CHEMICAL HYGIENE PLAN
COPPER MOUNTAIN COLLEGE

COPPER MOUNTAIN COMMUNITY COLLEGE DISTRICT
6162 ROTARY WAY, P. O. BOX 1398
JOSHUA TREE, CALIFORNIA 92252
(760) 366-3791

PREPARED BY: BRUCE W. BRIDENBECKER
October 10, 2014
Revised: November 3, 2016

Copper Mountain College Chemical Hygiene Plan

	PAGE
TABLE OF CONTENTS	1
I Introduction	2
A. History of the OSHA Laboratory Standard	2
B. Role of the Chemical Hygiene Plan	3
II Facilities To Be Covered Under This Plan	3
III Responsibilities	3
A. President	3
B. Vice President for Academic and Student Success / CIO and CSSO	3
C. Chemical Hygiene Officer	4
D. Faculty & Staff	4
IV Standard Laboratory Procedures And Regulations	5
A. Basic Rules and Procedures	5
B. Control Measures and Equipment	6
C. Chemical Procurement, Distribution, and Storage	6
D. Housekeeping, Maintenance, and Inspections	7
E. Medical Program	8
F. Protective Apparel and Equipment	9
G. Records	9
H. Spills and Accidents	10
I. Waste Disposal Program	10
V Training	11
Appendices	12
Appendix A Copper Mountain College Incident Report Form	13
Appendix B Copper Mountain College Lab Procedures	14
Appendix C Labeling and the Globally Harmonized System (GHS)	41
Appendix D Links to Federal and State OSHA Guidelines	43
Signature Pages	

I. INTRODUCTION

The purpose of the written Chemical Hygiene Plan at Copper Mountain College is to set forth procedures, equipment, personal protective equipment, and work practices that are capable of (1) protecting employees from the health hazards associated with hazardous chemical use in the laboratory and (2) keeping exposures below safe threshold levels. The intent of the program is to minimize risks associated with hazardous chemical use by reduction, elimination (where feasible), and adherence to the standard permissible exposure limit (PEL) and threshold limit values (TLV) established for safe use.

Because knowledge concerning the hazards involved and the best means of reducing those hazards increases constantly, the College reserves the right to modify this document at any time as new information becomes available which would affect something contained within this plan. It shall be the policy of the College to review this document at least once per year by the Chemical Hygiene Officer.

I.A. History of the OSHA Laboratory Standard

On November 25, 1983, the Occupational Safety and Health Administration (OSHA) published the Hazard Communication Standard, which applied to certain manufacturers and in part to certain laboratories. HazComm requires that employers inform employees about the presence and use of hazardous substances in the workplace. HazComm applies to all employees in all workplaces. OSHA received many comments regarding whether the procedures of the Hazard Communication Standard should apply to laboratories where the staff is highly educated. OSHA decided that although "...31.9% of all laboratory workers have bachelors degrees, 20.6% have masters degrees, and 20.9% have doctorates...there is some question as to whether laboratory workers actually make themselves as knowledgeable as they should be and some laboratory employees are not professionally trained." (51 CFR 2664). Thus, while HazComm may seem inappropriate for employees with scientific training, OSHA was not convinced that these workers should not fall under some (other) set of guidelines.

Other unique differences for laboratories (compared to production facilities) were noted: the small amounts of chemicals used, the vast number of different chemicals involved, and nearly half of the laboratories in one survey could not accurately predict their chemical needs even one month in advance.

OSHA decided "...Despite the existence of the unique characteristics of laboratory work places, in actual practice incidents of acute adverse health effects resulting from exposure to toxic substances in laboratories do occur. Furthermore, some studies...have shown increased risks of certain types of diseases for laboratory workers. In addition, although laboratory workers are, in general, a well educated work force, there is evidence that many laboratories do not have health and safety programs...". Therefore, OSHA proposed the Occupational Exposures to Hazardous Chemicals in Laboratories rule from which this Chemical Hygiene plan originates.

On January 31, 1990, The Department of Labor has published in the Federal Register an amendment to 29 CFR 1910, Subpart Z, identified as Section 1910.1450 (URL:

https://www.osha.gov/pls/oshaweb/owares.do_search?p_doc_type=STANDARDS&p_search_type=StandTextPolicy&p_search_str=1910.1450). The title of that amendment is "Occupational exposures to hazardous chemicals in the laboratory", better known as the "Laboratory Standard". A part of that standard is the requirement for the development of a Chemical Hygiene Plan. The fact that Copper Mountain College is a teaching institution is irrelevant to the Lab Standard; the Lab Standard applies to (relatively small) companies that have labs that do not produce chemicals. OSHA has determined that educational institutions fit into this category. Cal/OSHA guidelines are identified in the California Code of Regulations, Title 8, Sections 5191 and 5194(URL: http://www.dir.ca.gov/title8/5191.html; http://www.dir.ca.gov/title8/5194.html). See Appendix D for links to both agencies.

I.B. Role of the Chemical Hygiene Plan

This Chemical Hygiene Plan describes the Copper Mountain College safety program, including, but not limited to, standard operating procedures (SOPs) for safe use of hazardous chemicals, criteria for selecting control measures including personal protective equipment, engineering controls, control-equipment inventory and operations (such as vented hoods), employee training programs, medical programs, and safety inspections.

This document is intended to comply with 29 CFR 1910.1450 as well as other applicable Federal and State regulations. Where references exist within this document to other documents, those documents will be considered fully applicable here as if those documents had been reproduced here. The Chemical Hygiene Plan is designed as a tool to coordinate safety procedures.

This Chemical Hygiene Plan shall be readily available to employees, their bargaining units, and upon request, to the Assistant Secretary of Labor for OSHA and CAL/OSHA.

II FACILITIES TO BE COVERED UNDER THIS PLAN

The laboratories of the College and all of the work in these laboratories currently meets, and is expected to continue to meet, the definition of "Laboratory" and "Laboratory Scale" given in 29 CFR 1910 subpart Z. This plan covers all work in all laboratories in the Science Department.

III RESPONSIBILITIES

III.A. President

The President of the College or designee has ultimate responsibility for implementation of the Chemical Hygiene Plan.

III.B. Vice President for Academic and Student Success/CIO and CSSO

The Vice President for Academic and Student Success / CIO and CSSO has the responsibility for approval of the Chemical Hygiene Plan and for the appointment of a qualified individual as the Chemical Hygiene Officer.

III.C. Chemical Hygiene Officer (CHO)

The Chemical Hygiene Officer (CHO) is the person responsible for making recommendations about the implementation of the Chemical Hygiene Plan at Copper Mountain College. The CHO has the responsibility to review the Chemical Hygiene Plan as circumstances warrant, and at least once every 12 months, recommending changes to the Vice President for Academic and Student Success. The CHO also has the responsibility for consulting regularly with faculty and staff regarding the use of hazardous substances in labs and for recommending training for personnel who fall under the purview of this Standard.

The CHO, in conjunction with the Director of Facilities and Operations (DFO) or designee will ensure the faculty and staff, of the College perform the following duties: (references refer to specific sections of this document)

1. Safety Data Sheet (SDS) procurement (IV.C.1).
2. Arranging periodic cleaning of lab benches and areas (IV.D.1).
3. Disposal of hazardous waste (IV.D.1, IV.I.1, and Appendix B).
4. Informal lab inspections (IV.D.2).
5. Overseeing maintenance of safety equipment (IV.D.3).
6. Maintaining an inventory of all chemicals (IV.G.2).
7. Safety training for students using the laboratories (Appendix B).

The Vice President for Academic and Student Success / CIO and CSSO evaluates the faculty and staff members within all of the areas described in this Chemical Hygiene Plan and in consultation with the CHO will insure that the work is done in a manner consistent with the policies and procedures contained in this Chemical Hygiene Plan. In the absence of the CHO the DFO will be the primary point of contact.

III.D. Faculity & Staff

College faculty and staff, which work, in laboratory settings are expected to see that the provisions of the Chemical Hygiene Plan are carried out within the laboratories under their supervision. They (in concert with the CHO) are responsible for making certain that all persons who work within the laboratories are aware of the hazards of the materials with which they are working and have received the training required by the Chemical Hygiene Plan, the Hazard Communications Plan and any other applicable Federal or State regulations prior to beginning work in the laboratory. Further, they are required to plan the work to be done in the laboratories under their supervision so that is done in a manner consistent with this Chemical Hygiene Plan. Where such work departs from the usual practices, either because a new procedure is to be used or especially hazardous materials are required to carry out the work, the lab supervisor should consult with the CHO to be certain that the procedures to be followed will ensure the safety of the persons involved. In this document, "laboratory supervisor" refers to the faculty or staff member who is most directly responsible for work performed in a lab or stockroom.

IV STANDARD LABORATORY OPERATING PROCEDURES AND REGULATIONS

IV.A. Basic Rules and Procedures

Definitions. OSHA has defined a "hazardous chemical" as "a chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic harm may occur in exposed employees." The term "health hazard" includes "chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoetic systems, and agents which damage the lungs, skins, eyes, or mucous membranes."

The non-mandatory recommendations for a Chemical Hygiene Plan also include references to "moderately chronic," "highly chronic," and "highly acute" toxicity without defining these terms precisely. This Chemical Hygiene Plan places the burden on the lab supervisor, in consultation with the CHO, to make informed decisions about the relative danger of various substances encountered in labs. Information supplied on SDSs can assist in this process.

All workers shall follow these basic rules and procedures when working with hazardous chemicals within the laboratory. It is expected that all workers will abide by the guidelines listed below.

1. Avoidance of "Routine" Exposure. Never taste chemicals. Avoid contact with skin. As a general rule, one should avoid smelling chemicals, particularly as a means of identification. However, since it is prudent to know the odors of some common chemicals as a matter of safety, when smelling any chemical, waft the vapors very cautiously to avoid inhaling high concentrations and minimize the amount smelled.

2. Eating, Smoking, etc. Do not eat, drink, smoke, or apply cosmetics in areas where hazardous chemicals or preserved biological specimens are present. Wash hands before conducting these activities. Do not store or handle food or beverages in labs or storage areas. Do not use refrigerators, glassware or utensils which are also used for laboratory operations for the storage or handling of food or beverages.

3. Equipment and Glassware. Handle and store laboratory glassware with care to avoid damage; do not use damaged glassware. Use extra care with Dewar flasks and other evacuated glass apparatus; shield or wrap them to contain chemicals and fragments should implosion occur. Do not use mouth suction for pipetting or starting a siphon. Use equipment only for designed purpose.

4. Horseplay. Avoid practical jokes or other behavior which might confuse, startle, or distract another worker.

IV.B. Control-Measures and Equipment.

1. Unattended Operations. Leave lights on, place an appropriate sign on the door, and provide for containment of hazardous chemicals and/or toxic substances in the event of failure of utility service (such as cooling water or electricity) to an unattended operation. No operations involving the use of extremely hazardous materials may be allowed to run unattended without prior approval of the CHO or designee. Such approval will only be granted if the CHO or designee is convinced that precautions have been taken to ensure the safety of others. All unattended operations involving the use of especially hazardous materials will require posting of a sign that such operations are being conducted and that the room may not be entered by persons other than the person(s) conducting the operation. This sign shall also include the name and telephone number of the individual(s) responsible for the laboratory.

2. Use of Hoods. Laboratory ventilation should be normally not less than 20 cubic feet per minute airflow through each room. This flow rate is not considered sufficient to prevent accumulation of chemical vapors. Work done with chemicals with low TLVs or high vapor pressure should be done in a fume hood. Fume hoods should provide 60 to 100 linear feet per minute of airflow. Confirm adequate hood performance before use; keep the hood sash at the indicated level at all times except when adjustments within the hood are being made; keep materials stored in hoods to a minimum and do not allow these materials to block vents of air flow. Leave the hood "on" when it is not in active use if toxic substances are stored in it or if it is uncertain whether adequate general laboratory ventilation will be maintained when it is "off". Be alert to unsafe conditions and see that they are corrected when detected. The adequacy of hood performance shall be tested at least annually. To the extent feasible, each hood should have a continuous monitoring device to allow convenient confirmation of adequate hood performance before use. If this is not possible, working with substances of unknown toxicity should be avoided or other types of local ventilation devices should be provided.

IV.C. Chemical Procurement, Distribution, and Storage

1. Procurement. The Instructional Assistant will insure that SDSs are received for all hazardous chemicals ordered in his/her respective department. The College, through the Vice President for Academic and Student Success and the CHO, retains the right to require that specific permission be granted before chemicals, which will pose significant risks are procured. It also retains the right to limit the quantities of such chemicals or to deny the acquisition of such chemicals if the conditions do not exist for the proper handling and/or disposal of the chemical. (See the Hazardous Waste Management Policy and Procedures in Appendix B).

2. Stockrooms/Storerooms. Chemicals should be stored, insofar as practical, in their original containers with labels intact. Labels shall not be removed or defaced and have the information found in Appendix C. Bottles of chemicals should be placed of the storage shelves in such a way as to minimize the danger of bottles falling off the shelves. Chemicals may be stored in open shelves and arranged in chemically compatible categories unless the properties such as odor or reactivity warrant segregated and/or vented storage. (The lab supervisor or CHO should be consulted anytime uncertainty

arises regarding such storage.) Substances that pose a particularly high health risk should be stored in secured areas, with appropriate ventilation as needed. The chemical storeroom and the staff work space, are considered to be secured areas. Flammable chemicals will be stored separately from other chemicals in special cabinets or rooms. All chemicals should be examined at least annually to determine the need for replacement and the integrity of the container and label. Amounts stored within a laboratory should be as small as practical. The chemicals are to be returned to the storeroom as soon as the need for the chemical no longer exists in the laboratory.

3. Distribution. When chemicals are needed in a laboratory and the chemical is to be placed in a secondary bottle, that bottle will be labeled with the following information: 1) Chemical Name; 2) Signal Word and GHS Pictograms (optional); 3) Hazard/Precautionary statements; 4) Last Name of person filling the container; and 5) Date. When chemicals are hand carried between rooms, the container will be placed in an outside container or bucket. When several bottles of chemicals are to be moved at the same time, the use of a laboratory cart is permitted provided that the bottles are properly contained on the cart.

IV.D. Housekeeping, Maintenance, and Inspections.

1. Cleaning. Floors within the laboratories are normally to be cleaned by the custodial staff. Cleaning of bench tops and tables is the responsibility of the faculty and staff at the end of each lab activity. Periodic cleaning of bench tops and tables by custodial staff can be arranged in advance by contacting the DFO. In the event of spills, the faculty member in charge is required to supervise the cleaning and disposal of the spilled material. Chemical waste is stored in clearly labeled containers by the faculty and staff at the conclusion of each lab activity.

2. Inspections. Formal housekeeping and chemical hygiene inspections will be held at least annually. These formal inspections are the responsibility of the DFO. Informal inspections will be conducted by the CHO and are also are the responsibility of faculty and staff to continually correct any deficiency as quickly as possible. Informal inspections are the responsibility of faculty and staff. In addition, inspections may be held from time to time by representatives of various Federal and State regulatory agencies. The CHO, or DFO and his/her designee, should accompany these persons on the inspection tour.

3. Maintenance. The primary responsibility for noting the need for repair of malfunctioning equipment, including fume hoods and ventilation systems, rests with staff and faculty. These persons are charged with prompt reporting of any malfunctions in the safety related equipment to the DFO. In addition, a regular program of inspection of safety related equipment will be conducted. Eye wash devices will be tested or inspected before each semester and regularly flushed, as recommended by the manufacturer, by staff, faculty, DFO or designee. Safety showers will be tested regularly by staff, faculty, DFO or designee. Fume hoods will be inspected regularly by staff, faculty, DFO or designee. Out-of-service equipment will be plainly marked so that persons in the area of the equipment will be aware that it is not in service. Out-of-service equipment will be repaired and put back into service as quickly as possible. Appropriate lock out/tag out procedures will be followed.

4. Passageways. Hallways will not be used as storage areas for chemicals. Access to exits, emergency equipment, and utility controls will never by blocked by stored materials.

IV.E. Medical Program

1. Compliance and Regulation. Regular medical examinations, consultations, and surveillance of personnel will be provided as required by law or regulation. The cost of this surveillance will be borne by the College.

2. Routine Surveillance. Anyone whose work involves regular and frequent handling of a hazardous chemical, any person showing symptoms which may have been caused by exposure to hazardous materials in the workplace, any person involved in an incident creating the likelihood of a hazardous exposure, any person who is routinely exposed to hazardous chemicals above the action level, or in the absence of an action level, the PEL of an OSHA-regulated substance for which there are exposure monitoring and medical surveillance requirements, or any persons having a medical condition which is known to be aggravated by exposure to hazardous materials within the workplace may consult a licensed physician qualified in the area of occupational exposure to hazardous materials to determine on an individual basis whether a regular schedule of medical surveillance is desirable. The cost of such surveillance will be borne by the College.

3. First Aid. In any situation requiring first aid attention, the faculty and staff should be contacted. When the emergency is such that severe impairment of function or death may result if help is delayed in arriving call 911 prior to contacting Campus Security. Hard copies of all relevant SDSs should be secured as soon as possible. "Incident Report Forms" (Appendix A) should be readily available in all labs and completed as thoroughly as possible at the time of the accident. Information on specific criteria can be found in Copper Mountain College's, Injury and Illness Prevention Plan (IIPP).

4. Information Provided to and by the Physician. In the event of an event or condition requiring the consultation with or examination by a licensed physician, the employer shall provide the following information to the physician: (i) the identity of the hazardous chemical to which the employee may have been exposed, (ii) a description of the conditions under which the exposure occurred, including quantitative exposure data, if available, and (iii) a description of the signs and symptoms of exposure that the employee is experiencing, if any. The relevant SDS(s) shall also be provided to the physician as quickly as possible. For any examination or consultation provided under this Plan, Copper Mountain College shall obtain a written opinion from the examining physician which shall include the following: (i) any recommendation for further medical follow-up, (ii) the results of the medical examination and any associated tests, (iii) any medical condition which may be revealed in the course of the examination which may place the employee at increased risk as a result of exposure to a hazardous workplace, and (iv) a statement that the employee has been informed by the physician of the results of the consultation or medical examination and any medical condition that may require further examination of treatment.

IV.F. Protective Apparel and Equipment

1. All laboratories in which hazardous chemicals are used must be equipped with fire extinguishers, eye wash stations, and where feasible, drench showers. Persons using these laboratories must be informed of their locations and trained in the proper use of the equipment at the time they first begin working in the laboratory. Additional safety apparel is available at the staff work area.

2. Personal protective equipment (PPE) is provided by Copper Mountain College to users of the laboratories when and where necessary (unless an individual already has appropriate PPE). Copper Mountain College has the responsibility to assess if hazards are present or are likely to be present which necessitates the use of personal protective equipment. If such assessment reveals a need for personal protective equipment, the DFO will communicate selection decisions to each affected employee and select the PPE that properly fits each affected employee.

3. Appropriate eye protection must be worn by all persons, including visitors, in all laboratories while hazardous chemicals are being used. Glasses must meet ANSI Z87.1-1989 standards. Safety glasses with side shields are the minimum protection; goggles are recommended in situations where splashes or projectiles are probably hazards. Full-face shields should be worn when conducting particularly hazardous operations. Special glasses are required when glassblowing or working with lasers. Faculty and staff, in consultation with the CHO, are responsible for specifying which level of eye protection is appropriate for particular labs.

Employees who wear contact lenses in the lab must have a bright red dot in the form of a sticker on the side of their glasses, goggles or other face/eye protection. This can inform co-workers and emergency rescuers that they are wearing contact lenses.

4. Appropriate gloves will be worn when the potential for contact with toxic materials exists. Inspect gloves before each use.

5. Any experiment or procedure that necessitates the use of a respirator under 29 CFR 1910.132 shall be conducted in a sufficiently well-ventilated environment such that the use of a respirator is not required. Lab supervisors should consult with the CHO as necessary.

IV.G. Records

1. Records of all accidents will be written and retained for at least ten years following the accident. Reports of all accidents are to be made on an Academic Safety "Incident Report Form." (Appendix A.) The Security Department, the Office of Academic Affairs, and Human Resources will maintain copies of all Incident Report Forms.

2. Inventory records for all substances will be maintained by lab staff in order to know the identities, locations, and quantities of all chemicals on hand. Laboratory notebooks should be maintained in such a fashion as to record the usage of substances which pose a

particularly high health risk and these notebooks are to be retained by the lab supervisor indefinitely.

3. Medical records will be maintained by Human Resources Department of the College for thirty years or as otherwise required by state and/or federal regulations in accordance with the requirements of state and federal regulations.

IV.H. Spills and Accidents

1. All laboratory operations are to be carried out in accordance with accepted laboratory practices to ensure the prevention of accidental spills. Should a spill occur, immediate attention is required of the person causing the spill to minimize the spread of the spilled material. It is the responsibility of the person causing the spill to report the spill to the lab staff. Except for the most minor spills, the lab staff will notify the CHO or the DFO who will arrange for the cleanup of the spilled material according to accepted practices. Outside help will be called in to clean up the spill when the extent of the spill or the material involved in the spill are such that inside help is not capable of handling the situation.

2. The fire alarm system is available to signal people to evacuate the building in the event of an emergency requiring that action. This alarm system is tested annually by Facilities and Operations. As with all fire alarms, the Fire Department and campus Security will be notified and appropriate corrective action taken.

3. After the emergency, an Incident Report Form, (Appendix A), will be completed by lab staff and/or the CHO. All accidents or near accidents will be carefully analyzed by the Facilities Committee and the recommendations arising from the analysis will be distributed to all who might benefit from the information. Also, as a follow up to any safety related Incident Reports, a written recommendation will be sent to the DFO and a copy filed with the Incident Report for a permanent record. If corrective action is necessary, the DFO will be copied with the recommendation.

IV.I. Waste Disposal Program

The proper disposal of chemical wastes is necessary to protect people, plants, and animals from the harm that could be caused by the improper and careless disposal of these wastes.

1. Disposal of wastes from laboratories shall conform to the regulations outlined in the document "Hazardous Waste Management Policy and Procedures" (Appendix B). All faculty and staff under the purview of this Chemical Hygiene Plan are responsible for the collection of these wastes from each of the respective laboratories, the identification of the wastes, and the storage of the wastes pending removal of the wastes by the chemical waste disposal company contracted by the College.

2. Outdated chemicals and those which bear no label will be placed, in their bottles, with the laboratory waste to be removed by the commercial waste disposal company.

3. The College shall contract with a reputable waste disposal contractor who will show evidence that the disposal means used by that contractor are means that fall within the

legal requirements and provide due consideration of the environmental consequences of waste disposal.

V. TRAINING

The following section is taken directly from 29 CFR 1910.1450, with minor editorial changes.

Employee information and training.
1. The employer shall provide employees with information and training to ensure that they are apprised of the hazards of chemicals present in their work area.

2. Such information shall be provided at the time of an employee's initial assignment to a work area where hazardous chemicals are present and prior to assignments involving new exposure situations. The need for refresher information and training will be recommened by the CHO to the Vice President for Academic Affairs and Student Success based on significant changes in the Chemical Hygiene Plan and/or other safety-related issued on campus.

3. Employees shall be informed of:

i. the contents of Cal/OSHA Section 8 and 29 CFR 1910.1450 and all applicable appendices shall be made available to employees;

ii. the location and availability of the employer's Chemical Hygiene Plan;

iii. the permissible exposure limits for OSHA regulated substances or recommended exposure limits for other hazardous chemicals where there is no applicable OSHA standard;

iv. signs and symptoms associated with exposures to hazardous chemicals used in the laboratory; and

v. the location and availability of known reference material on the hazards, safe handling, storage and disposal of hazardous chemicals found in the laboratory including, but not limited to, Material Safety Data Sheets received from the chemical supplier.

4. Training.

i. Employee training shall include:

A. Methods and observations that may be used to detect the presence or release of a hazardous chemical (such as monitoring conducted by the employer, continuous monitoring devices, visual appearance or odor of hazardous chemicals when being released, etc.);

B. The physical and health hazards of chemicals in the work area; and

C. The measures employees can take to protect themselves from these hazards, including specific procedures the employer has implemented to protect employees from exposure to hazardous chemicals, such as appropriate work practices, emergency procedures, and personal protective equipment to be used.

ii. The employee shall be trained on the applicable details of this Chemical Hygiene Plan.

Laboratory personnel should consult the literature and/or use the services of knowledgeable persons regarding the hazards of the chemicals being used and proper procedures to be followed in the laboratory. Knowledgeable people include, but are not limited to, faculty members who have special expertise in the hazards and use of certain chemicals or classes of chemicals and the Chemical Hygiene Officer.

Appendices

Appendix A Copper Mountain College Incident Report Form
Appendix B Copper Mountain College Lab Procedures
Appendix C Labels and the Globally Harmonized System (GHS)
Appendix D Links to Federal and State OSHA Guidelines

APPENDIX A

Copper Mountain College Incident Report Form

Copper Mountain College Incident Report Form
For apparently non-serious injuries or exposures:
Contact class instructor, and Bruce W. Bridenbecker (EXT 0266)

For any injury or exposure which may seem serious or life-threatening:
First: call 911 immediately with detailed information on the location of patient(s)

Next: Call 5325 or (760) 610-3671 to notify College Security
Next: Locate hard copy of relevant SDS(s)
Next: Contact Bruce W. Bridenbecker, CHO (0266) or Jerry L. Phipps, Director of Facilities and Operations (5292 or 760-910-3181).

Describe incident/accident:
If Injuries or Exposures: (one sheet for each patient)

Name of patient: _____ Age: _____
Current medications: _____
Medical history: _____
Known allergies _____
Date: _____ Time of injury/exposure: _____

Best Estimate of Exposure:
Substance(s): _____

Duration and route of exposure: _____

(Inhalation, ingestion, injection, absorption)

NOTE: Transfer relevant SDS(s) to emergency room or physician with patient.
Signs and Symptoms

Symptoms reported by patient

Signs of injury and/or exposure as reported by bystanders:

Actions taken on scene:

Emergency Room Personnel: Please make a copy of this form for your records, if necessary, and return the original to: Human Resources, Copper Mountain College, PO Box 1398, Joshua Tree, CA 92252.

APPENDIX B

Copper Mountain College Lab Procedures

General Lab Rules……..15
Storing Chemicals ……..16
Handling Chemicals ……..19
General Rules for Safe Transport of Chemicals ……24
Chemical Spills ……..25
Eye Protection ……..27
Skin Protection ……..29
Hazardous Waste Disposal ……..33
Ventilation ……..37
Gas Cylinders ……..39

General Lab Rules

1. Wear appropriate eye protection at all times. Prescription glasses or contact lenses are not considered appropriate eye protection.

2. Do not work alone while doing laboratory work that may be hazardous.

3. Do not smoke in laboratories.

4. Do not eat in the laboratory. Never store food in a chemical refrigerator or chemicals in a food refrigerator.

5. Do not use mouth suction for pipetting or for starting a siphon.

6. Perform all experiments that involve toxic, volatile, or malodorous materials in the hood or in an enclosed container such as a vacuum system.

7. Be familiar with the hazardous properties of the chemicals you will use. Read the SDSs for the reagents you will be using.

8. While conducting experiments: a) Wear protective clothing and gloves that are not permeable to the chemicals being used (See Skin Protection on page 28); b) Confine long hair.

9. Do not operate equipment unless you have been instructed in its proper use.

10. Keep the laboratory free of clutter. Never store chemicals on the floor.

11. Dispose of chemical waste properly, no matter how small the quantity.

12. Make sure that you know the location of all safety equipment before beginning laboratory work.

13. Wash hands thoroughly with soap and water after working with hazardous materials.

14. Protect your laboratory and laboratories and offices on floors below from floods. Never plug a sink and leave water running unattended.

15. Secure all compressed gas cylinders to walls or benches.

Storing Chemicals

General Guidelines

1. Do not store excessive quantities of chemicals in chemical supply room. Purchase the minimum amount, required and dispose of unneeded chemicals in a timely fashion.

2. Date bottles of chemicals when they are opened. Peroxidizable chemicals such as isopropyl ether should be tested periodically or discarded according to the time limits. Discard any chemical of dubious purity (by the usual waste disposal procedures) if it cannot be purified safely.

3. Store reagents on shelves or in cabinets. Store large bottles of chemicals on the lowest shelves of any chemical storage area. Do not allow bottles to extend over the edge of a shelf.

4. Do not store chemicals on storage cabinets. They are more readily knocked over and are unprotected from potential exposure to fire.

5. Hoods should not be used for chemical storage. Hood storage interferes with air-flow in the hood, causes clutter, and increases the fuel load in the event of a hood fire. If small quantities of chemicals are stored in the hood, they should be placed on an elevated shelf.

6. No chemicals (either reagents or waste chemicals) should be stored on the floor. Floor storage presents a major safety hazard because bottles can break if knocked over or struck together.

7. Chemicals requiring refrigerated storage should be properly labeled and sealed to prevent escape of any vapors. Use only refrigerators designated for chemical storage. Flammable liquids MUST be stored only in explosion-safe refrigerators. Do not refrigerate chemicals unnecessarily.

8. Seal caps of open bottles of volatile chemicals using Parafilm. This will prevent odor problems and deterioration of air/moisture sensitive reagents.

9. Inspect storage areas periodically for damaged containers such as cracked bottles or caps or rusted cans. Replace loose or deteriorating labels.

Storage of Specific Classes of Chemicals

1. Provide separate storage areas for corrosive chemicals, solvents, oxidizing agents, pyrophoric materials, and air- or water-reactive materials.

2. Store acids separate from bases. Store ammonium hydroxide in a separate cabinet, preferably ventilated.

3. Store oxidizers, including oxidizing acids such as nitric and perchloric acids separate from oxidizable compounds such as acetic acid. Perchloric acid MUST be stored where it cannot contact organic material.

4. Store highly toxic chemicals in unbreakable secondary containers labeled with a description of the contents. Cyanides and sulfides MUST be kept safe from any contact with acids. Store cyanides in a separate cabinet, not in a location visible to passersby. Dispose of cyanides for which you have no current use.

5. Store pyrophoric materials separate from flammable materials, in a dry, inert atmosphere such as a nitrogen-filled desiccator or a glove box.

Solvent Storage

1. Solvents are classified by the National Fire Protection Association (NFPA) by flash point (Fp) and boiling point (bp) as follows:

Flammable Liquid Class	Flash Point Range	Boiling Point
Class I	less than 110 F (38 C)	
Class IA	less than 73 F (23 C)	less than 100 F (38 C)
Class IB	less than 73 F (23 C)	greater than 100 F (38 C)
Class IC	greater than 73 F (23 C)	less than 100 F (38 C)
Class IIA	greater than 100 F (38 C)	less than 140 F (60 C)
Class IIB	greater then 140 F (60 C)	less than 200 F (93 C)
Class IIIA	greater than 200 F (93 C)	

Flash point is defined as the minimum temperature at which a liquid gives off vapor in sufficient concentration to form an ignitable mixture with air near the surface of the liquid. Many common solvents such as acetone, ethanol, and hexane are Class IB liquids. Ethyl ether and low-boiling petroleum ether are class IA liquids. Storage of

flammable and combustible liquids is regulated by fire codes. The following storage procedures and regulations are taken largely from NFPA codes 45 and 30.

2. Store flammable and combustible liquids in approved flammable liquid storage cabinets. Such cabinets may be vented, but this is not required. If the cabinet is not vented, the vent openings should be sealed with the bungs supplied with the cabinet. The total volume of flammable and combustible liquids stored in the cabinet should not exceed the maximum quantities recommended by the manufacturer of the cabinet. No more than 3 cabinets may be located in a single fire area (laboratory).

3. Quantities of flammable liquids greater than one liter should be stored in approved safety cans. Glass containers no larger than 1 gallon (4 L) are acceptable if purity would be adversely affected by storage in metal.

4. The largest allowable laboratory container for a Class IA solvent is 1 gallon (4 L) for glass, plastic, or metal, or 2 gallon (8L) for approved safety cans. Five gallon (20 L) cans may not be stored or used anywhere in the department except in the stockroom solvent storage rooms. It is recommended that the Class IA solvents such as ethyl ether be purchased only in 1 gallon (4 L) or smaller containers. If you require a larger quantity, you should order more than one bottle of the 1 gallon size.

Handling Chemicals

Be aware that all chemicals are hazardous to some degree, and protect your self from accidental skin, eye and respiratory contact.

Know the hazards of the materials you are working with. If you are using an unfamiliar procedure or chemical, conduct a literature search for reports of known or suspected hazards. Safety Data Sheets, (SDS), are an important primary source of information on physical properties, health hazards, reactivity, and spill cleanup procedures.

General Guidelines

1. Whenever possible, perform hazardous reactions in a properly functioning hood using appropriate shielding.

2. Never taste a laboratory chemical.

3. Take special precautions when scaling up a reaction. A reaction that is safe under published conditions may be violent when multiplied in scale.

4. Read labels carefully, and keep labels clean so that they are legible. Replace deteriorating or fading labels before a chemical becomes unidentifiable.

5. Clearly label all containers. Labels should include chemical names, structures when appropriate, hazard and precautionary statements, last name of owner, and date. If you know of special risk, include appropriate warnings. Unidentified materials cannot be disposed of and can cause serious accidents.

6. If it is necessary to smell a chemical, do so by wafting the vapors toward your nose with your hand so that the minimum amount is inhaled.

7. Never pour a chemical back into its original bottle after measuring out too much. This can contaminate the original contents.

8. Never combine the contents of two or more bottles of the same reagent. If one of the bottles is contaminated, the resulting combination is now contaminated.

9. Be aware of chemical incompatibilities before mixing to avoid explosive or uncontrollable reactions, generation of toxic gases, etc.

Handling of Organic Peroxides

Peroxides are a group of compounds that contain an oxygen-oxygen bond. As a class, organic peroxides are the most explosive substances that are normally found in the laboratory. Peroxides are sensitive to light, heat, and friction, as well as to strong oxidizing and reducing agents. Explosions involving peroxides are unpredictable and violent.

1. Store peroxides away from sources of light, heat, friction, and mechanical disturbance.

2. A solid peroxide can often be stored more safely if it is dissolved in a non-peroxidizable inert solvent such as an aliphatic hydrocarbon. Do not allow solutions of peroxides to evaporate, because the concentration of peroxide may reach a dangerous level.

3. Store solutions of peroxides at a cool temperature, but do not refrigerate peroxides at a temperature below which precipitation or freezing out of solid material may occur; in this form, peroxides are extremely sensitive to shock and heat.

4. Do not store peroxides or solutions of peroxides in glass bottles with ground glass or screw caps. The friction caused by opening the bottle can initiate an explosion. Polyethylene bottles with screw caps may be used.

5. Use ceramic spatulas for handling peroxides; metal spatulas can catalyze an explosive reaction.

6. Use no flames in areas where peroxides are being handled.

7. Purchase, store, and use the minimum quantity of peroxide necessary. Use special caution when scaling up reactions that use peroxides.

8. Perform experiments involving peroxides in a hood and behind a safety shield.

9. Clean up all spills immediately by absorption on vermiculite or other suitable absorbent.

Peroxide-forming Chemicals -- Some chemicals can easily form peroxide when exposed to atmospheric oxygen. These peroxidizable chemicals are especially dangerous because the presence of peroxides may not be known. Check this list of peroxidizables compounds before using a organic solvent in a distallion or reaction.

Handling of Peroxide-Forming Chemicals

1. Buy and use the minimum quantities of Peroxidizable substances necessary.

2. Store peroxide-forming chemicals for the shortest possible time. Date the container when it is opened. Test for peroxide formation when first opened and every 3 months. If peroxide levels are acceptable, date the container when the test was performed. If the material contains hazardous concentrations, either treat to remove peroxides or discard.

3. Peroxide formation in ethers and hydrocarbons can be prevented if they are stored under an inert atmosphere, for example, argon or nitrogen. The container should be well sealed.

4. Store peroxidizable chemicals away from source of heat, light, sparks, other ignition sources, and mechanical shock.

5. Peroxide-forming compounds should be kept at a cool temperature. Do not refrigerate peroxides if solid peroxide may precipitate or freeze out. Solid material is especially sensitive to shock.

6. Do not store peroxide-forming compounds in glass bottles having ground glass or screw caps, or metal cans with metal screw caps. Serious explosions can occur by merely unscrewing the top of a glass bottle that contains peroxides. Metal cans with plastic caps and polyethylene bottles are safer containers for ethers and other peroxidizable compounds. The safest container is the one supplied by the manufacturer.

7. Test peroxidizable substances before using, and periodically in storage as specified in item 2 above. Chemicals test using Quantofix Peroxide Test Papers (available from Aldrich). There is a supply of these on hand in the chemical supply room.

8. Peroxides may be removed from solvents by passing the solvent through a column of alumina or Dowex-1 resin. The column MUST NOT be allowed to run dry and the packing should be handled as other peroxide waste. It is less dangerous, however, to use a new bottle of peroxide-free solvent than to purify solvent containing peroxides.

9. Serious accidents can occur when substances capable of forming peroxides are distilled. Consider other methods of purification. If distillation is necessary, the following precautions should be observed where peroxide formation is suspected.

10. Test for peroxides before distilling. The peroxide test strips can indicate the concentration of peroxide in ppm. allowing you to know just how much peroxides are present.

11. Do the distillation under an inert atmosphere. Do not allow air to come in contact with hot solvent.

12. Add a suitable reducing agent to the distillation flask, such as sodium/benzophenone for ethers. Make sure that no compounds that react vigorously with the reducing agent are present in the distillation flask.

13. Do not carry the distillation to dryness; leave at least 10% liquid in the flask.

14. Wear goggles, face shield and use a free standing safety shield when distilling peroxidizable chemicals. Conduct the distillation in a hood with the sash closed.

15. Be aware that freshly distilled peroxidizable material may reform peroxide with two weeks of distillation.

10. Spills should be cleaned up immediately by absorption on solusorb or other suitable absorbents. These absorbants are located in the laboratory or main stockroom.

Handling of Common Chemicals that are Particularly Hazardous

Many compounds found in older literature have been found in recent years to be more hazardous than once thought. When the research was preformed, these compounds were readily available and the chronic effects were not known. Therefore, if you use a procedure not recently published, you must check the MSDS of the reagents to get the most recent information on hazardous health affects. For the compounds listed below, consider finding a substitute solvent or reactant to avoid possible risk. If you cannot find a substitute, then take special precautions to avoid exposure.

1. Benzene is considered a Category I Carcinogen by OSHA. Chronic poisoning can occur by inhalation of relatively small amounts over a long period of time. The toxic action is primarily on the blood-forming organs. Benzene has been documented to cause leukemia. Benzene is readily absorbed through the skin. Toluene should be substituted whenever possible. OSHA permissible exposure limit is 1 ppm.

2. Carbon Tetrachloride is another dangerous solvent found in many literature references. At one time, carbon tetrachloride was used in fire extinguishers (if you ever find an old extinguisher with CCl_4, contact the Chemical Hygiene Officer

immediately). Keep exposure to the liquid and its vapors to an absolute minimum. High concentration in the air can lead to death from respiratory failure. Less severe exposure can lead to kidney and liver damage. In addition to inhalation hazard, it can be readily absorbed through the skin. Methylene chloride, (dichloromethane), is a much safer chlorinated hydrocarbon. However, almost all chlorinated hydorcarbons have been found to be toxic to some degree. The current threshold limit value for carbon tetrachloride is 5 ppm.

3. Chloroform is a compound similar to carbon tetrachloride with one less chlorine atom ($CHCl_3$). Therefore, it has many of the adverse health affects as carbon tetrachloride. Repeated exposure can cause kidney, liver and heart damage. In laboratory animals it has been shown to be a carcinogen and mutagen. Use methylene chloride as a substitute. The PEL for chloroform is 2 ppm.

4. Formaldehyde use as preservative of biological tissue has been found to be a human carcinogen. Repeated inhalation can cause cancer of the lungs, nasopharynx, and/or nasal passages. It can cause respiratory tract irritation and edema. It can also cause eye and skin irritation. Formaldehyde is a colorless, pungent, irritant gas that is water soluble and most frequently found in 37% aqueous solution commonly known as formalin. Alway use formalin in a hood and wear gloves and splash-proof goggles. The threshold limit value for formaldehyde is 0.75 ppm.

5. Ethyl ether is an extremely flammable solvent use in Grinard reactions and extractions. The greatest danger of ethyl ether is its very low flash point (-30° C). The vapors of ether are heavier than air and can "crawl" along the benchtop to a source of ignition. It tends to form peroxides especially anhydrous. It is a depressant to the central nervous system and can cause unconciousness or even death on severe exposure. Carry out reactions using ethyl ether in the hood.

6. Perchloric Acid usually found as 72% aqueous solution is a very strong oxidizing acid. Contact with combustible materials at elevated temperatures may cause fire or explosion. Handle with extreme care as severe burns can result from skin contact. Wear heavy rubber gloves and apron in addition to splash-proof goggles.

General Rules for Safe Transport of Chemicals

1. Use a hand-held rubber safety bottle carrier for liquids and hazardous solids in glass containers. These carriers are mandatory for 2.5 L and 4 L bottles of liquids.

2. Do not attempt to carry an armful of bottles. Use a cart with side panels if transporting several chemicals at once. Do not allow containers to collide with each other during transport.

3. Always use a hand truck for cylinders of compressed gases. Remove regulators and replace protective cylinder cap before transport. Do not drag or roll cylinders. Chain the cylinder to the hand truck as soon as cylinder is in place before transport.

4. Never pick up a bottle by the cap or lid.

5. Wear eye protection while transporting chemicals.

6. Plan to transport the extremely hazardous chemicals during times of reduced traffic.

7. Do not transport extremely hazardous materials by yourself.

8. Bring a spill kit when transporting hazardous liquids.

9. Place bottles of extremely toxic or carcinogenic chemicals in an unbreakable outer container before transport.

10.Wear protective gloves and laboratory coat.

11.Extremely hazardous materials should be sent in an empty elevator to a second person waiting at the desired floor.

12.Transport dry ice carefully. A relative small block can produce enough CO_2 gas to displace all oxygen in a small, enclosed area.

Chemical Spills

General Guidelines

1. Notify people in the area of the hazard.

2. Evacuate the laboratory and close the door behind the spill and/or fire.

3. Post a person outside the laboratory door to prevent anyone from entering the laboratory.

4. For a small spill, follow the guidelines below.

5. For a large spill or one that may threaten life and health, call 911 and indicate to the operator that a Hazardous Materials Response Unit is required.

6. Be prepared to give the following information:
   type of chemical or hazard
   amount spilled
   exact location of the spill (room number, building)
   Do not hang up until the operation releases you.

7. Inform Security and your Supervisor.

8. Call the Chemical Hygiene Officer, Bruce W. Bridenbecker at EXT 0266 or in his absence, the Director of Facilities and Operations, Jerry L. Phipps at EXT 5295 for assistance and so an accident report can be filled out.

Emergency Response to a Chemical Spill

Laboratories have kits and equipment for cleaning up spills.

1. A neutralizing agent. The spill control kits are clearly labeled as to which type of neutralizing agent should be used. The four types of spills are: (1) acid; (2) caustic, or basic; (3) solvent; and (4) mercury.

2. Gloves, plastic bags, whisk broom, and dust pan are available.

Procedure

1. Do not attempt to clean up spills of highly toxic or dangerous materials unless you can do so without harming yourself and other people. In case of a spill of a highly toxic or dangerous material, evacuate the laboratory and shut the door. Call Emergency (911) for help with dangerous spills that may require self-contained

breathing apparatus for cleanup. Inform people in adjacent laboratories and offices of the spill and to stay out of the area of the spill.

2. Wear protective clothing when cleaning up a spill.

3. Spills of acids and bases can be neutralized by the neutralizing agent in the spill control kits. The neutralizing agent should be poured around the perimeter of the spill and then poured inward to dike the spill. Thoroughly mix the slurry with the scoops provided. The caustic and acid neutralizers may bubble.

4. Spills of volatile organic solvent should be covered with an adsorbent immediately to prevent fumes form igniting. Turn off room circuit breakers and any flames. Pour the solvent absorbent around the perimeter and inward to dike the spill. Mix the absorbent until it appears as a dry, free-running, non-adhering, granular material.

5. Spills of toxic solids should be swept up and placed in a labeled plastic bag. The person or persons cleaning up the spill should make sure to wear personal protective equipment before attempting to clean up the spill.

6. Once the spill has be neutralized or absorbed use the scoop provided to place the mixture in a plastic bag. Label the bag with the following information:

1.material spilled
2.date and time of the spill
3.person or persons who cleaned up the spill

7. Give the labeled plastic bag containing the spill to lab supervisor, CHO, DFO or designee for proper disposal.

Eye Protection

Rarely do you find an experienced laboratory technician, chemist, or science instructor who can not tell you about a "close call" in the laboratory. One never knows when an accident will occur. The number one safety precaution is Safety Goggles. A simple lab technique like decanting a solvent or measuring out a corrosive liquid can result in a tiny droplet being splashed out of the container. If that droplet were to land in your eye, serious eye damage or even blindness could be the result.

The CHP states that all students, laboratory assistants, instructors, and visitors in the science laboratory, chemical storage areas, and laboratory and lecture preparation areas are required to wear safety goggles. Eye protection is necessary every time there is a chance of spraying or splattering a chemical. When working with a dry powder reagent, a dusty situation could allow particulate matter to enter you eyes. Every person entering a laboratory, even visitors and maintenance personnel, must wear appropriate eye protection.

Many individuals try to avoid wearing safety goggles because they are uncomfortable. Or they put them on for a short time and then lower them to dangle around their necks. One student wearing safety goggles, pulled the goggles up onto his forehead so he could see better while he was measuring a solvent into a 10 mL graduated cylinder. What made the situation even worst, is that he lifted both the bottle of solvent and the graduated cylinder to eye level and only several inches from his eyes so he could see better. Even if you are very careful in your technique in the laboratory, you cannot predict what your neighbor might do. So never remove your goggles in the laboratory.

The College supplies safety goggles that have been selected for their safety and comfort. They meet the American National Standards Institute (ANSI) Z87.1 requirement for impact resistance and splash protection.

If doing a reaction that is potentially dangerous, (exothermic or gas releasing), a face shield should be worn in addition to the safety goggles. The face shields provide an additional barrier protecting the face and neck in addition to the eyes. Also in the issue rooms and research labs free standing plastic shields are available. The shield is placed in front of the chemical apparatus and is narrow enough that you can wrap your arms around the shields to make adjustments in the equipment or start the reaction.

For those persons wearing contact lenses or corrective lenses, the experts have developed a suitable rule: Wearing contact lenses in the lab is acceptable and does not create an additional hazard for the wearer. However, appropriate safety goggles must be worn with contact lenses or prescription glasses. Some soft lenses do absorb organic vapors and corrosive vapors like hydrogen chloride or ammonia. So

if you are wearing contact lenses and notice any discomfort while working with volatile solvents, or corrosive liquids or gases then the lenses should be taken out.

Skin Protection

The skin, consist of cells and tissues made of proteins, lipids, and carbohydrates. When hazardous chemicals touch your skin, they may react with these tissues, or be absorbed into one or more layer of the skin. The result could be irritation and rashes, chemical burns, and possibly permanent damage. When absorbed, some hazardous chemicals can enter the bloodstream and collect in and damage organs like the nerves, liver, and kidneys. And some chemicals can harm the red blood cells and other cells of the blood. A condition in which the one becomes allergic to chemicals can also result from overexposure by absorption. Therefore, wearing gloves and other skin protection is important while handling hazardous chemicals in the laboratory.

The CHP gives specific procedures to protect your skin when working in the laboratory. Before using a hazardous chemical, select a glove that is resistant to that particular chemical. In most labs disposable gloves are available in the lab area and heavier rubber gloves can be obtained from the lab instructor if a strong corrosive will be used. Here is a chart with information about protection from various gloves.

GLOVE PROTECTION

See chart at bottom for key			natural		4mil	9mil	17mil
chemical tested	**nitrile**	**neoprene**	**rubber**	**pvc**	**silver shield**	**Vitron***	**butyl***
ACETALDEHYDE	NT	E	E	NT	G	NR	E
ACETIC ACID GLACIAL	NT	NT	NT	NT	NT	NT	NT
ACETIC ACID 50%	E	E	E	E	NT	NT	NT
ACETONE	P	E	E	P	G	P	E
ACETONITRILE	NT	E	NT	NT	E	ID	E
ACYLONITRILE	P	G	NT	NT			
AMMONIUM HYDROXIDE 29%	E	E	E	E	NT	NT	NT
ANILINE	P	E	E	G	E	P	E
AROCLOR	NT	NT	NT	NT			
BENZENE	P	NT	NT	NT	E	G	P
BENZENE CHLORIDE	NT	NT	NT	NT			
BIS(2-HYDROXYETHYL) AMINE	E	E	E	E			
2-BUTONE	NT	G	G	NT			
2-BUTOXYETHANOL	E	E	E	NT			
BUTYL ACETATE	F	E	NT	NT	G	NR	F
BUTYL CELLOSOLVE	E	E	E	NT			
CARBOLIC ACID	NT	E	E	NT			
CARBON DICHLORIDE	G	NT	NT	NT			
CARBON DISULFIDE	F	NT	NT	NT	G	G	P
CARBON TETRACHLORIDE	G	P	NT	NT	G	E	P
CELLOSOLVE	E	E	E	NT			
CELLOSOLVE ACETATE	F	E	G	NT			
CHLOROBENZENE	NT	NT	NT	NT	E	E	P
CHLOROFORM	NT	P	NT	NT	P	E	P
CHLOROETHANE	P	P	NT	NT			
O-CHLOROTOLULENE	NT	NT	NT	NT			
P-CHLOROTOLULENE	NT	NT	NT	NT			
CHROMIC ACID 50%	E	NT	NT	NT			
M-CRESOL (3-CRESOL)	F	E	E	E			

CUMENE	G	F	NT	NT			
CYCLOHEXANE	E	E	NT	NT	E	E	P
DIAMINE	E	E	E	E			
1,2-DICHLOROBENZENE	NT	NT	NT	NT			
1,3-DICHLOROBENZENE	P	NT	TN	NT			
DICHLORODIFLUOROMETHANE	NT	NT	NT	NT			
1,2-DICHLOROETHANE	P	P	NT	NT	G	G	F
DICHLOROMETHANE	NT	F	NT	NT			
DIETHANOLAMINE	E	E	E	E			
DIETHYL ETHER	E	E	NT	NT			
1,4-DIETHYLENE OXIDE	NT	NT	NT	NT			
DIMEETHYL ACETAMIDE	P	G	F	NT			
DIMETHYL FORMAMIDE	NT	E	E	NT	E	P	E
DIMETHYL SULFOXIDE (DMSO)	G	E	E	G	G	F	E
1,4-DIOXANE	NT	NT	NT	NT	E	P	E
ETHANOL	E	E	E	E			
2-ETHOXYETHANOL	E	E	E	NT			
2-ETHOXYETHYL ACETATE	F	G	G	NT			
ETHYL ACETATE	NT	G	NT	NT	G	P	G
ETHYL ALCOHOL	E	E	E	E			
ETHYL ETHER	E	E	NT	NT	G	P	P
ETHYLENE DICCHLORIDE	P	P	NT	NT			
ETHYLENE GYCOL	E	E	E	E			
ETHYLENE GYCOL MONOETHYL ETHER ACETATE	F	G	G	NT			
ETHYLENE GYCOL MONOETHYLACETATE	E	E	E	NT			
ETHYLENE OXIDE	NT	NT	NT	NT			
FORMALDEHYDE 37%	E	E	E	G	G	E	E
FORMALIN SOLUTION	E	E	E	G			
FREON 12	NT	NT	NT	NT			
FREON TF	E	E	NT	NT			
FURFURAL	P	F	NT	NT			
GASOLINE	E	E	NT	NT			
HEPTANE	E	E	NT	NT			
HEXANE	E	E	NT	NT	G	E	NR
HYDRAZINE	E	E	E	E	G	P	E
HYDROCHLORIC ACID 37%	E	E	E	E	G	NR	E
HYDROFLUROIC ACID 48%	E	E	E	E	G	G	F
ISOAMYL ACETATE	NT	NT	NT	NT			
ISOBUTYL ALCOHOL	E	E	NT	NT			
ISOPROPANOL	E	E	E	E			
ISOPROPYL ALCOHOL	E	E	E	E			
ISOPROPYL BENZENE	E	F	NT	NT			
KEROSENE	E	E	NT	NT			
METHANE DICHLORIDE	NT	F	NT	NT			
METHANOL	E	E	E	NT			
METHYL ALCOHOL	E	E	E	NT			
METHYL CHLOROFORM	P	P	NT	NT			
METHYL CYANIDE	NT	E	NT	NT			
METHYL ETHYL KETONE (MEK)	NT	G	G	NT	E	P	E
METHYL IODIDE	NT	NT	NT	NT			
METHYL ISOBUTYL KETONE (MIBK)	P	P	NT	NT			
N-METHYL-2-PYRROLIDONE	P	G	NT	NT			
METHYLENE CHLORIDE	NT	F	NT	NT	E	F	P
M-METHYLPHENOL	F	E	E	E			
MINERAL SPIRITS	E	E	NT	NT			
MURIATIC ACID	E	E	E	E			
NAPHTHA	E	E	NT	NT			
NITRIC ACID 50%	G	E	E	E	E	G	F
NITROBENZENE	P	G	NT	NT	E	E	E
OLEIC ACID	E	E	NT	NT			
PENTANE	NT	NT	NT	NT	E	E	P

PERCHLOROETHYLENE	G	NT	NT	NT	E	E	P
PETROLEUM ETHER	E	E	NT	NT			
PHENOL SAT.	NT	E	E	NT	G	E	E
PHOSPHORIC ACID 85%	E	E	E	E			
POLYCHLORINATED BIPHENYLS (PCBS/50%)	NT	NT	NT	NT	E	E	P
POTASSIUM HYDROXIDE 50%	E	E	E	E			
PYRIDINE	NT	NT	NT	NT			
RULE 66 SOLVENT	E	E	NT	E			
SODIUM HYDROXIDE 50%	E	E	E	E	E	G	E
SULFURIC ACID 50%	E	NT	E	E	E	E	G
1,1,2,2-TETRACHLOROETHANE	NT	NT	NT	NT			
1,1,2,2-TETRACHLOROETHYLENE	G	P	NT	NT	G	NR	E
TETRAHYDROFURAN (THF)	P	P	NT	NT	E	P	F
TOLUENE (TOUOL)	P	P	NT	NT	G	E	P
TOLUENE DIISOCYANTE	F	NT	G	F	E	E	E
TOUOL	P	P	NT	NT			
1,1,1-TRICHLOROETHANE	P	P	NT	NT	G	E	NR
TRICHLOROETHYLENE (TCE)	P	NT	NT	NT	G	G	P
TRICHLOROTRIFLUOROETHANE	E	E	NT	NT			
TRIETHANOAMINE (TEA)	E	E	E	E			
TRIFLUOROETHANOL	NT	NT	NT	NT			
TRIHYDROXYTRIETHYLAMINE	E	E	E	E			
TURPENTINE	E	E	NT	NT			
VINYL ACETATE	F	G	NT	NT			
XYLENES	F	F	NT	NT	E	E	P
XLOLS	F	F	NT	NT			
BENZALDEHYDE	E	F	F	G			
BROMINE		G	G	G			
BUTANE		E	P	P			
BUTYLALDEHYDE		G	P	G			
CALCIUM HYPOCHLORITE	G	G	P	G			
CHLORINE		G	G	G			
CHLOROACETONE		E	F	P			
DIBENZYL ETHER		G	F	P			
DIBUTYL PHTHALATE		G	F	P	G	E	E
DIETHANOLAMINE		E	F	E			
ETHYLENE TRICHLORIDE		P	P	P			
FLUORINE		G	G	G			
GLYCEROL	E	G	G	E			
HYDROBROMIC		E	G	E			
HYDROGEN PEROXIDE	G	G	G	E			
IODINE		G	G	G			
METHYLAMINE	E	G	G	E	F	E	E
METHYL CELLOSOLVE		E	F	P			
METHYLENE CHLORIDE	G	F	F	F			
MONOETHANOLAMINE		E	F	E			
MORPHOLINE		E	F	E	E	F	E
PERCHLORIC ACID	F	G	F	E			
PROPYLENE DICHLORIDE		F	P	P			
SODIUM HYPOCHLORITE	F	P	G	G			
TRICRESYL PHOSPHATE		F	P	F			
TRINITROTOLUENE		E	P	P			
METHYL MERCURY					E		
1,1-DICHLOROEHTANE					NT	G	ID
DIETHYLAMINE					E	P	P
GLUTARALDEHYDE					E	E	E
TETRACHLOROETHYLENE					G	E	P
VINYL CHLORIDE					E	E	P

P-TERT-BUTYLTOLUENE					E	E	F
CHLORONAPHTHALENE					E	E	NR
CYCLOHEXANOL					G	E	E
CYCLOHEANONE					G	E	E
DIVINYL BENZENE					E	G	F
NITROPROPANE					G	P	G
PENTACHLOROPHENOL					E	E	NR
N-PENTATE					G	E	NR

Performance Rating	Weight Change	Penetration Time	References
Excellent	0-10%	>8 hours	MAPA Professional
Good	11-20%	>6 hours	Fisher Scientific
Fair	21-30%	< 6 hours	Lab Safety Supply
Poor	>30%	Minutes	Direct Safety Catalog
Not Tested	not tested		"Prudent Practices"

It is worth noting that aromatic and halogenated hydrocarbons will attack all types of natural and synthetic glove material. Should swelling occur, the user should change to fresh gloves and allow the swollen gloves to dry and return to normal. If using one of these solvents, then whenever you leave the lab, remove the gloves to allow any absorbed solvent to escape. All gloves wear out after a period of time. Dispose of questionable gloves rather than risk injury.

Before using the gloves, check for rips, pinholes and defects by air inflation. However, do not blow into the gloves with your mouth. Use the airlines available in the lab. After working with toxic materials, rinse the gloves before taking them off. While removing the gloves, be careful not to contaminate yourself. The used decontaminated gloves should be disposed of immediately in the trash.

Another form of skin protection is the laboratory coat. Most lab coats are made of material that resist water and other liquids to some degree. The lab coats can protect your clothing from getting small holes caused by droplet of corrosive liquids. If you will be working with a strong corrosive, ask the stockroom manager for a rubber apron.

A common problem in the educational science laboratory is the wearing of open shoes like sandals or thongs. The feet should be covered completely to protect them from chemicals and broken glass. And under no circumstances should a person enter the laboratory bare-footed.

Hazardous Waste Disposal

Purpose

The purpose of this policy is to 1) prevent haphazard or indiscriminate disposal of College-generated wastes that can pose a hazard to health and the environment, and 2) to provide for the proper and legal disposal of such wastes.

Definitions

Generally, waste is defined as surplus, unneeded, or unwanted material. Lab workers have some latitude in declaring a substance as a waste, although some regulations limit this discretion. Anything that is abandoned or "inherently wastelike" (such as a spilled substance) is a waste.

The following characteristics are associated with hazardous materials:

(1) A material is ignitable (flammable) if it has any of the following characteristics:

- it has a flashpoint of less than 60 C (140 F), or some other characteristic that has the potential to cause fire;

- it is capable, under standard temperature and pressure, of causing fire through friction, absorption of moisture, or spontaneous chemical changes and, when ignited, burns vigorously and persistently so as to create a hazard;

- it is a flammable compress gas, or can form a flammable gas mixture;

- is it an oxidizer that stimulates combustion of organic materials.

(2) A material is corrosive if it is a liquid that has a pH of less than 2 or greater than 12.5 (or corrodes certain grades of steel).

(3) The material is reactive; that is, it is normally unstable, reacts violently with water, is capable of detonation if exposed to some initiating source, or produces toxic gases.

(4) The material 1) has an LD50 less than 50 mg/kg (oral, rat), an LC50 less than 2 mg/L (rat), or a dermal LD50 less than 200 mg/kg (rabbit), or is otherwise capable of causing or significantly contributing to an increase in serious, irreversible, or incapacitating reversible, illness, or 2) is listed in Appendix VIII in 40 CFR 261.

Procedures

The Copper Mountain College hazardous waste management program has four basic components: waste minimization, identification, storage, and disposal.

1. Minimization

a. Only those amounts of chemicals that are needed should be ordered. "Economy of Scale" purchases should be avoided when the immediate foreseeable use of the chemical is not obvious.

b. Procedures should be designed, where possible, to eliminate or minimize the amount of waste materials generated. This should preferably be included as part of the lab experiment for student laboratories.

c. Whenever possible, spent solvents should be recovered and recycled by distillation or chromatographic purification for reuse.

d. Aqueous solutions of acids and bases should be neutralized before flushing down the drain with large volumes of water.

e. Solutions containing toxic heavy metals such as mercury, lead, chromium, silver, etc. should be precipitated and the metal recovered in solid form for subsequent disposal as a solid waste.

f. Fume hoods should not be used as a means of disposal of volatile chemicals.

g. Liquid organic wastes should be emptied into labeled plastic containers kept in vented metal cabinets in each laboratory.

h. Highly reactive wastes such as acid chlorides should be converted to a less reactive form before disposing in the waste containers.

2. Identification

a. All wastes are to be clearly labeled with: contents, the name of the person who labeled it, and the date. Labels are to be as specific and thorough as possible. Labels should include product or chemical name, suspected contaminants, and a note about the process, which produced it.

b. Every effort should be made to avoid an unlabeled waste container. If such a container is discovered, the staff should attempt to determine the most likely contents of the container by interviewing appropriate people. The substance should be analyzed only if there is a high degree of certainty that this can be done without

risk. If this cannot be done, the substance must be disposed of as an "unknown" at considerable cost to the College.

3. Storage

a. Each department is responsible for storing its own waste until it is transferred to a central location prior to being picked up by a disposal firm.

b. Each department may accumulate no more than 55 gallons of hazardous waste or 1 quart of acutely hazardous waste.

c. The Code of Federal Regulations states that hazardous waste pick-ups are to occur within 90 days after the waste starts to accumulate (at the collection site) in order to avoid becoming a storage facility. All college departments will be notified of the collection date so that wastes can be made available for pick-up.

4. Disposal

a. Certain chemical wastes are not to be treated or disposed of on site, but are shipped off campus. Wastes sent off campus include those that require special disposal permits, those subject to regulations specifying where and how they may be disposed, and those for which no on-campus disposal system works. As noted above, these wastes can be accumulated for no more than 1 year at the department location. Once at Facilities and Operations, off-campus disposal must occur within 90 days.

b. A permit is received from the EPA for this disposal. The wastes are packed in accordance with EPA and Department of Transportation specifications, detailing the types of wastes that may be packed together, types of packing material, and types and conditions of the containers. Labels must be affixed to the containers to indicate the types of waste contained within. Pertinent documentation is made by College personnel regarding the wastes being removed for disposal. The waste drums are then picked up by the outside firm who is responsible for transportation and the disposal of the wastes. Facilities and Operations will schedule the pick-up date for the waste with an approved disposal contractor.

c. An annual written survey will be made by the Purchasing Department to determine the amount and kind of wastes to be disposed. The survey will include a definition of hazardous waste and examples of such materials. A written response will be attached to a copy of the survey request, and determination will be made of the need for disposal services based on the response.

Addendum

Samples of Hazardous Waste

MPCA - Toxic and Hazardous Wastes. Toxic and hazardous wastes are waste materials including but not limited to poisons, pesticides, herbicides, acids, caustics, pathological wastes, radioactive materials, flammable or explosive materials, and similar harmful chemicals and wastes which require special handling and must be disposed of in a manner to conserve the environment and protect the public health and safety.

Infectious Waste

1. All wastes originating from persons placed in isolation for control and treatment of an infectious disease.

2. Bandages, dressings, casts, catheters, tubing, and the like, which have been in contact with wounds, burns, or surgical incisions of a suspected, known or medically identified hazardous infectious nature.

3. Laboratory and pathology waste of an infectious nature, which has not been autoclaved.

4. Any other waste as defined by the State Board of Health, which because of its potential infectious characteristics or hazardous nature requires handling and disposal in a manner prescribed for (1) through (3).

Ventilation

The primary form of protection from overexposure by inhalation in Copper Mountain College science laboratories is fume hoods. Laboratories are generally equipped with at least one negative pressure fume hood that pulls vapors of hazardous chemicals away from the user. If the laboratory does not have a hood, then a negative pressure glove box should be used or an appropriate respirator.

The CHP states that whenever exposure by inhalation is likely to exceed the threshold limits described in the SDS for that particular chemical, a fume hood should be used. Therefore, before using a compound check the SDS for that compound to determine whether it should be used exclusively in a fume hood. The CHP also provides guidelines for threshold limit value (TLV) or permissible exposure level (PEL). If the TLV or PEL is less than 50 ppm or 100 mg/m3 then the chemical should be used only in a fume hood.

Before using a fume hood, check to see that it is working properly. This can be accomplished by closing the sash to within one inch of being completely closed and taking a small strip of tissue or Kimwipes and placing it near the one inch opening. If the hood is working, the strip of tissue should be drawn into the hood demonstrating negative pressure. If the strip does not show negative pressure, then inform the lab supervisor to see if the room ventilation is turned on. The hoods do not work if the room ventilation is not working. If the room ventilation is working and the hood is not, call physical plant so a maintenance worker can check to see if a fan belt is broken or a circuit breaker has been tripped.

The hood performance can be greatly affected also by these factors:

1. Objects obstructing the return ducts. In particular, often people store chemical in hood. This cluttering of the hood interferes with the air being pull from the back bottom portion for the hood. Remove unnecessary chemical and equipment and return them to their proper location.

2. The position of the equipment or apparatus should be at least 6 inches back from the front sash. This can improve the capture rate by 1000 times.

3. Positioning the sash in the down position greatly increases the flow rate through the aperture. It is strongly recommended that the hood sash be kept down whenever possible.

4. Secondary currents created by portable fans, traffic in front of the hood, and wind conditions outside the building can push fumes into the room.

5. Positioning of the baffle at the rear wall of the hood determines whether the air will be drawn form the top or bottom of the hood. This baffle plate should be in the

down position for fumes lighter than air and when using a burner in the hood. The position of the baffle should be up for fumes that are heavier than air. Most hoods are set at the median position to draw moderately from both points. Only the Building Supervisor and laboratory supervisors are authorized to change the baffle position.

After you have checked the SDS and find that you are not required to use a hood, the reagent may be used in the open laboratory provided the room ventilation is working.

Gas Cylinders

Hazards of Compressed Gases

1. Mechanical failure of the cylinder, cylinder valve, or regulator can result in rapid diffusion of the pressurized contents into the atmosphere, leading to explosion, fire runaway reaction, or burst reaction vessels.

2. Unsecured cylinders can be knocked over very easily, causing serious injury and damage. Impact can shear the valve from an uncapped cylinder, especially if a regulator is attached, causing a rocking action or penwhelling leading to personal injury.

3. Gas cylinders may contain flammable, toxic, or corrosive gases; asphyxiants; or oxidizers.

Storage and Handling of Compressed Gases

1. Check to make sure that a label is attached or the identification of the contents is stenciled on the cylinder when a cylinder is brought to you. Do not accept a cylinder if the contents are not clearly identified. Do not rely on color coding to identify the contents of a gas cylinder; color coding is not standardized.

2. To transport a cylinder, use a hand truck equipped with a chain or belt for securing the cylinder. Make sure the protective cap covers the cylinder valve. Never move a cylinder while a regulator is attached. Do not move cylinders by carrying, rolling, sliding, or dragging them across the floor. Do not transport oxygen and combustible gases at the same time.

3. Secure gas cylinders to prevent them from falling over. Chains or a clamp-plus-strap assembly are the most common methods of keeping cylinders upright. Make sure the chain is high enough on the cylinder to keep it from tipping over.

4. Do not store incompatible gases together. Store cylinders of oxygen at least 20 feet away from cylinders of hydrogen or other flammable gases.

5. Store cylinders away from heat (never in areas above 125° C), including steam or hot water pipes, and away from areas where they might be subjected to mechanical damage.

6. Store full and empty tanks in volatile solvent room. Place "Empty" ring around the top of the tanks when removing them from service to avoid accidental connection to an empty to a pressurized system, causing backflow into the tank.

7. Ground cylinders of combustible gases (e.g., to a water pipe) to prevent buildup of static electricity. Keep cylinders away from locations where they might form part of a electrical circuit.

8. Keep the protective cap that comes with a cylinder of gas on the cylinder when it is not in use. The cap prevents the main cylinder valve from being damaged or broken.

9. NFPA codes specify maximum quantities and sizes of hazardous gas cylinders in laboratory areas. A typical laboratory in the department may have no more than three standard cylinders of flammable gases and/or oxygen; two of liquefied flammable gases; and three 4' X 15" cylinders (or volume equivalent) of gases with high Health Hazard Ratings (see NFPA 45).

10.Corrosive or unstable gases should be ordered in the minimum quantities necessary and stored in a hood or other safe, dry area. Corrosive gases, if stored for long periods, will corrode the valve internally and may be impossible to open or if opened, may not close.

11.Gases with Health Hazard Ratings of 3 or 4, or a rating of 2 with no physiological warning properties, MUST be kept in an hood or other ventilated enclosure. No more than three cylinders with ratings of 3 or 4 may be kept in one enclosure.

12.Cylinders not needed for current use should not be stored in laboratories. Recommended maximum retention periods for gases are 36 months for liquefied flammable gases, flammable gases, and oxygen; 6 months for corrosive or unstable gases or those with a Health Hazard Rating of 3 or 4.

13.When a cylinder is empty (preferably not less than 25 psi residual pressure), close the valve to prevent air and moisture from entering the tank, remove the regulator (purging it if necessary to safely remove toxic or corrosive gases), replace the cylinder cap, and label the tank "EMPTY." Use a hand truck to return the cylinder to the gas cylinder storage in the Volatile solvent room.

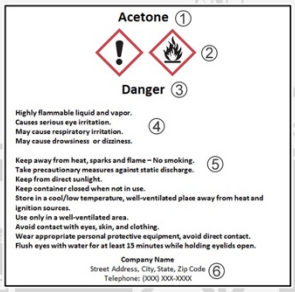
Appendix C

Labeling and the Globally Harmonized System (GHS) as described by MSDS online

OSHA's HazCom 2012 Labels FAQs

MSDSonline®
EH&S Compliance Made Simple

What 6 elements must shipped container labels have?



1. Product Identifier – Same as product identifier on SDS
2. Pictogram(s) – Black hazard symbol on white background with red diamond border
3. Signal Word – Either 'Danger' or 'Warning' as determined by severity
4. Hazard Statement(s) – Describes the nature and/or degree of the hazard(s)
5. Precautionary Statement(s) – Prevention, response, storage, and spill measures
6. Supplier Information – Including name, address and phone number

Remember

- ✓ No exemptions for small packages. Shipped containers are required to have all of the required label elements. OSHA does allow the use of pull-out labels, peel-back labels and tags.
- ✓ To black out unneeded red diamonds from preprinted labels there must no visible trace of the red diamond. Blacked out diamond must not deface, detract or cast doubt on rest of label.
- ✓ Employers do not have to relabel inventory that was labeled by manufacturer, however, workers must be aware of all new hazards and workplace labels will need to reflect any new hazards.

What are the 3 workplace label options?

1. Include all of the required information found on the manufacturers shipped label.
2. Use the product identifier and other words, pictures, symbols, or combination thereof, which provide specfic information regarding all chemical hazards.
3. Continue to use current system if it was compliant under HazCom 1994, meets requirements, and provides employees with info on all hazards of the chemical.

Are NFPA & HMIS Labels Allowed?

Employers may continue to use NFPA and HMIS labels. However, on their own, they do not meet the requirements for stand alone workplace labels. They lack product identifiers and often do not address all of the health and physical hazards of a chemical. If used, must be consistent with HazCom Requirements.

Where can I get all of the new SDSs?

You will have a mix of MSDS and SDS formats for some time. Manufacturer deadline to update to SDSs is June 1, 2015. Many will likely miss deadline. Stay alert. Keep an eye on MSDS library until all updates are complete.

Ask how MSDSonline can help with GHS Labels!

Remember

- ✓ Your Workplace Label System (workplace labels, employee training, and other info available in the workplace) should work together to provide employees with immediate access to all hazard information about a chemcial.
- ✓ Workplace labels do not require a red diamond border and may instead have a black border.
- ✓ Labels must be in English; other languages are permitted in addition to that.
- ✓ Labels are not required on portable containers. Hazardous chemicals transferred from a labled container to a portable container that is intended for immediate use by the employee making the transfer do not require a label.

Call us today! 1.888.362.2007 www.MSDSonline.com

OSHA HazCom / GHS Pictograms

MSDSonline®
EH&S Compliance Made Simple

OSHA aligned its Hazard Communication Standard (HazCom) with GHS in 2012. Effective June 1, 2015, hazardous chemical manufacturers must include GHS pictograms on their product container labels. GHS pictograms consist of a black hazard symbol on a white background surrounded by a red diamond border. A chemical's hazard classification determines which of the pictograms from below appear on its respective label. As of Dec. 1, 2013, all employers covered by the HazCom Standard must ensure their employees are trained on these new pictograms and other GHS label elements.

Health Hazard

- Carcinogen
- Mutagenicity
- Reproductive Toxicity
- Respiratory Sensitizer
- Target Organ Toxicity
- Aspiration Toxicity

Flame

- Flammables
- Pyrophorics
- Self-Heating
- Emits Flammable Gas
- Self-Reactive
- Organic Peroxides

Exclamation Mark

- Irritant (Skin & Eye)
- Skin Sensitizer
- Acute Toxicity (Harmful)
- Narcotic Effects
- Respiratory Tract Irritant
- Hazardous to Ozone Layer
  (Non-Mandatory for HazCom)

Corrosion

- Skin Corrosion / Burns
- Eye Damage
- Corrosive to Metals

Gas Cylinder

- Gases Under Pressure

Exploding Bomb

- Explosives
- Self-Reactives
- Organic Peroxides

Skull & Crossbones

- Acute Toxicity
  (Fatal or Toxic)

Flame Over Circle

- Oxidizers

Environment

(Non-Mandatory for HazCom)

- Aquatic Toxicity

www.MSDSonline.com 1.888.362.2007 Copyright © 2014, MSDSonline®. All rights reserved.

APPENDIX D

Links to Federal and State OSHA Guidelines

Federal OSHA
https://www.osha.gov/pls/oshaweb/owares.do_search?p_doc_type=STANDARDS&p_search_type=StandTextPolicy&p_search_str=1910.1450).

Cal/OSHA
http://www.dir.ca.gov/title8/5191.html
http://www.dir.ca.gov/title8/5194.html