods tested for a minimum face velocity of 100 feet/minute, with test results documented appropriately on an annual basis using a recognized standard method?
6 CCR 1010-6, section 8-203

Laboratory fume hoods are designed to protect laboratory personnel by preventing contaminants, such as chemical vapors, dusts, mists and fumes, from escaping into the laboratory environment. Face velocity is the rate of flow of air moving into the laboratory hood entrance, usually expressed in feet per minute (fpm). A minimum face velocity of 100 fpm for general laboratory hoods must be provided.

All hoods should have documentation of annual testing and a sticker designating the maximum safe sash height that achieves a face velocity of 100 fpm.

It is important to remember that face velocity is not the only factor contributing to hood performance. Work practices and make-up air also affect performance. The following are best work practices for safe fume hood use:

- Conduct all operations that generate irritating or hazardous air contaminants inside a fume hood. Substitute less hazardous materials when possible.
- Minimize sources of turbulence at the hood face (e.g. foot traffic, equipment, fans, moving arms in and out).
- Do not store chemicals or apparatus in the hood. Store hazardous chemicals in an approved safety cabinet.
- When working with open chemicals, reduce the sash as much as possible to maximize hood performance.
- Keep all apparatus and chemicals at least **6 inches back** from the front face of the hood.
- Do not use the hood as a waste disposal method (e.g. to volatilize chemicals).
- Keep the sash closed completely when the fume hood is not in use.

LINE D-4

Do fume hoods exhaust directly to the outside and at least 10 feet away from air intakes or building openings?
6 CCR 1010-6, section 8-203

Laboratory fume hoods serve to control exposure to toxic, offensive or flammable vapors, gases and aerosols. Sufficient fume hood capacity ventilation shall be provided and shall be used for any activity producing hazardous, toxic, or noxious gases, mists, vapors, or dusts. Hoods must exhaust directly to the outside and be located a minimum of 10 feet from any building air intakes or building openings.

Section E – Safety Equipment

LINE E-1

If corrosive, toxic, or hazardous chemicals are in use, are appropriately designed and accessible eyewash and shower stations installed?
6 CCR 1010-6, section 8-121, 8-122, 8-124

An easily accessible operational eye wash fountain must be provided in each laboratory or other areas where corrosives or irritating chemicals are used. The eye wash fountain shall be clean and provide a continual hands-free flow of water. **The use of portable eye wash bottles is not permitted.** A highly visible sign must mark the eye wash fountain location.

An easily accessible operational safety shower, capable of providing continuous flowing water, shall be provided for each laboratory or other areas where corrosive or irritating chemicals are used. The safety shower may be centrally located so as to serve more than one area if doors are not locked, and convenient prompt access is available. A highly visible sign must mark the safety shower location.

LINE E-2

Are eyewash and shower stations tested annually with test results appropriately documented?
6 CCR 1010-6, section 8-121, 8-122 and 8-124

Eye wash fountains must be tested on an annual basis and documented with the date, initials of the staff member conducting the test and test results.

To test the eye station:

1. Visually inspect the unit, looking for damage and ensuring that the protective nozzle covers are still in place and functioning correctly. Covers protect the nozzles from dust and other

contaminants but should be fitted in such a way as to not require a separate movement to remove them when the eye wash is activated.

2. Test the valve actuation: it should open in one second or less and stay on without being held.
3. Ensure that flushing to both eyes can be provided simultaneously.
4. Measure the flow with a flow meter or use a 1-gallon container. The eyewash should fill a 1 gallon container in 2.5 minutes or less. The flowmeter should show at least 0.4 gallons per minute (gpm).

It is also recommended that the eye wash is flushed until the water runs clean on a monthly basis to relieve the unit of any rust or pipe build-up.

Safety showers must be tested on an annual basis and documented with the date, initials of the staff member conducting the test and test results.

To test safety showers:

1. Visually inspect pipes for leaks and damage. Ensure that the unit is free of any obstructions.
2. Open the valve fully and verify that it stays open without the use of hands.
3. Measure the flow rate. Showers must deliver a minimum of 20 gpm flow. This can be accomplished by using a five-gallon container (with a mark at the three gallon level) and a curtain to channel the flow into the container. After activation, the level on the container should be reached within 9 seconds or less.

LINE E-3

When open flames are used, are appropriate fire blankets provided and accessible?
6 CCR 1010-6, section 8-119

An easily accessible fire blanket must be provided in each laboratory or other area where an open flame is used. The fire blanket must be approved by NFPA 45 (Fire retardant treated 100% wool blanket). Any asbestos fire blankets need to be replaced.

LINE E-4

Are extinguishers appropriate for the types of chemicals used and located in each laboratory?
6 CCR 1010-6, section 8-124

Extinguishers are required in all laboratories per NFPA 45 Fire Protection for Laboratories Using Chemicals. Dry chemical Class ABC extinguishers are recommended for laboratory use. In addition, if combustible metals (Mg, Na, K) are present, laboratories must have a Class D extinguisher as well.

LINE E-5

Are extinguishers inspected annually with results documented?
6 CCR 1010-6, section 8-124

On an annual basis, schools should inspect extinguishers to ensure:

- extinguishers are in their designated places;
- there are no obstructions to access or visibility;
- safety seals are not broken or missing;
- there is no evidence of physical damage, corrosion, leakage or clogged nozzle;
- pressure gauge readings are in the proper range or position;
- operating instructions are legible and facing outward;
- extinguisher appears full – confirmed by weighing or lifting; and
- required maintenance and recharging of extinguisher is completed on-time.

Inspection documentation should include

- name of person conducting the inspection;
- date; and
- result of inspection.

LINE E-6

When corrosive, toxic or hazardous chemicals are in use, is appropriate protective eyewear used?
6 CCR 1010-6, section 8-118

Eye protection that meets the American National Standards Institute's Practice for Occupational and Face Protection, ANSI Z87.1-1989 must be worn by all students participating in, observing, or in close proximity to any experiment or activity which could result in eye injury

LINE E-7

Is protective eyewear clean and santitized if shared among multiple users?
6 CCR 1010-6, section 8-118

Eye protection glasses, goggles, face shields, and similar eye protection devices shall be issued clean and properly sanitized and stored in a protected place.

If eyewear is shared and a UV light cabinet is used to sanitize eyewear, check to ensure that the bulbs function and that the cabinet is used in accordance with the instructions. UV lamps are designed to provide light energy of a certain wavelength. As they operate, they slowly lose their effectiveness. Therefore, schools should track the usage and replace the bulb once the lamp reaches the number of hours specified by the manufacturer.

Alcohol wipes or spray is also acceptable for sanitizing eyewear.

LINE E-8

Are classrooms using Bunsen burners or other equipment supplied with gas, equipped with emergency shut-off switches that are readily available, accessible and labeled for high visibility?
6 CCR 1010-6, section 8-123 and 8-124

Master gas valves and electric shut-off switches shall be provided for each laboratory or area where power equipment is used. All emergency shut-off switches must be labeled for high visibility and tested at least once annually. Testing should be documented with the date, initials of staff member performing the test and the results of the test.

LINE E-9

Are emergency shut-off switches tested with results documented annually?
6 CCR 1010-6, section 8-124

Emergency shut off switches including master gas valves and electrical shut off switches must be tested on an annual basis and the test results documented. Documentation may consist of a tag connected to the shut off switch that shows the date the test was conducted, the name of the person conducting the test, and the test results. A passing result is defined as a valve or switch that, when activated, immediately ceases to supply power or gas to connected equipment.

Attachment A

Incompatibility of Common Laboratory Chemicals

When certain hazardous chemicals are stored or mixed together, violent reactions may occur because the chemicals are unsuitable for mixing, or are incompatible. Classes of incompatible chemicals should be segregated from each other during storage, according to hazard class.

Use the following general guidelines for hazard class storage:

- Flammable/Combustible Liquids and Organic Acids
- Flammable Solids
- Mineral Acids
- Caustics
- Oxidizers
- Perchloric Acid
- Compressed Gases

CHEMICAL	INCOMPATIBLE CHEMICALS
Acetic acid	aldehyde, bases, carbonates, hydroxides, metals, oxidizers, peroxides, phosphates, xylene
Acetylene	halogens (chlorine, fluorine, etc.), mercury, potassium, oxidizers, silver
Acetone	acids, amines, oxidizers, plastics
Alkali and alkaline metals	acids, chromium, ethylene, halogens, hydrogen, mercury, earth nitrogen, oxidizers, plastics, sodium chloride, sulfur
Ammonia	acids, aldehydes, amides, halogens, heavy metals, oxidizers, plastics, sulfur
Ammonium nitrate	acids, alkalis, chloride salts, combustible materials, metals, organic materials, phosphorous, reducing agents, urea
Aniline	acids, aluminum, dibenzoyl peroxide, oxidizers, plastics
Azides	acids, heavy metals, oxidizers
Bromine	acetaldehyde, alcohols, alkalis, amines, combustible materials, ethylene, fluorine, hydrogen, ketones (acetone, carbonyls, etc.), metals, sulfur
Calcium oxide	acids, ethanol, fluorine, organic materials
Carbon (activated)	alkali metals, calcium hypochlorite, halogens, oxidizers
Carbon tetrachloride	benzoyl peroxide, ethylene, fluorine, metals, oxygen, plastics, silanes

CHEMICAL	INCOMPATIBLE CHEMICALS
Chlorates	powdered metals, sulfur, finely divided organic or combustible materials
Chromic	acid acetone, alcohols, alkalis, ammonia, bases
Chromium	trioxide benzene, combustible materials, hydrocarbons, metals, organic materials, phosphorous, plastics
Chlorine	alcohol's, ammonia, benzene, combustible materials, flammable compounds (hydrazine), hydrocarbons (acetylene, ethylene, etc.), hydrogen peroxide, iodine, metals, nitrogen, oxygen, sodium hydroxide
Chlorine dioxide	hydrogen, mercury, organic materials, phosphorous, potassium hydroxide, sulfur
Copper	calcium, hydrocarbons, oxidizers
Hydroperoxide	reducing agents
Cyanides	acids, alkaloids, aluminum, iodine, oxidizers, strong bases
Flammable liquids	ammonium nitrate, chromic acid, hydrogen peroxide, nitric acid, sodium peroxide, halogens
Fluorine	alcohol's, aldehydes, ammonia, combustible materials, halocarbons, halogens, hydrocarbons, ketones, metals, organic acids
Hydrocarbons (butane, propane benzene, turpentine)	acids, bases, oxidizers, plastics etc
Hydrofluoric acid	metals, organic materials, plastics, silica (glass), (anhydrous) sodium
Hydrogen peroxide	acetylaldehyde, acetic acid, acetone, alcohol's carboxylic acid, combustible materials, metals, nitric acid, organic compounds, phosphorous, sulfuric acid, sodium, aniline
Hydrogen sulfide	acetylaldehyde, metals, oxidizers, sodium
Hypochlorites	acids, activated carbon
Iodine	acetylaldehyde, acetylene, ammonia, metals, sodium
Mercury	acetylene, aluminum, amines, ammonia, calcium, fulminic acid, lithium, oxidizers, sodium
Nitrates	acids, nitrites, metals, sulfur, sulfuric acid

CHEMICAL	INCOMPATIBLE CHEMICALS
Nitric acid	acetic acid, acetonitrile, alcohol's, amines, (concentrated) ammonia, aniline, bases, benzene, cumene, formic acid, ketones, metals, organic materials, plastics, sodium, toluene
Oxalic acid	oxidizers, silver, sodium chlorite
Oxygen	acetaldehyde, secondary alcohol's, alkalis and alkalines, ammonia, carbon monoxide, combustible materials, ethers, flammable materials, hydrocarbons, metals, phosphorous, polymers
Perchloric acid	acetic acid, alcohols, aniline, combustible materials, dehydrating agents, ethyl benzene, hydriotic acid, hydrochloric acid, iodides, ketones, organic material, oxidizers, pyridine
Peroxides, organic	acids (organic or mineral)
Phosphorus (white)	oxygen (pure and in air), alkalis
Potassium	acetylene, acids, alcohols, halogens, hydrazine, mercury, oxidizers, selenium, sulfur
Potassium chlorate	acids, ammonia, combustible materials, fluorine, hydrocarbons, metals, organic materials, sugars
Potassium perchlorate	alcohols, combustible materials, fluorine, hydrazine, metals, organic matter, reducing agents, sulfuric acid
Potassium permanganate	benzaldehyde, ethylene glycol, glycerol, sulfuric acid
Silver	acetylene, ammonia, oxidizers, ozonides, peroxyformic acid
Sodium	acids, hydrazine, metals, oxidizers, water
Sodium nitrate	acetic anhydride, acids, metals, organic matter, peroxyformic acid, reducing agents
Sodium peroxide	acetic acid, benzene, hydrogen sulfide metals, oxidizers, peroxyformic acid, phosphorous, reducers, sugars, water
Sulfides	acids
Sulfuric acid	potassium chlorates, potassium perchlorate, potassium permanganate

Attachment B:
Prohibited and Restricted Chemical Lists

Prohibited Chemicals

Name	Formula	CAS #	NFPA Reactive	NFPA Health	NFPA Flammable	NFPA Special	Possible HW Codes
2-Butanol (Sec-Butyl Alcohol)	C2H5CH(OH)CH3	78-92-2	0	1	3		D001
Acetal			0	2	3		D001
Acetaldehyde	CH3CHO5	75-07-0	2	3	4		D001
Acetyl Chloride	CH3COCl	75-36-5	2	3	3	W	D001/D003
Acetyl Nitrate							D001
Acrolein	CH2CHCHO	107-02-8	3	4	3		D001/D003
Acrylic Acid	H2CCHCO2H	79-10-7	2	2	2		D001/U008
Acrylonitrile	CH2CHCN	107-13-1	2	4	3		D001/U009
Alcohols (Allylic, Benzylic)							D001
Alkly-Substituted Cycloaliphatics							D001
Aluminum Hydrophosphide							D003
Aluminum Phosphide	AlP	20859-73-	2	4	4	W	D003/ D006
Amatol							D003
Ammonal							D001/D003
Ammonium Bromate							D003
Ammonium Chlorate							D001/D003
Ammonium Hexanitrocobaltate							D003
Ammonium Nitrite							D001
Ammonium Perchlorate	NH4ClO4	7790-98-9	4	1	0	OX	D001

Prohibited Chemicals

Name	Formula	CAS #	NFPA Reactive	NFPA Health	NFPA Flammable	NFPA Special	Possible HW Codes
Ammonium Periodate							D003
Ammonium Permanganate			3	0	0	OX	D001
Ammonium Tetraperoxychromate							D007
Antimony Compounds							D001
Arsenic And Arsenic Compounds							D004
Azides							D003
Azidocarbonyl Guanidine							D003
Barium	Ba	2	2	1		W	D005
Barium Chlorate	Ba(ClO3)2*H2O	13477-00-	1	2	0	OX	D001/D005
Barium Oxide (Anhydrous)	BaO	1304-28-5	2	3	0		D005
Barium Peroxide	BaO2	1304-29-6	0	1	0	OX	D001/D005
Benzene	C6H6	71-43-2	0	2	3		D001
Benzene Diazonium Chloride							D003
Benzotriazole	C6H5N3	95-14-7	0	2	1		D003
Benzoyl Peroxide	(C6H5CO)2O2	94-36-0	4	1	4	OX	D001/D003
Benzyl Alcohol	C6H5CH2OH	100-51-6	0	2	1		D001
Bismuth Nitrate	Bi(NO3)3*5H2O	10035-06-	3	1	0	OX	D001
Borane, Boranes, Diboranes							D003
Boron Tribromide			2	3	0	W	D001
Boron Trifluoride			1	4	0		D003
Bromine Pentafluoride	Brf5	7789-30-2	3	4	0	W,O	D003

Prohibited Chemicals

Name	Formula	CAS #	NFPA Reactive	NFPA Health	NFPA Flammable	NFPA Special	Possible HW Codes
Bromine Trifluoride			3	4	0	W,O	D001
Butadiene	C4H6/CH2=(CH)2=CH	106-99-0	0	2	4		D001/D003
Butenetroil Trinitrate							D003
Cadmium and Cadmium Compounds							D006
Calcium Nitrate, Anhydrous	Ca(NO3)2	10124-37-	3	1	0	OX	D001/D006
Calcium Permanganate	Ca(MnO4)						D001
Carbon Tetrachloride	CCl4	56-23-5	0	3	0		D019, U211
Chloral Hydrate	CCl3CH(OH)2	302-17-0					Toxic, non-hazardous
Chlorine	Cl2	7782-50-5	0	4	0	OX	D003
Chlorine Dioxide	ClO2	10049-04-				OX	D001
Chlorine Trifluoride			3	4	0	W,O	D003
Chlorine Trioxide							D003
Chloroacetylene							D003
Chloroform	CHCl3	67-66-3	0		2	0	D022/U044
Chloropicrin	CCl3NO2	76-06-2	3	4	0		D003
Chloroprene							D001
Chlorotrifluoroethylene							D001
Chromium (IC) Chloride	CrCl3*6H2O	10060-12-	2	1	0		D007
Chromium (Powder)	Cr	7440-47-3	1	2	1		D007
Chromyl Chloride	CrO2Cl2	14977-61-	2	3	0	W	D007
Cobalt (Powder)	Co	7440-48-4					D001
Colchicine	C22H25NO6	64-86-8	0	4	1		Toxic, non-hazardous
Copper Acetylide							D003

Prohibited Chemicals

Name	Formula	CAS #	NFPA Reactive	NFPA Health	NFPA Flammable	NFPA Special	Possible HW Codes
Cumene	C6H5CH(CH3)2	98-82-8	1	2	3		D001/U055
Cycloheptanone	C7H12O	502-42-1	2	3			D001
Cyclohexanol	C6H11OH	108-93-0	1	2	2		D001
Cyclopentene	C5H8	142-29-0	1	1	3		D001
Diacetylene							D001/D003
Diazidoethane							D003
Diazodinitrophenol							D003
Diazomethane	CH2N2	334-88-3					D003
Dicyclopentadiene	C10H12	77-73-6	1	1	3		D001
Diisopropyl Ether	C6H14O	108-20-3	1	2	3		D003
Dinitrophenol	C6H3OH(NO2)2	51-28-5					P048
Dioxane	C4H8O2	123-91-1	1	2	3		D001/U108
Dipentaerythritol Hexanitrate							D001
Disulfur Dinitride							D001
Divinyl Acetylene			3		3		D001
Divinyl Ether			2	2	4		D001/D003
Ethyl Ether	(C2H5)2O	60-29-7A	1	1	4		D001
Ethyl Nitrite			4	3	4		D001
Ethylene Glycol Dimethyl Ether (Glyme)			0	1	2		D001
Ethylene Glycol Dinitrate	C2H4N2O6	628-96-6					D001/D003
Ethylene Oxide	C2H4O	75-21-8	3	3	4		D001/D003/U115
Formaldehyde	CH2O	50-00-0A	0	3	2		U122
Furan			1	1	4		D001
Glycol Dinitrate	C2H4N2O6	628-96-6					D001

Prohibited Chemicals

Name	Formula	CAS #	NFPA Reactive	NFPA Health	NFPA Flammable	NFPA Special	Possible HW Codes
Glycol Monolactate Trinitrate							D001
Grignard Reagents (Ether Solvents)							D001/D003
Guanyl Nitrosaminoguanyl Hydrazine							D001
Hexyl Alcohol	CH3(CH2)4CH2OH	111-27-3	0	1	2		D001
HMX			4	3			D003
Hydrazoic Acid							D003
Hydrofluoric Acid	HF	7664-39-3	0	4	0		D002
Hydrogen Peroxide (>30%)	H2O2	7722-84-1	1	3	0	OX	D001
Hydrogen Peroxide (60%)	H2O2	7722-84-1	3	2	0	OX	D001
Hydrogen Sulfide	H2S	7783-06-4	0	4	4		D003
Isopropyl Ether			1	1	3		D001/D003
Lead Arsenate	Pb3(AsO4)2	7784-40-9	0	2	0		D004/D008
Lead Dinitride (Azide)	Pb3(N3)2	13424-46-					D008
Lead Dinitrorescorcinate (Styphnate)			4	3	4		D008
Lead Dioxide, Brown	PbO2	1309-60-0	3	3	0	OX	D008
Lead Mononitrorescorcinate							D003/D008
Lithium Nitrate	LiNO3	7790-69-4	3	2	0	OX	D001
Lithium Nitride							D001/D003
Lithium Peroxide							D001
Magnesium (except Mg ribbon & turnings)	Mg	7439-95-4	2	0	1	W	D001
Magnesium Peroxide							D001
Mannitol Hexanitrate							D001/D003
Mercury And Mercury Compounds							D009

Prohibited Chemicals

Name	Formula	CAS #	NFPA Reactive	NFPA Health	NFPA Flammable	NFPA Special	Possible HW Codes
(except in sealed devices)							
Methyl Acetylene	C3H4	74-99-7	2	2	4		D003
Methyl Cyclopentane	C6H12	96-37-7	0	2	3		D001
Methyl Isocyanate	CH3NCO	624-83-9	2	4	3	W	D003
Methyl Methacrylate, Monomer	C5H8O2	80-62-6	2	2	3		D001/U162
M-Trinitrocresol							D003
Nessler's Reagent (Mercury Compound)	Hg+KI+NaOH	NA26					D009
Nicotine	C10H14N2	54-11-5	0	4	1		P075
Nitroglycerin			4	2	2		D003
Nitrosoguanidine							D003
Osmic Acid	OsO4	20816-12-	0	4	0		D002
Osmium Tetroxide	OsO4	20816-12-	0	4	0		P087
O-Toluidine	C7H9N	95-53-4	0	2	3		D001
Pentaerythritol Tetranitrate (PETN)		78-11-5					D003
Perchloric Acid	HClO4	7601-90-3	3	3	0	OX	D003
Phenol	C6H6O	108-95-2	0	4	2		D001
Phenyl Thiourea	C7H8N2S	103-85-5A	0	4	0		D003
Phosphorus Halides and Oxides							D001
Phosphorus, Phosphides							D001
Phthalic Anhydride, Picrates, Picramide, and Picryl Compounds.	C8H4O3	85-44-9	2	3	1		D001
Picric Acid	C6H3N3O7	88-89-1	4	3	4		D002/D003

Prohibited Chemicals

Name	Formula	CAS #	NFPA Reactive	NFPA Health	NFPA Flammable	NFPA Special	Possible HW Codes
P-Nitrophenol	NO2C6H4OH	100-02-7	2	3	1		U170
Polyvinyl Nitrate							
Potassium Amide							
Potassium Cyanide	KCN	151-50-8	0	3	0		D003
Potassium Dinitrobenzfuroxan							D003
Potassium Nitrite	KNO2	7758-09-0	3	2	0	OX	D001
Potassium Perchlorate	KClO4	7778-74-7	2	1	0		D001
Potassium Periodate	KIO4	7790-21-8	3	2	0	OX	D001
Potassium Peroxide	KO2	12030-88-	3	3	0		D001
Potassium Superoxide	KO2	12030-88-	3	3	0		D001/D003
RDX		121-82-4					D003
Sec-Butyl Alcohol (2-Butanol)	C4H10O	78-92-2A	0	1	3		D001
Silanes and Chlorosilanes							D001
Silicon Tetrachloride			2	3	0	W	D003
Silver Acetylide							D003/D011
Silver Cyanide	AgCN	506-64-9	1	3	0		D003/D011/P104
Silver Dinitrorescorcinate (Styphnate)							D003/D011
Silver Fulminate (Cyanate)	AgOCN	3315-16-0	0	1	0		D011/D003
Silver Nitride							D001/D011
Silver Oxalate							D003/D011
Silver Tetrazene							D003

Prohibited Chemicals

Name	Formula	CAS #	NFPA Reactive	NFPA Health	NFPA Flammable	NFPA Special	Possible HW Codes
Sodamide	H2NNa	7782-92-5	2	2	3	W	D003
Sodium Amide	H2NNa	7782-92-5	2	2	3	W	D003
Sodium Arsenate	Na3AsO4*12H2O	7778-43-0	0	3	0		D004
Sodium Arsenite	NaAsO2	7784-46-5	0	3	0		D004
Sodium Chlorate	NaClO3	7775-09-9	2	1	0	OX	D001
Sodium Chlorite			1	1	0	OX	D001
Sodium Cyanide	NaCN	143-33-9	1	3	0		D003/P106
Sodium Dithionite	Na2S2O4	7775-14-6	2	3	1	W	D003
Sodium Hydrosulfite	Na2S2O4*2H2O	7775-14-6	2	2	1		D003
Sodium Methylate	CH3ONa	124-41-4	2	3	3	W	D003
Sodium Perborate	UNDEFINED	7632-04-4	0	3	0		D001
Sodium Perchlorate			2	2	0	W,O	D001
Sodium Permanganate	NaMnO4	10101-50-	2	2	1	OX	D001
Sodium Peroxide	Na2O2	1313-60-6	2	3	0	W,O	D001/D003
Strontium Perchlorate		13450-97-					D001
Styrene Monomer	C8H8	100-42-5	2	2	3		D001
Sulfur Trioxide	SO3	7446-11-9	2	3	0	W	D003
Sulfuryl Chloride (Sulfonyl)	Cl2O2S	7791-25-5	2	3	0	W	D002/D003
Sulfuryl Chloride Fluoride	ClFO2S	13637-84-	2	3	1	W	D003
T-Butyl Hypochlorite							D003
Tetrafluoroethylene			3	2	4		D003
Tetrahydrofuran	C4H8O	109-99-9	1	2	3		D003/D011
Tetrahydronaphthalene	C10H12	119-64-2	0	1	2		Toxic, non-hazardous

Prohibited Chemicals

Name	Formula	CAS #	NFPA Reactive	NFPA Health	NFPA Flammable	NFPA Special	Possible HW Codes
Tetranitromethane		509-14-8					D003
Tetraselenium							D010
Tetranitride							D003
Tetrazene							D003
Tetryl		479-45-8	4	2	2		D003
Thallium Nitride							D001
Thermit	Fe2O3 + Al	69012-31-	0	0	0		D003
Thermite Igniting Mixture	Al	Unknown	1	0	1		
Thiocarbonyl							D001/D003
Tetrachloride	CCl4S	594-42-3	2	3	0		D019/U211
Thionyl Chloride	SOCl2	7719-09-7	2	4	0	W	D002
Titanium (Powder)	Ti	7440-32-6	2	1	1		D001
Titanium Tetrachloride			2	3	0		D001/D003
Triethyl Aluminum		97-93-8					D003
Triethyl Arsine							D001/D004
Triisobutyl Aluminum		100-99-2					D003
Trimethyl Aluminum		75-24-1					D003
Trinitroanisole							D003
Trinitrobenzene			4	2	4		D001/D003
Trinitrobenzoic Acid							D001/D003
Trinitronaphthalene							D003
Trinitroresorcinol							D003
Trinitrotoluene	C7H5N3O6	118-96-7	4	2	4		D003
Trisilyl Arsine							D004

Prohibited Chemicals

Name	Formula	CAS #	NFPA Reactive	NFPA Health	NFPA Flammable	NFPA Special	Possible HW Codes
Uranium Compounds							
Uranyl Acetate	UO2(C2H3O2)2	541-09-3	0	0	0		
Uranyl Nitrate	UO2(NO3)2.6H2O	10102-06-	0	1	0		D001
Urea Nitrate							D001
Vinyl Acetate	C4H6O2	108-05-4	2	2	3		D001
Vinyl Acetylene			3	2	4		D001
Vinyl Chloride	C2H3Cl	75-01-4	2	2	4		D001/D003
Vinyl Ethers			2	2	4		D003
Vinylidene Chloride (1,1-DCE)	C2H2Cl2	75-35-4	2	2	4		D003
Zinc Peroxide							D001/D003

Restricted Chemicals

Name	Formula	CAS #	NFPA Reactive	NFPA Health	NFPA Flammable	NFPA Special	Possible HW Code
2-Butanone (MEK)	CH3COC2H5	78-93-3A	0	1	3		D001/D035/U159
Acetamide	CH3CONH2	60-35-5	1	3	1		D003
Acetanilide	CH3CONHC6H5	103-84-4	0	3	1		Toxic, non-hazardous
Acetic Acid	CH3COOH	64-19-7A	1	2	2		D002
Acetic Anhydride	(CH3CO)2O	108-24-7	1	3	2	W	D003
Acetone	CH3COCH3	67-64-1	0	1	3		D001/U002
Acetyl Halides							D003
Acetylcholine Bromide	CH3CO2C2H4N(C	66-23-9	0	2	0		D003
Acridine Orange	UNDEFINED	10127-02-	0	2	0		Non-hazardous
Adipoyl Chloride	ClOC(CH2)4COCl	111-50-2	0	2	2		D003
Alizarin Red	UNDEFINED	130-22-3	0	2	1		Non-hazardous
Alkyl Aluminum Chloride							D001
Aluminum	Al	7429-90-5	1	0	1		D001
Aluminum Acetate	Al(C2H3O2)2OH	142-03-0	1	1	0		Non-hazardous
Aluminum Bromide	AlBr3	7727-15-3	1	3	1		D003
Aluminum Chloride, Hydrate	ALCL3*6H2O	7784-13-6	0	3	0		D003
Aluminum Fluoride	AlF3	7784-18-1	0	2	0		D003

Restricted Chemicals

Name	Formula	CAS #	NFPA Reactive	NFPA Health	NFPA Flammable	NFPA Special	Possible HW Code
Aluminum Hydroxide	Al(OH)3*3H2O	21645-51-	1	1	0		Non-hazardous
Aluminum Nitrate	Al(NO3)3*9H2O	7784-27-2	0	1	0	OX	D001
Aluminum Tetrahydroborate							D001
Ammonia, Anhydrous (use restrictions)	NH3	7664-41-7	0	3	1		D003
Ammonia, Liquid	NH3	1336-21-6	0	3	1		Non-hazardous
Ammonium Acetate	NH4C2H3O2	631-61-8	1	1	1		Non-hazardous
Ammonium Bicarbonate	NH4HCO3	1066-33-7	1	1	0		D001
Ammonium Bichromate	(NH4)2Cr2O7	7789-09-5	1	1	1	OX	D001/D007
Ammonium Bromide	NH4Br	12124-97-	0	2	0		D003
Ammonium Carbonate	NH4CO3	10361-29-	2	2	0		Non-hazardous
Ammonium Chloride	NH4Cl	12125-02-	0	2	0		Non-hazardous
Ammonium Chromate	(NH4)2CrO4	7788-98-9	1	1	1	OX	D003/D007
Ammonium Fluoride	NH4F	12125-01-	0	3	0		Non-hazardous
Ammonium Hydroxide	NH4OH	1336-21-6	0	3	1		D002
Ammonium Iodide	NH4I	12027-06-	1	2	0		Non-hazardous
Ammonium Molybdate	(NH4)6Mo7O24*4H	12054-85-	1	2	0		Non-hazardous
Ammonium Nitrate (500 g limit)	NH4NO3	6484-52-2	3	0	0	OX	D001
Ammonium Oxalate	(NH4)2C2O4*H2O	6009-70-7	1	3	0		Non-hazardous

Restricted Chemicals

Name	Formula	CAS #	NFPA Reactive	NFPA Health	NFPA Flammable	NFPA Special	Possible HW Code
Ammonium Phosphate							Non-hazardous
Dibasic	(NH4)2H2PO4	7783-28-0	1	2	0		Non-hazardous
Ammonium Phosphate							Non-hazardous
Monobasic	NH4H2PO4	7722-76-1	0	2	0		Non-hazardous
Ammonium Sulfate	(NH4)2SO4	7783-20-2	0	3	0		Non-hazardous
Ammonium Sulfide	(NH4)2S*H2O	12135-76-	0	3	3		D003
Ammonium Tartrate	(NH4)2C4H4O6	3164-29-2	0	2	0		Non-hazardous
Ammonium Thiocyanate	NH4SCN	1762-95-4	1	2	1		D003
Amyl Acetate	CH3COOC5H11	628-63-7	0	1	3		D001
Amyl Alcohol (N)	CH3(CH2)3CH2OH	71-41-0A	0	1	3		D001
Aniline	C6H5NH2	62-53-3	0	3	2		Non-hazardous
Aniline Hydrochloride	C6H5NH2*HCL	142-04-1	3	1			D003
Anisoyl Chloride	C8H7ClO2	100-07-2	0	3	2		D003
Barium Acetate	Ba(C2H3O2)H20	543-80-6	0	2	0		D005
Barium Carbide							D005/D001
Barium Chloride,							D005
Hydrate	BaCl2*2H2O	10326-27-	0	3	0		D005
Barium Nitrate	Ba(NO3)2	10022-31-	0	1	0	OX	D001/D005
Benzaldehyde	C6H5CHO	100-52-7	0	2	2		Non-hazardous

Restricted Chemicals

Name	Formula	CAS #	NFPA Reactive	NFPA Health	NFPA Flammable	NFPA Special	Possible HW Code
Benzene Phosphorus Dichloride							D003
Benzoic Acid	C6H5COOH	65-85-0	2	1			Non-hazardous
Benzyl Chloride	C6H5CH2Cl	100-44-7	1	3	2		D003
Benzyl Sodium							D001
Benzylamine	C6H5CH2NH2	100-46-9	0	3	2		D002
Beryllium Tetrahydroborate							Non-hazardous
Biphenyl (Diphenyl)	C6H5C6H5	92-52-4	0	2	1		Non-hazardous
Bismuth Pentafluoride	BiF5	7787-62-4	0	1	0		D003
Boric Acid (SOLID)	H3BO3	10043-35-	0	2	0		Non-hazardous
Boron Bromodiiodide							D003
Boron Dibromoiodide							D003
Boron Phosphide							D001
Boron Trichloride							D001
Bromine Monofluoride							D003
Bromine Water	Br2 + H2O	7726-95-6				OX	D001
Bromobenzene	C6H5Br	108-86-1	0	2	2		D001
Bromodiethylaluminum							D001
Bromoform	CHBr3	75-25-2	0	3	0		Non-hazardous

Restricted Chemicals

Name	Formula	CAS #	NFPA Reactive	NFPA Health	NFPA Flammable	NFPA Special	Possible HW Code
Butanol (N-Butyl Alcohol)	CH3(CH2)3OH	71-36-3	0	1	3		D001
Butyric Acid	CH3CH2CH2COH	107-92-6	0	3	2		D001
Calcium (100 g limit)	Ca	7440-70-2	2	3	1	W	D001
Calcium Bromide	CaBr2	7789-41-5	1	1	0		Non-hazardous
Calcium Hypochlorite	Ca(OCl)2	7778-54-3	1	3	0	OX	D001
Calcium Nitrate Tetrahydrate	Ca(NO3)2*4H2O	13477-34-	1	2	0	OX	D001
Calcium Phosphide							D003
Camphor (+/-)	C10H16O	21368-68-	0	0	2		Non-hazardous
Carbon Disulfide (BI)	CS2	75-15-0	0	2	3		D001/P022
Ceric (IV) Sulfate	Ce(SO4)2*4H2O	13590-82-	0	3	0	OX	D001
Cesium Amide							D001/D003
Cesium Phosphide							D003
Chlorine Monofluoride							D003
Chlorine Pentafluoride							
Chloroacetic Acid	C2H3ClO2	79-11-8B	0	3	1		D003
Chloroacetyl Chloride	C2H2Cl2O/ClCH2C	79-04-9	1	3	0		D003
Chlorobenzene	C6H5Cl	108-90-7	0	2	3		D001/D021/U037

Restricted Chemicals

Name	Formula	CAS #	NFPA Reactive	NFPA Health	NFPA Flammable	NFPA Special	Possible HW Code
Chlorodiisobutyl Aluminum							D001
Chlorophenyl Isocyanate	C7H4ClNO	3320-83-0					D003
Chromic Acid	CrO3	1333-82-0	1	3	0	OX	D002/D007
Chromium (IC) Nitrate	Cr(NO3)3*9H2O	7789-02-8	1	3	0	OX	D001/D007
Chromium Sulfate	Cr2(SO4)3*nH2O	10101-53-	0	2	0		D007
Chromium Trioxide	CrO3	1333-82-0	1	3	0		D001/D007
Cobalt (ous) Nitrate	Co(NO3)2*6H2O	10026-22-	0	2	0	OX	D001
Cupric Bromide, Anhydrous	CuBr2	7789-45-9	0	2	0		Non-hazardous
Cyclohexane	CH2(CH2)4CH2	110-82-7	0	1	3		D001/U056
Dichlorobenzene	C6H4Cl2	106-46-7B	0	2	2		U070-U072
Dichloroethane	C2H4Cl2	107-06-2B	0	2	3		D029/U077
Dichloromethane	CH2Cl2	75-09-2A	0	2	1		U080
Diethyl Aluminum Chloride	C4H10AlCl	96-10-6					D001
Diethyl Zinc	C4H10Zn	557-20-0					D001
Diisopropyl Beryllium							D003
Dimethyl Magnesium							D003

Restricted Chemicals

Name	Formula	CAS #	NFPA Reactive	NFPA Health	NFPA Flammable	NFPA Special	Possible HW Code
Diphenyl Diisocyanate							D003
Diphenylamine	(C6H5)2NH	122-39-4	0	3	1		Non-hazardous
Ethanol	C2H5OH	64-17-5B	0	0	3		D001
Ethyl Acetate	CH3COOC2H5	141-78-6	0	1	3		D001
Ethyl Alcohol	C2H5OH	64-17-5A	0	0	3		D001
Ethyl Methacrylate	CH2CCH3COOC2	97-63-2	0	2	3		U118
Ethylene Dichloride	C2H4Cl2	107-06-2A	0	2	3		D001/U077
Ethylenediamine	NH2CH2CH2NH2	107-15-3	0	3	2		D003
Faa Solution	UNDEFINED	NA14	0	2	3		
Fehlings Solution A	UNDEFINED	7758-99-8	1	3	0		D002
Fehlings Solution B	UNDEFINED	NA15	1	3	0		D002
Ferric Chloride, Anhydrous	FeCl3	7705-08-0	1	3	0		Non-hazardous
Ferric Nitrate	Fe(NO3)3*9H2O	7782-61-8	1	1	0	OX	D001
Fluorine Monoxide							D001
Fluorosulfonic Acid							D002
Formalin	CH2O	50-00-0B	0	2	2		U122

Restricted Chemicals

Name	Formula	CAS #	NFPA Reactive	NFPA Health	NFPA Flammable	NFPA Special	Possible HW Code
Formic Acid	HCOOH	64-18-6	0	3	2		D001/D002
Gasoline	UNDEFINED	8006-61-9	0	1	3		D001/D018
Glutaraldehyde	OCH(CH3)3CHO	111-30-8	1	3	0		Toxic, non-hazardous
Gold Acetylide							D003
Hematoxylin	C16H14O6*3H2O	517-28-2	1	1	0		Toxic, non-hazardous
Heptane, N-	CH3(CH2)5CH3	142-82-5	0	1	3		D001
Hexamethylene Diisocyanate	C8H12N2O2	822-06-0	0	1	2	W	D003
Hexamethylenediamine	H2N(CH2)6NH2	124-09-4	0	3	2		Toxic, non-hazardous
Hexane, N-	CH3(CH2)4CH3	110-54-3	0	1	3		D001
Hydriodic Acid	HI	10034-85-	0	3	0		D002
Hydrobromic Acid	HBr	10035-10-	0	3	0		D002/D003
Hydrochloric Acid	HCl	7647-01-0	0	3	0		D002
Hydrogen Peroxide (30% or less)	H2O2		1	3	0	OX	D001
Hydroquinone	C6H4(OH)2	123-31-9	0	2	1		Toxic, non-hazardous
Hydroxylamine							D003
Hydrochloride	NH2OH*HCl	5470-11-1	1	3	1		

Restricted Chemicals

Name	Formula	CAS #	NFPA Reactive	NFPA Health	NFPA Flammable	NFPA Special	Possible HW Code
Iodine	I2	7553-56-2	1	3	0	OX	D001
Iodine Monochloride	ICl	7790-99-0	1	3	0		D003
Iron	Fe	7439-89-6	1	3	1		Dusts are D001
Isoamyl Alcohol	(CH3)2CHCH2CH2	123-51-3A	0	1	2		D001
Isobutyl Alcohol	(CH3)2CHCH2OH	78-83-1	0	1	3		D001
Isopentyl Alcohol	(CH3)2CHCH2CH2	123-51-36	0	1	3		D001
Isopropyl Alcohol	(CH3)2CHOH	67-63-0	0	1	3		D001
Kerosene	UNDEFINED	8008-20-6	0	0	2		D001
Lead Nitrate	Pb(NO3)2	10099-74-	0	1	0	OX	D001/D008
Lead Oxide, Red	Pb3O4	1314-41-6	1	3	1	OX	D001/D008
Lead Peroxide (DI)	PbO2	1309-60-0	1	3	0	OX	D008
Lithium Amide							D003
Lithium Bromide	LiBr	7550-35-8	0	2	0		Toxic, non-hazardous
Lithium Ferrosilicon							D001
Lithium Silicon							D001/D003
Lithium Sulfate	Li2SO4*H2O	10102-25-	0	2	0		Toxic, non-hazardous
Lye	NaOH	1310-73-2	1	3	0		D002 (if liquid)
Magnesium (ribbon)	Mg	7439-95-4	2	0	1	W	D001

Restricted Chemicals

Name	Formula	CAS #	NFPA Reactive	NFPA Health	NFPA Flammable	NFPA Special	Possible HW Code
Magnesium Nitrate	Mg(NO3)2*6H2O	13446-18-	0	1	0	OX	D001
Manganese Carbonate	MnCO3	598-62-9	1	0	0		Non-hazardous
Manganese Dioxide	MnO2	1313-13-9	1	2	0	OX	D003
Manganese Nitrate (ous)	Mn(NO3)2*6H2O	10377-66-	0	3	0	OX	D001
Manganese Oxide	MnO2	1313-13-9	0	1	0	OX	D001
Methyl Alcohol	CH3OH	67-56-1	0	1	3		D001/U154
Methyl Aluminum Sesquibromide		C3H9Al2Br3					D001
Methyl Aluminum Sesquichloride	C3H9Al2Cl3	12542-85-					D001
Methyl Ethyl Ketone (MEK)	CH3COC2H5	78-93-3B	0	1	3		D001/U159
Methyl Magnesium Bromide	CH3BrMg	75-16-1					D001
Methyl Magnesium Chloride	CH3ClMg	676-58-4					D001
Methyl Magnesium Iodide	CH3IMg						D001
Methylene Chloride	CH2CL2	75-09-2B	0	2	1		U080
Naphthalene	C10H8	91-20-3	0	2	2		D001
Napthol-1 (A)	C10H7OH	90-15-3	1	3	1		D001
N-Butyl Alcohol	C6H10O	71-36-3B	0	1	3		D001

Restricted Chemicals

Name	Formula	CAS #	NFPA Reactive	NFPA Health	NFPA Flammable	NFPA Special	Possible HW Code
N-Butyl Lithium							D001
Nickel Antimonide							D003
Nickel(II) Nitrate	Ni(NO3)2*6H2O	13478-00-	1	2	0		D001
Nickel(II) Sulfate	NiSO4*6H2O	10101-97-	0	2	0		Non-hazardous
Nitric Acid	HNO3	7697-37-2	0	3	0	OX	D002
Nitrobenzene	C6H5NO2	98-95-3	1	3	2		Toxic, non-hazardous
Nitrogen	N2	7727-37-9	0	3	0		
Octyl Alcohol	CH3(CH2)6CH2OH	111-87-5	0	1	2		Non-hazardous
O-Dichlorobenzene	C6H4Cl2	95-50-1	0	2	2		U070
Oxalic Acid, Hydrate	H2C2O4*2H2O	6153-56-6	0	2	1		D002
Oxygen	O2	7782-44-7	0	3	0	OX	
P-Dichlorobenzene	C6H4Cl2	106-46-7	0	2	2		U071
Pentyl Alcohol (Amyl)	CH3(CH2)4OH	71-41-0B	0	1	3		D001
Petroleum Ether (500 ml limit)	UNDEFINED	8032-32-4	0	1	4		D001/D003
Phosphoric Acid	H3PO4	7664-38-2	0	3	0		D002
Phthalic Acid	C6H4(COOH)2	88-99-3	1	0	1		(non HW as a solid)

Restricted Chemicals

Name	Formula	CAS #	NFPA Reactive	NFPA Health	NFPA Flammable	NFPA Special	Possible HW Code
Polyphenyl Polymethyl Isouanta							
Polyvinyl Alcohol	CH2CH(OH)	9002-89-5	0	0	2		Non-hazardous
Potassium Bromate	KBrO3	7758-01-2	0	2	0	OX	D001
Potassium Chromate	K2CrO4	7789-00-6	1	3	0	OX	D001/D007
Potassium Dichromate	K2Cr2O7	7778-50-9	1	3	1	OX	D007
Potassium Ferricyanide	K3Fe(CN)6	13746-66-	1	1	0		D003
Potassium Ferrocyanide	K4Fe(CN)6*3H2O	14459-95-	1	1	0		D003
Potassium Hydroxide	KOH	1310-58-3	1	3	0		D002
Potassium Iodate	KIO3	7758-05-6	1	1	0	OX	
Potassium Nitrate	KNO3	7757-79-1	0	1	0	OX	D001
Potassium Permanganate	KMnO4	7722-64-7	0	1	0	OX	D001
Potassium Persulfate	K2S2O8	7727-21-1	0	1	0	OX	D001
Potassium Sulfide	K2S	1312-73-8	0	3	1		D001
Propane (use restrictions)	CH3CH2CH3	74-98-6	0	1	4		D001
Propionic Acid	C3H6O2	79-09-4	0	2	2		D001
Propyl Alcohol	C3H8O	71-23-8	0	1	3		D001
Pyridine	C5H5N	110-86-1	0	3	3		D001/D038/U196

Restricted Chemicals

Name	Formula	CAS #	NFPA Reactive	NFPA Health	NFPA Flammable	NFPA Special	Possible HW Code
Pyrosulfuryl Chloride							D003
Silver Nitrate	AgNO3	7761-88-8	0	1	0	OX	D001/D011
Silver Sulfate	Ag2SO4	10294-26-	0	2	0		D011
Sodium Bisulfite	NaHSO3	7631-90-5	1	1	0		
Sodium Chromate	Na2CrO4	7775-11-3	1	3	0	OX	D007
Sodium Cobaltinitrite	Na3Co(NO2)6	13600-98-	0	2	0	OX	D001
Sodium Dichromate, Hydrate	Na2Cr2O7*2H2O	7789-12-0	1	1	0		D007
Sodium Fluoride	NaF	7681-49-4	0	3	0		Toxic, non-hazardous
Sodium Hydroxide	NaOH	1310-73-2	1	3	0		D002
Sodium Hypochlorite	NaClO	7681-52-9	1	2	0		D001
Sodium Iodate	NaIO3	7681-55-2	1	1	0	OX	D001
Sodium Iodide	NaI	7681-82-5	1	2	0	OX	D001
Sodium Meta-Bisulfite	Na2S2O5	7681-57-4	1	3	0		Non-hazardous
Sodium Nitrate	NaNO3	7631-99-4	1	1	0	OX	D001
Sodium Nitrite	NaNO2	7632-00-0	1	2	0	OX	D001
Sodium Phosphate, Tribasic	Na3PO4*12H2O	7601-54-9	1	2	0		Non-hazardous
Sodium Potassium Alloy							D001

Restricted Chemicals

Name	Formula	CAS #	NFPA Reactive	NFPA Health	NFPA Flammable	NFPA Special	Possible HW Code
Sodium Sulfide	Na2S*9H2O	1313-84-4	1	3	1		D003
Sodium Thiocyanate	NaSCN	540-72-7	1	3	0		Toxic, non-hazardous
Sodium Thiosulfate	Na2S2O3*5H2O	10102-17-	1	0	0		Non-hazardous
Stannic Chloride	SnCl4	7646-78-8	1	3	0		D003
Strontium Nitrate	Sr(NO3)2	10042-76-	0	1	0	OX	D001
Sulfur Chloride	Cl2S2	10025-67-	1	2	1		D003
Sulfur Pentafluoride							D003
Sulfuric Acid (<10%)	H2SO4	7664-93-9	0	3	0		D002
Sulfuric Acid (>10%) (2.5 l limit)	H2SO4	7664-93-9	2	3	0	W	D002
T-Butanol	(CH3)3COH	75-65-0	0	1	3		D001
Terpineol	C10H17OH	98-55-5	0	0	2		D001
Thiophosphoryl Chloride	Cl3SP	3982-91-0	0	3	0		D003
Tin	Sn	7440-31-5	1	1	1		D001
Toluene	C7H8	108-88-3	0	2	3		D001/U220
Toluene Diisocyanate	C9H6N2O2	584-84-9	1	3	1		D003
Toluidine Blue	CH3C6H4NH2	95-53-4	0	3	2		Non-hazardous

Restricted Chemicals

Name	Formula	CAS #	NFPA Reactive	NFPA Health	NFPA Flammable	NFPA Special	Possible HW Code
Trichloroethane-1,1,1	C2H3Cl3	71-55-6	1	3	1		U226
Trichloroethylene	C2HCl3	79-01-6	0	2	1		D040/U228
Triethanolamine	C6H15NO3	102-71-6	1	2	1		Non-hazardous
Triethyl Stibine							D001/D003
Trimethylpentane 2,2,4	C8H18	540-84-1	0	0	3		D001
Tri-N-Butyl Aluminum							D003
Trioctyl Aluminum							D003
Triphenyl Tetrazolium Chloride	C19H15N4Cl	298-96-4	1	2	1		D003
Tripropyl Stibine							D001/D003
Trisodium Phosphate	Na3H3PO4	7601-54-9	1	2	0		Non-hazardous
Trivinyl Stibine							D003
Tungsten	W	7440-33-7	1	1	2		Powders are D001
Turpentine	C10H16	8006-64-2	0	1	3		D001
Vanadium Trichloride	VCl3	7718-98-1					D003
Xylene	C8H10	1330-20-7	0	2	3		D001/U239
Zinc (Powder)	Zn	7440-66-6	1	1	1	W	D001
Zinc Acetylide							D001

Restricted Chemicals

Name	Formula	CAS #	NFPA Reactive	NFPA Health	NFPA Flammable	NFPA Special	Possible HW Code
Zinc Nitrate (500 g limit)	Zn(NO3)2*6H2O	10196-18-	2	1	1	OX	D001
Zinc Phosphide	Zn3P2	1314-84-7	1	3	3		D001/D003

Restricted Chemicals (Demonstration Use Only)

Name	Formula	CAS #	NFPA Reactive	NFPA Health	NFPA Flammable	NFPA Special	
Aluminum Chloride, Anhydrous (25 g limit)	AlCl3	7446-70-0	2	3	0	W	D003
Ammonium Dichromate (100 g limit)	(NH4)2Cr2O7	7789-09-5	3	4	1	OX	D007
Ammonium Persulfate (100 g limit)	(NH4)2S2O8	7727-54-0	3	2	0	OX	D001
Antimony Metal (50 g limit)	Sb	7440-36-0					Powders are D001
Bromine (3 - 1 g ampules limit)	Br2	7726-95-6	0	4	0	OX	D003
Calcium Carbide (100 g limit)	CaC2	75-20-7	2	1	3	W	D003
Chromium Oxide (20 g limit)	Cr2O3	1308-38-9	3	4	0	OX	D007
*Collodion (100 ml limit)	C25H33O13(NO3)7	9004-70-0	0	1			D003
*Cyclohexanone (100 ml limit)	C6H10O	108-94-1	0	1	2		D001
*Cyclohexene (100 ml limit)	C6H10	110-83-8	0	1	3		D001
*Cyclopentanone (100 ml limit)	C5H8O	120-92-3	0	2	3		D001
*Diethyl Ether (500 ml limit)	(C2H5)2O	60-29-7B	1	2	4		D001/D003
*Diglyme (500 ml limit)	(CH3O)CH2	111-96-6	1	1	2		Non-hazardous
Dinitrophenylhydrazine (100 g limit)	C6H6N4O4	119-26-6	2	1	2		D003

Restricted Chemicals (Demonstration Use Only)

Name	Formula	CAS #	NFPA Reactive	NFPA Health	NFPA Flammable	NFPA Special	
Hydrides, Borohydrides (100 g limit)							
Hydrogen (limited to 2 cu ft lecture bottle)	H2	1333-74-0	0	0	4		
Lithium (20 g limit)	Li	7439-93-2	2	1	1	W	D001
Magnesium (turnings) (100 g limit)	Mg	7439-95-4	2	0	1	W	D001
* Methyl Isobutyl Ketone (MIBK) (250 ml limit)	CH3COCH2CH(CH)	108-10-1	1	2	3		D001/U161
Pentane (100 ml limit)	C5H12	109-66-0	0	1	4		D001
Phosphorus, Red (Amorphous) (50 g limit)	P	7723-14-0	1	1	1	W	D001/D003
Potassium (1- bottle w/5 demonstration-size pieces)	K	7440-09-7	2	3	1	W	D001
Potassium Chlorate (100 g limit)	KClO3	3811-04-9	0	2	0	OX	D001
Silver Oxide (100 g limit)	Ag2O	20667-12-	2	1	1	OX	D001/D011
Sodium (100 g limit)	Na	7440-23-5	2	3	3	W	D001
Wright's Stain (HG Containing) (100 ml limit)	Undefined	68988-92-	0	0	3		D009

*** Indicates those compounds that have peroxide forming potential that must be addressed in the written chemical management plan.**

Attachment C
Hazardous Waste Determination by School Laboratories

Hazardous waste identification begins with a straightforward point: in order for any material to be a hazardous waste, it must first be a waste. A waste is essentially a thing that someone throws away, an item with no value. A waste can also be abandoned by being burned or incinerated, stored in lieu of disposal, or recycled. That's right, even materials that are going to be recycled may first have to be managed as waste!

Hazardous wastes can pose a danger to human health and the environment. They can be a solid, semi-solid, a liquid, or a contained gas. The criteria for hazardous waste identification are laid out in the Colorado Hazardous Waste Regulations 6 CCR 1007-3 Part 261, and are covered briefly here. Please visit the Hazardous Materials and Waste Management Division's website for additional guidance documents on making this determination at http://www.colorado.gov/cs/Satellite/CDPHE-HM/CBON/1251615961696. "*Hazardous Waste Identification Guidance Document*," found under *Guidance - All Hazardous Waste Generators*, is particularly helpful.

A waste can be a hazardous waste if it exhibits certain characteristics or if it is listed in the regulations. These wastes are called "characteristic" and "listed," and a waste may meet the criteria for one or multiple characteristic descriptions or listings.

Characteristic hazardous wastes are based on properties of the waste such as levels of hazardous constituents, or physical properties such as ignitibility. Generators may use process knowledge or analytical tests to determine the presence of the characteristic. Some hazardous characteristics are defined by a narrative description and do not have a specific test such as those for reactive wastes. Characteristic hazardous wastes carry "D" hazardous wastes codes.

Listed hazardous wastes are listed in Part 261, and include some commonly generated wastes and solvents, wastes from very specific processes and industries, and formulations of specific unused chemicals. Listed hazardous wastes carry "F, K, P" and "U" hazardous wastes codes.

Hazardous Waste Can be One of Two Types

1. **Listed wastes:** Your waste is considered hazardous if it appears on one of four lists in the Colorado Hazardous Waste Regulations. Listed wastes are hazardous regardless of their concentration.

    - **F listed hazardous wastes** are wastes from *non-specific* sources such as spent solvents or wastewater treatment sludges from electroplating.
        - Common F-listed wastes used in degreasing or used as solvents contain methylene chloride, methyl ethyl ketone, xylene, acetone, or toluene.

- **K listed hazardous wastes** are wastes from a *specific* source. For example, wastewater treatment sludge from the production of chrome yellow and orange pigments is listed as K002.

- **P and U listed wastes** are off-specification or discarded commercial chemical products or any residue remaining in a container that held commercial chemical products in the P or U listing or, any residue or contaminated media resulting from the cleanup of a spill of a commercial chemical product in the P or U listing.

2. **Characteristic wastes:** Even if a waste does not appear on the list it is considered hazardous if it falls under one of the following hazardous waste categories:

   - **D001 - ignitable**
     - It is a liquid with a flash point less than 140°F,
     - It is not a liquid but is capable of causing a fire that burns so vigorously that it creates a hazard,
     - Is an oxidizer, or
     - It is an ignitable compressed gas.

   - **D002 - corrosive**
     - It is a liquid that can dissolves steel at a specified rate, or
     - It is a liquid and has a pH less than or equal to 2 or greater or equal to 12.5.

   - **D003 - reactive**
     - It is unstable,
     - It is explosive,
     - It undergoes violent change without detonation,
     - It produces toxic gases when mixed with water or other materials, or
     - It is a cyanide or sulfide bearing waste which, when exposed to pH conditions between 2 and 12.5, can generate toxic gases, vapors or fumes.
     - The Division holds that waste meets this definition if:
       - It contains a releasable sulfide concentration of 500 mg H_2S/kg, or
       - It contains a releasable cyanide concentration of 250 mg HCN/kg.

   - **D004 through D043 - toxic**
     - It is a metal, pesticide or organic chemical at high enough concentrations that it fails the Toxicity Characteristic Leaching Procedure (TCLP) test method 1311.
     - Common metals that are hazardous at certain levels are lead, arsenic, barium, chromium, cadmium, silver, and mercury.

Other Considerations – Exclusions and the Mixture Rule

Beyond hazardous waste determination, several other determination rules are laid out in Part 261.

A number of exclusions are included in the hazardous wastes regulations. Many of them are very specific, for specific processes, and most do not apply to a school laboratory.

Most spent materials that will be recycled are considered regulated waste before the recycling process. Only materials that will be used as a direct feed in a process, or as a substitute for a commercial chemical product, are exempt from hazardous waste regulation.

The mixture rule for listed hazardous wastes basically states that a mixture made up of any amount of a nonhazardous waste and any amount of a listed hazardous waste is a listed hazardous waste. In other words, if a small vial of listed hazardous waste is mixed with a large quantity of nonhazardous waste, the resulting mixture bears the same waste code and regulatory status as the listed waste in the vial. This principle applies regardless of the actual threat posed by the waste mixture or the mixture's chemical composition.

In contrast, a mixture involving solely characteristic hazardous wastes is hazardous only if the mixture itself exhibits a RCRA hazardous characteristic. Mixing wastes to remove a characteristic is treatment, and is often regulated and may require a permit.

Universal Waste

Colorado has adopted streamlined hazardous waste management regulations that govern the collection and management of certain widely generated wastes known as "universal wastes." The Universal Waste Regulations, found in Part 273, reduce the management requirements for these wastes, while still ensuring the management of universal waste is conducted in a manner that is protective of human health and the environment.

Even though universal wastes (such as waste electronic devices, waste batteries, and spent light bulbs) are still considered a hazardous waste, universal wastes and used oil are not counted towards your monthly hazardous waste generation volume.

Resources

- Part 261 of the Colorado Hazardous Waste Regulations 6 CCR 1007-3 describes the listing http://www.colorado.gov/cs/Satellite/CDPHE-HM/CBON/1251615960502

- The Division has a number of guidance documents to assist you in making this determination, including the document titled "Hazardous Waste Identification Guidance Document."
  http://www.colorado.gov/cs/Satellite/CDPHE-HM/CBON/1251615961696

- Apply knowledge of your process and use Material Safety Data Sheets (MSDS) for information regarding the products you use at your facility.

  Be aware that the Material Safety Data Sheets may not provide all the information that you need to make a hazardous waste determination. In most instances OSHA only requires that the MSDS list ingredients that are health hazards if they are 1% or more of the material's composition (1% = 10,000 parts per million). Therefore, some ingredients in a product that may be a hazardous waste when disposed may not be listed on the Material Safety Data Sheet if they are included in the product at amounts less than 1%. Since it is your responsibility to ensure all your hazardous wastes are managed and disposed of properly, it is wise to send samples to an environmental analytical lab that is familiar with the methods of analysis for hazardous waste, so you can make an accurate hazardous waste determination.

- Talk to your school district.

- Call the Hazardous Materials and Waste Management Division, Customer Technical Assistance Line at 303-692-3320.

Attachment D
Laboratory Safety for Students

Life threatening injuries can happen in the laboratory. For that reason, students need to be informed of the correct way to act in the laboratory environment. The following is a safety checklist adapted from the **School Chemistry Laboratory Safety Guide** published by the U.S. Consumer Product Safety Commission and the National Institute for Occupational Safety and Health. This list can be used to acquaint students with the safety do's and don'ts in the laboratory.

Conduct

- Do not engage in practical jokes or boisterous conduct in the laboratory.
- Never run in the laboratory.
- The use of personal audio or video equipment is prohibited in the laboratory.
- The performance of unauthorized experiments is strictly forbidden.
- Do not sit on laboratory benches.

General Work Procedures

- Know emergency procedures.
- Never work in the laboratory without the supervision of a teacher.
- Always perform the experiments or work precisely as directed by the teacher.
- Immediately report any spills, accidents, or injuries to a teacher.
- Never leave experiments while in progress.
- Never attempt to catch a falling object.
- Be careful when handling hot glassware and apparatus in the laboratory.
- Hot glassware looks just like cold glassware.
- Never point the open end of a test tube containing a substance at yourself or others.
- Never fill a pipette using mouth suction. Always use a pipetting device.
- Make sure no flammable solvents are in the surrounding area when lighting a flame.
- Do not leave lit Bunsen burners unattended.
- Turn off all heating apparatus, gas valves, and water faucets when not in use.
- Do not remove any equipment or chemicals from the laboratory.
- Coats, bags, and other personal items must be stored in designated areas, not on the bench tops or in the aisle ways.
- Notify your teacher of any sensitivities that you may have to particular chemicals if known.
- Keep the floor clear of all objects (e.g., ice, small objects and spilled liquids).

Housekeeping

- Keep work area neat and free of any unnecessary objects.
- Thoroughly clean your laboratory work space at the end of the laboratory session.
- Do not block the sink drains with debris.
- Never block access to exits or emergency equipment.
- Inspect all equipment for damage (cracks, defects, etc.) prior to use; do not use damaged equipment.

- Never pour chemical waste into the sink drains or wastebaskets.
- Place chemical waste in appropriately labeled waste containers.
- Properly dispose of broken glassware and other sharp objects (e.g., syringe needles) immediately in designated containers.
- Properly dispose of weigh boats, gloves, filter paper, and paper towels in the laboratory.

Appropriate Apparel and Protective Equipment

- Always wear appropriate eye protection (i.e., chemical splash goggles) in the laboratory.
- Wear disposable gloves, as provided in the laboratory, when handling hazardous materials. Remove the gloves before exiting the laboratory.
- Wear a full-length, long-sleeved laboratory coat or chemical-resistant apron.
- Wear shoes that adequately cover the whole foot; low-heeled shoes with non-slip soles are preferable. Do not wear sandals, open-toed shoes, open-backed shoes, or high-heeled shoes in the laboratory.
- Avoid wearing shirts exposing the torso, shorts, or short skirts; long pants that completely cover the legs are preferable.
- Secure long hair and loose clothing (especially loose long sleeves, neck ties, or scarves).
- Remove jewelry (especially dangling jewelry).
- Synthetic finger nails are not recommended in the laboratory; they are made of extremely flammable polymers that can burn to completion and are not easily extinguished.

Hygiene Practices

- Keep your hands away from your face, eyes, mouth, and body while using chemicals.
- Food and drink, open or closed, should never be brought into the laboratory or chemical storage area.
- Never use laboratory glassware for eating or drinking purposes.
- Do not apply cosmetics while in the laboratory or storage area.
- Wash hands after removing gloves, and before leaving the laboratory.
- Remove any protective equipment (i.e., gloves, lab coat or apron, chemical splash goggles) before leaving the laboratory.

Emergency Procedures

- Know the location of all the exits in the laboratory and building.
- Know the location of the emergency phone.
- Know the location of and know how to operate the following:
    - Fire extinguishers
    - Alarm systems with pull stations
    - Fire blankets
    - Eye washes
    - First-aid kits
    - Deluge safety showers
- In case of an emergency or accident, follow the established emergency plan as explained by the teacher and evacuate the building via the nearest exit.

Chemical Handling

- Check the label to verify it is the correct substance before using it.
- Wear appropriate chemical resistant gloves before handling chemicals.
- Gloves are not universally protective against all chemicals.
- If you transfer chemicals from their original containers, label chemical containers as to the contents, concentration, hazard, date, and your initials.
- Always use a spatula or scoop to remove a solid reagent from a container.
- Do not directly touch any chemical with your hands.
- Never use a metal spatula when working with peroxides. Metals will decompose explosively with peroxides.
- Hold containers away from the body when transferring a chemical or solution from one container to another.
- Use a hot water bath to heat flammable liquids. Never heat directly with a flame.
- Add concentrated acid to water slowly. Never add water to a concentrated acid.
- Weigh out or remove only the amount of chemical you will need. Do not return the excess to its original container, but properly dispose of it in the appropriate waste container.
- Never touch, taste, or smell any reagents.
- Never place the container directly under your nose and inhale the vapors.
- Never mix or use chemicals not called for in the laboratory exercise.
- Use the laboratory chemical fume hood when there is a possibility of release of toxic chemical vapors, dust, or gases. When using a hood, the sash opening should be kept at a minimum to protect the user and to ensure efficient operation of the hood. Keep your head and body outside of the hood face. Chemicals and equipment should be placed at least six inches within the hood to ensure proper air flow.
- Clean up all spills properly and promptly as instructed by the teacher.
- Dispose of chemicals as instructed by the teacher.
- When transporting chemicals (especially 250 mL or more), place the immediate container in a secondary container or bucket (rubber, metal or plastic) designed to be carried and large enough to hold the entire contents of the chemical.
- Never handle bottles that are wet or too heavy for you.
- Use equipment (glassware, Bunsen burner, etc.) in the correct way, as indicated by the teacher.