LSCCE LAB SAFETY RIGHT-TO-KNOW (RTK) TRAINING

PURDUE UNIVERSITY | Lyles School of Civil and Construction Engineering

Introduction

- The Hazard Communication Standard is an OSHA regulation (29 CFR 1910.1200) "…to ensure that the hazards of all chemicals produced or imported are evaluated, and that information concerning their hazards is transmitted to employers and employees. This transmittal of information is to be accomplished by means of comprehensive hazard communication hazard programs, which are to include container labeling and other forms of warning, safety data sheets and employee training."

- Right-to-Know and Hazard Communication essentially mean the same thing and are frequently used interchangeably. Both phrases refer to the standard and the Purdue program which was put in place to help ensure that the University stays in compliance with the standard. A "DTI" is the designated trained individual who is responsible for maintaining the chemical inventory, keeping a complete file of safety data sheets (SDS), and facilitating employee training for their individual work area.

Training Objectives

- Indicate the potential physical and health hazards of the chemicals used in the work area.
- Indicate how to recognize and detect spills or leaks of chemicals in the work area.
- Indicate what to do in case of a mechanical accident or if the material is ingested, inhaled, injected, or absorbed.

Training Outline

Here is an outline of the material that will be covered in this training:

- Introduction
  - Right-to-Know
  - Purpose of training
  - Employees covered by the program
- Rights & Responsibilities of:
  - Environmental Health and Public Safety (EHS)
  - Supervisors & managers
  - Designated Trained Individuals (DTI)
  - Employees
- General Information/Program Requirements
  - Written compliance manual
  - SDS
  - Chemical inventory list
- Job-Specific Training
  - Hazardous chemicals used
    - Product by product, or
    - by chemical class (acid, base, solvent, flammable, etc.)
- Physical Hazards of Products in the Work Area
  - Flammable/combustible
  - Corrosive
  - Reactive/explosive
- Health Hazards of Products in the Work Area
  - Local and systemic effects
  - Acute and chronic effects
- Exposure Limits
  - Threshold limit values (TLV)
  - Permissible exposure limits (PEL)

Training Outline (continued)

Here is an outline of the material that will be covered in this training:

- Factors Influencing Health Effect
  - Physical state of product
  - Product concentration
  - Exposure route and time exposed
  - Individual Sensitivity
- Equipment Hazards
- Field Hazards
- Safety Data Sheets (SDS)
  - Explanation of what a SDS is
  - Information contained on a SDS
  - How to read a SDS
  - How to request a SDS
- Labeling System
  - All containers must be labeled
  - University's labeling system, NFPA
  - Number rating and meaning
  - PPE symbol decals and meaning
- Control Methods
  - Protective equipment: gloves, goggles, etc.
  - Engineering: exhaust ventilation
  - Administrative: limiting work time for each individual
- Other Safety Topics in Civil and Construction Engineering
- Summary

The Designated Trained Individual (DTI)

- Each lab has a DTI who is responsible for safety in their lab.
- After attending the DTI training class, the DTI is expected to communicate the following information to the employees in his/her area(s) of responsibilities:
  - Identify processes and areas where hazardous chemicals are used or located in work area
  - Indicate location of written compliance manual
  - Indicate location of safety data sheets (SDSs)
  - Indicate how to read an SDS, how to locate and understand the information presented on the SDSs
  - Indicate the importance of personal protective equipment (PPE) and how to determine what PPE is needed for a chemical
  - Identify chemicals and their hazards on all containers with secondary container labels and indicate how to correctly complete such labels
  - Identify equipment that may be hazardous and communicate protocol for safe operation of this equipment, including procedures and personal protective equipment
- The purpose of this training is:
  - Provide employees with knowledge to understand the hazards of the chemicals they work with
  - Provide a safer and healthier workplace for all employees
  - Ensure regulatory compliance with the State and Federal Right-To-Know Law, 29 CFR 1910.1200

Employees Covered

- Who is covered under the RTK or Hazard Communication Program (HCP or HazCom)
  - Support Service Employees
    - Physical Facilities, Transportation, Printing Services, Airport Operations, Intercollegiate Athletics, Housing and Food Services, Clerical
  - Academic Employees
    - Support Services (i.e., departmental shops), Laboratory with non-laboratory use of chemicals
- An Employee is anyone who receives a paycheck from Purdue University whether full-time, part-time, temporary, or student

Responsibilities

- Environmental Health and Public Safety (EHS)Identify processes and areas where hazardous chemicals are used or located in work area
  - Train DTIs
  - Conduct work area audits
  - Assist with SDS acquisitions
  - Program oversight
- DTIs
  - Coordinate work area Hazard Communication program including but not limited to
  - Chemical inventories & employee exposure records
  - Maintain SDSs for work area
  - Ensure ALL containers are labeled
  - Conduct employee training
  - Maintain safe and healthful work conditions
  - Contact EHS with questions

Employee Rights

- To be informed about the known health and physical hazards in your work area
- To be trained to use proper safety techniques and hygiene practices
- To inform your DTI about accidents or hazardous situations in your work area without fear of repercussions from your supervisor or the University
- To file a formal complaint with IOSHA
  - Indiana Department of Labor – IOSHA
    402 West Washington Street
    Room W195
    Indianapolis, IN 46204-2287
  - 317.232.2655
  - http://www.in.gov/dol/iosha.htm

Employee Responsibilities

- To use the available information and to stay informed about the hazards in your work area
- To use the safety techniques and hygiene practices as a routine part of your daily activities
- To attend the training sessions conducted by your DTI (online or otherwise)

General Information

- Program requirements
  - chemical inventory
  - employee exposure record
  - employee training
  - SDSs
  - Labeling
- For this Work Area
  - SDS's are the responsibility of each lab. They are also available from Environmental Health and Public Safety (EHS).
  - Each lab must identify and communicate hazards of the lab.
  - Each lab is responsible for designating a DTI and training employees who work in the lab.

Job Specific Information

- Overview
  - Hazardous chemicals used in this work area:
    - are listed in the chemical inventory
  - Training may be done product by product or by chemical class
    - Chemical classes include but are not limited to: acids, bases, and solvents
- Chemical Hazards in This Work Area:
  - Solvents
    - defatting of the skin
    - eczema, severe dry and cracking skin
  - Acids, pH < 7
    - burns and blisters the skin
    - lung irritation if inhaled
    - flush skin with water for 15-20 minutes
  - Bases, ph > 7
    - burns skin, damage area can penetrate to bone if not neutralized
    - eye damage
    - Call 9-1-1. Flush skin with water until help arrives. Seek medical attention.

Physical Hazards

- Physical Hazards of Products in the Work Area
  - Flammable
  - Corrosive
  - Reactive/instable
  - Explosive
  - Other

Physical Hazards (continued)

Biohazard - Is there the actual or potential presence of a biohazard (such as an infection agent that presents a risk of death, injury or illness. See OSHA 1910.1030.

Compressed Gas - See Sections 3 and 9 of the SDS. Is the material held in a container either at an absolute pressure greater than 276 kPa at 21degrees C, or an absolute pressure greater than 717 kPa at 54 degrees C or both, or any liquid flammable material having a Reid vapor pressure greater than 276 kPa at 38 degrees C.

Corrosive - Does the material destroy living tissue when contacted? Review the NFPA rating for Health Hazard. See Section 3 of the SDS. Also determine if the material is an organic peroxide.

Explosive - See Sections 3, 5 and 10 of the SDS. Will the material explode when heated, shocked, or mixed with water? Consider how the material will polymerize or whether there could be explosive dust-air mixtures. You also may want to indicate, in particular, if the material is "Unstable" or "Water Reactive" or an "Oxidizer“

Flammable - Is the material flammable and what term do you want to use (combustible liquid, flammable gas, flammable liquid/solid, or Pyrophoric? See Sections 3, 5 and 10 of your SDS. Also consult with ANSI Z129.1-1994 for detailed explanations of Flammability. A pyrophoric material ignites spontaneously in dry or moist air at or below 54.4ºC?

Poison - Is the material highly toxic? See ANSI Z129.1-1994 for definitions of when a material is highly toxic. See Sections 3 and 11 of your SDS.

Radioactive - See Sections 3 and 10 of your SDS.

Health Hazards

Toxic -Lethal in large doses

Highly Toxic (Poison) - Lethal in small doses

Reproductive Toxin - Chemicals which affect the reproductive capabilities including chromosomal damage (mutations) and effects on fetuses (teratogenesis)

Irritant - A chemical, which is not corrosive, but which causes a reversible inflammatory effect on living tissue by chemical action at the site of contact

Corrosive - A chemical that causes visible destruction of, or irreversible alterations in, living tissue by chemical action at the site of contact

Sensitizer - A chemical that causes a substantial proportion of exposed people or animals to develop an allergic reaction in normal tissue after repeated exposure to the chemical

Carcinogen - A chemical considered likely to cause cancer

Health Hazards of Products in the Work Area

- Local and Systemic Effects
  - Local - Involves one site in the body, usually the point of contact
    - Skin irritation or burns
    - Eye irritation or burns
    - Upper respiratory tract irritation
  - Systemic - Involves more than one part of the body, not just the point of contact
    - Central nervous system: headaches, dizziness, nausea, etc.
    - Organ damage: liver, lungs, etc.
    - Cancer
- Acute vs. Chronic
  - Generally, the terms "acute" and chronic" are used to delineate between the effects on the basis of severity or duration
    - "Acute" effects usually occur rapidly as a result of short-term exposures, and are of short duration
    - "Chronic" effects generally occur as a result of long-term exposure, and are of long duration

Exposure Limits

- Guidelines established to protect the average healthy worker from health effects
  - based on 8 hour days, 40 hour weeks, 40 year working lifetime
  - assumes worker is an average healthy person

- Two types used in the U.S.
  - Threshold Limit Value (TLV)
  - Permissible Exposure Limit (PEL)

- The TLVs are a voluntary guideline established by the American Conference of Industrial Hygienists
  - updated more frequently, tend to be more protective, not mandated by law

- The PELs are the mandatory limits established by OSHA
  - mandated by law, legally enforceable, not updated as often

Factors Influencing Health Effects

- Physical State of the Product
  - Gas, liquid, solid
- Concentration of the Product
  - More concentrated, more damage in a given time frame
    - example: consider the effects of drinking one scotch and water in one hour versus drinking the same amount of straight scotch for one hour
- Length of Exposure (Time) to the Product
  - The longer you are exposed to a product at a given concentration the greater the chance of health effects
    - example: drinking one scotch and water in an evening once a month versus drinking one scotch and water an hour every evening every month

Factors Influencing Health Effects (continued)

- Route of Exposure

Inhalation - Chemicals may enter the bloodstream through the lungs

Ingestion - Chemicals may be absorbed into the bloodstream through the small intestine, stomach, etc.

Skin Absorption - Chemicals may be absorbed through the skin

Skin or Eye Contact - Chemicals may be absorbed through the skin or eye

- Individual Sensitivities
  - some people will have greater health effects than others
- Other Exposures

Equipment Hazards

- Equipment may present hazards due to force, sharp or moving parts, noise and particulate emissions.
- Make sure you know how to use equipment safely and are aware of the potential dangers associated with any equipment used.
- Make sure you use the appropriate Personal Protection Equipment that is required.

Field Hazards

- Civil/Construction engineering duties may include work out of the building in the field, for example, for data collection.
- Make sure you are aware of potential dangers as well as the appropriate protocol that should be followed when working in the field.
- Make sure you use the appropriate Personal Protection Equipment that is required (for example, Class 3 safety vest, hard hat, and safety cones).

Globally Harmonized System of Classification and Labelling of Chemicals/GHS

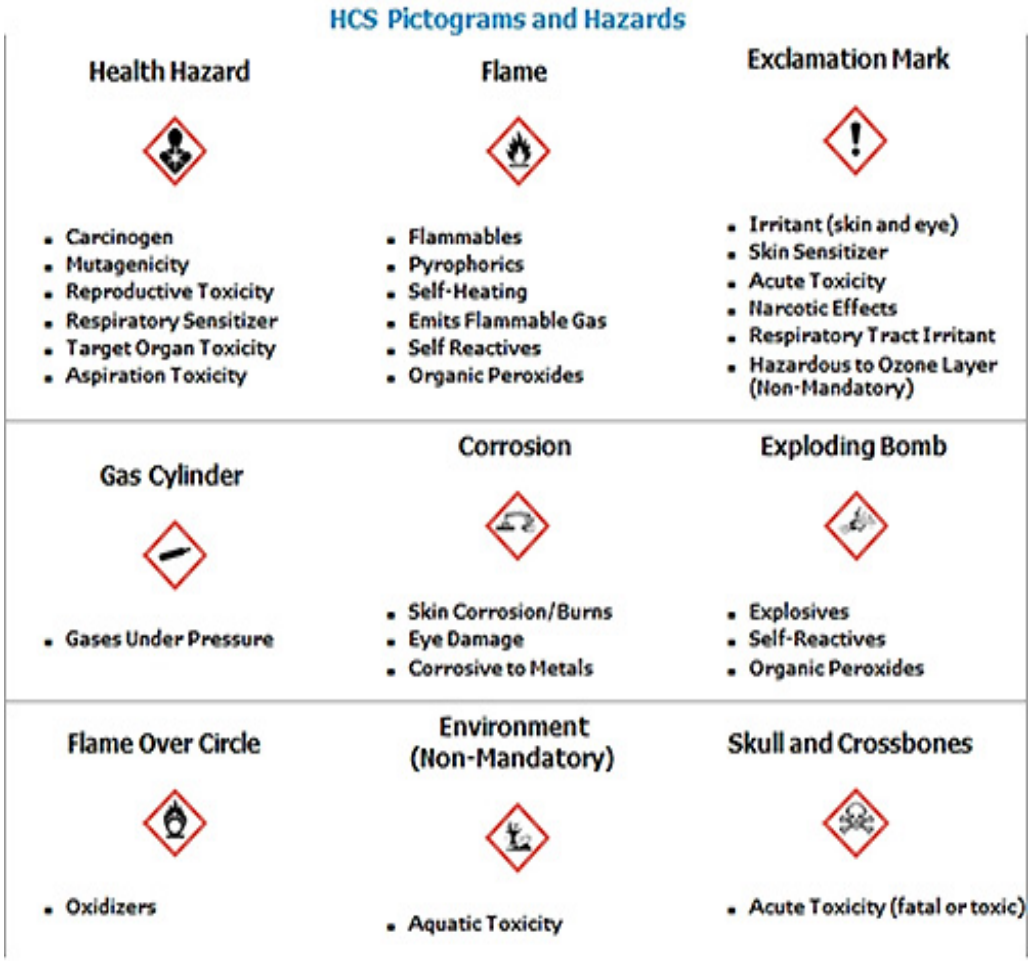
- A worldwide system which will harmonize container labeling, classification and hazard identification of chemicals, and safety data sheet format and content
- Manufacturers and distributors must create and use updated container labels on their products
- Labels include all pertinent information, such as product and supplier info, hazard signal word, pictograms, and precautionary statements.

GHS – Hazard Classifications

- Hazard classification is assessed by manufacturers and suppliers
  - Each material falls into a defined hazard class with pre-determined precautionary statements issued according to that evaluation.
  - This is somewhat similar to the hazard rating number system; even though the modification suggests a revised numbering scale of 1-5 (with 1 being the most hazardous and 5 being the least), the NFPA has not adopted this change and neither will Purdue. We will continue to use the same numbering system and secondary container labels we have been (NFPA 704 diamond labels for secondary containers).

GHS – Pictograms

- Nine pictograms utilized in identifying hazards of all chemicals
- Each chemical has at least one pictogram (in some cases, multiple pictograms) to visually convey the hazards associated with it
- Everyone needs to be familiar with the meaning(s) of each pictogram. Labels and safety data sheets will not always include that information, so a certain level of understanding by the end users will have to be achieved/maintained. Environmental Health and Public Safety (EHS) will provide pictogram reference cards to post in work areas to help people become familiar with these pictograms and their meanings.



GHS – Safety Data Sheets

Standard SDS format will include these 16 sections:

1. Identification
2. Hazard(s) identification
3. Composition/information on ingredients
4. First-aid measures
5. Fire-fighting measures
6. Accidental release measures
7. Handling and storage
8. Exposure controls/personal protection
9. Physical and chemical properties
10. Stability and reactivity
11. Toxicological information
12. Ecological information
13. Disposal considerations
14. Transport information
15. Regulatory information
16. Other information

GHS – Safety Data Sheets (Continued)

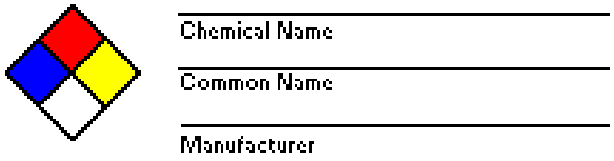
- OSHA will not enforce sections 12-15 as they do not have jurisdiction over these categories; these would fall under EPA or other environmental regulatory agencies.
  - Every SDS will have the same 16 sections in the same order, regardless of issuer.
  - Every section will have the same safety information, i.e. section 4 will ALWAYS relay first aid measures; section 8 will ALWAYS show PPE requirements, etc.
  - Keep current MSDS available until new SDS are found; archive old MSDS as new SDS are collected.
  - Questions? Contact Phyllis Young; PLHILL@PURDUE.EDU; 494-6371

Labels

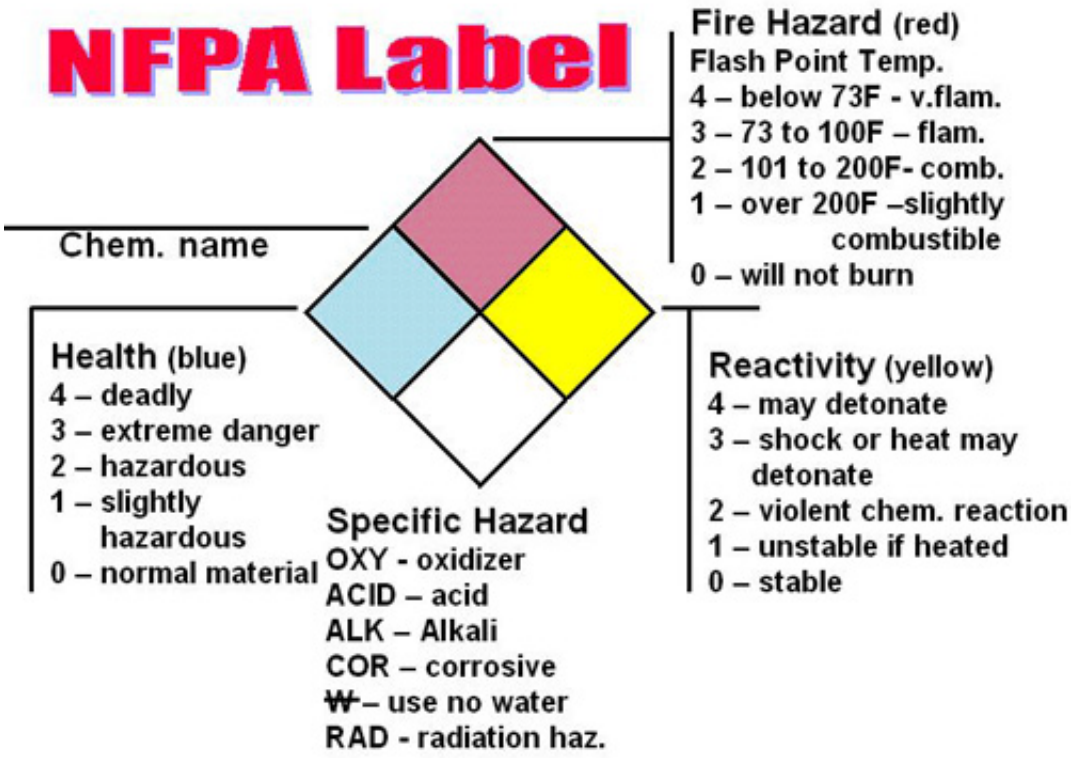
- Incoming containers must be labeled by manufacturer or distributor
  - Required minimum information
    - Product Name
    - Manufacturer/Distributor
    - Address
    - Hazard information
- Labels must be intact and attached to the container
- Prominently displayed on the container and at least written in English
- Never remove or deface labels unless container is empty
- Inspect containers on a regular basis to ensure labels are secure and still legible
  - If label is partially coming off, reattach with adhesive or clear packing tape
  - If label is becoming illegible, use an approved University secondary container label to re-label the container

Labels – Secondary Containers

- Secondary Containers
  - All must be labeled
    - Product name as it appears on the SDS
    - Hazard information
      - Health
      - Flammability
      - Reactivity/Instability
      - Special hazard
      - Personal Protective Equipment
  - Labels available from EHS



Uses NFPA diamond hazard identification system

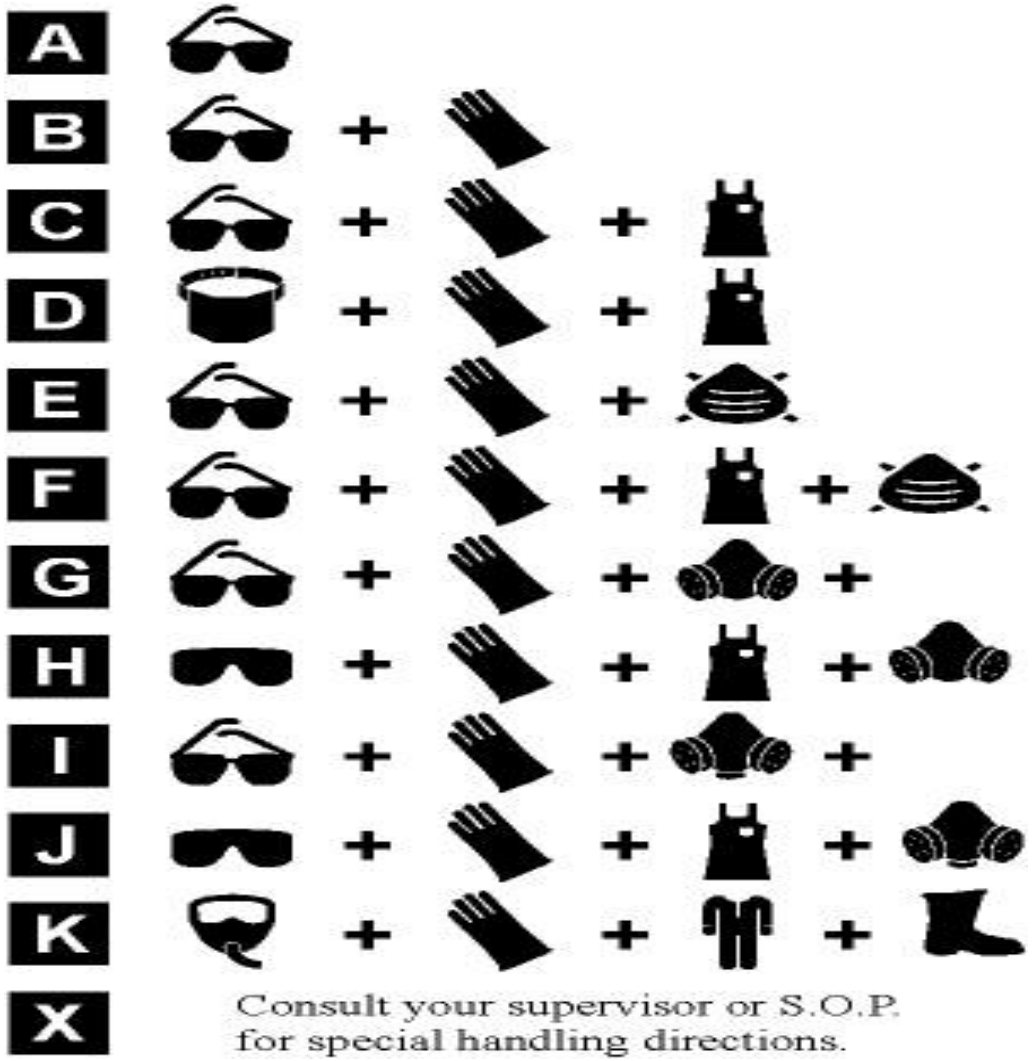


Labels - NFPA Hazard Rating System

- Diamond divided into four smaller diamonds
  - Start at the left diamond and move clockwise to read the hazard information
  - May or may not be color coded
  - Information will always be in the same location
    - Health
    - Fire
    - Reactivity/Instability
    - Special Hazard
  - Numbers will be 0-4
    - 0 = minimal hazard
    - 4 = severe hazard
    - Complete definitions available in Appendix I of the written compliance manual
  - Special hazard information includes oxidizer, corrosive, acid, base, etc.

Labels - Personal Protective Symbol Decals

- PPE decals may be on original labels
- used on secondary container labels (available from EHS)



How Personal Protective Equipment (PPE) are selected

- Consult Section 8 of your 16-part SDS

Eyes:

Use safety "Glasses" for dusts and materials that are "mildly irritating" to the eyes

Use "Goggles" for materials that are liquids and materials that are "irritating," "severely irritating" or “corrosive“ to the eyes and for compressed gases that my cause frost bite.

Face:

Use “Face Shield” if the material is “corrosive”

Hands:

Generally, "Gloves" should be worn, but you may need to verify which type of glove should be used.

Body & Feet:

A "Full Suit" is recommended if the materials are "corrosive", that are "highly toxic" or "toxic" to organs. Also consider the amount of material to which a worker will be exposed.

If a full suit is not used, substitute an "Apron".

Respirator:

There are many different possible types of respirators that can be used and the choice often depends upon the potential exposure level.

Control Measures

- Control Methods
  - Ways to reduce exposure to chemical products
    - Personal protective equipment (PPE)
      - Gloves
      - Goggles
      - Respirators
      - Other
    - Engineering
      - Local exhaust ventilation
      - Remote handling of materials
    - Administrative
      - Limit work time
      - Rotate work groups
      - Break areas separate from work areas
      - No smoking, eating, drinking, or applying cosmetics in work areas

Chemical Hygiene Plan and Hazardous Materials Safety Manual

- A chemical hygiene plan provides information about hazards in a laboratory. Purdue has a general template for a Chemical Hygiene Plan that provides basic information on safe handling of chemicals and hazardous materials. This basic information may be accessed electronically at https://www.purdue.edu/ehps/rem/documents/programs/chp2014.pdf. Some laboratories require additional information on lab procedures and hazardous material protocol that is specific to the lab.

- The chemical hygiene plan contains information about a wide range of topics related to safe handling of chemicals, including but not limited to:
  - General safety guidelines
  - Engineering controls such as ventilation systems, and process design to reduce hazards
  - Administrative controls which may include limiting work time and developing rules and protocol for safety
  - Personal protection equipment (PPE)
  - Model standard operating procedures for physical hazards and health hazards
  - Biological hazards
  - Radioactive and radiation hazards
  - Chemical storage
  - Transportation of hazardous materials
  - Waste disposal
  - Emergency response

Personal Protection Equipment (PPE)

- PPE plays an important role in safety.
- Many activities in labs may require PPE, such as gloves, eye protection, and lab coat.
- Purdue has a policy on PPE that can be accessed electronically at http://www.purdue.edu/rem/documents/programs/PPEPolicy.pdf.
- Individual labs provide guidance on the PPE that may be required for certain tasks through the hazard certification, which is posted in each lab.
- Never use a chemical, or undertake a process, or procedure or use a piece of equipment unless you are aware of the PPE that is appropriate. If you are unsure or do not have appropriate PPE do not do undertake the activity.

Safety - Other Potential Hazards in Civil and Construction Engineering Labs and Field Work

- There is a wide range of activities in civil and construction engineering labs, and the potential hazards vary significantly from lab to lab.
- Potential hazards that may exist in civil and construction engineering labs and during data collection in the field may include but are not limited to:
  - Saws and equipment with sharp and/or moving blades
  - Testing equipment that exerts large forces
  - Cranes
  - Ladders, lifts, aerial platforms and scaffolding that present a fall risk
  - Concrete saws and other equipment that results in airborne particulates
  - Hot emulsions that may present a burn hazard
  - Water and electric pumps that may present an electrocution hazard
  - Lasers that may require special eye protection and other PPE
  - Loud equipment that may warrant hearing protection
  - Field hazards associated with being near moving vehicles
- If you have any questions about potential hazards, make sure you ask the lab safety contact (DTI), or contact EHS if additional information or training is needed.

Safety is Everyone's Concern

- Environmental Health and Public Safety (EHS) also provides information about ergonomics and safety workplace design
  - Office workers may be vulnerable to repetitive stress injuries, which may be reduced by proper workplace design and equipment
- Safety Attitude
  - Everyone needs to be aware of safety
  - Safety is everyone's responsibility
  - Educate yourself about potential hazards and use your common sense to stay safe!

THANK YOU

Your Right-to-Know (RTK) Training Certification must be renewed annually as long as you are a paid employee of the Lyles School of Civil and Construction Engineering