

DVD 1: INTRODUCTION AND LABORATORY AREAS

PART 3

LABORATORY SAFETY AND INSPECTIONS

OVERVIEW

Safety In the laboratory is an important part of any corporate safety program. This segment focuses on laboratory safety concepts and gives detailed examples of safe versus unsafe laboratory situations.

OBJECTIVES

After you have completed this unit you should be able to:

- describe proper usage of laboratory hoods.
- identify safety features and equipment used in the laboratory.
- state the important parts of a chemical label.
- identify several hazardous laboratory situations and remedy them.

INTRODUCER

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KEY TERMS

Material Safety Data Sheet (MSDS)

Relief device

Face velocity

Velometer

SUPPORTING MATERIALS AND REFERENCES

1. D. A. Crowl and J. F. Louvar, *Chemical Process Safety: Fundamentals with Applications*, 2nd ed. (NY: Prentice Hall, 2002) Chapter 3: Industrial Hygiene
2. *Industrial Ventilation: A Manual of Recommended Practice*, 25th ed. (Cincinnati, OH: American Conference of Governmental Industrial Hygienists, 2004).
3. *Prudent Practices in the Laboratory, Handling and Disposal of Chemicals* (Washington, DC: National Academy Press, 1995).

Laboratory Safety and Inspections

OUTLINE

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I. Laboratory safety

- A. Safety glasses: must have side shields and must be ANSI Z87 certified and stamped.
- B. Proper usage of laboratory hoods
Design criteria: 100 feet per minute (fpm) face velocity
 - 1. hood must be checked
 - a. annually using a velometer
 - b. continuously by using a draft gauge which is mounted on the surface of the hood
 - 2. Sashes must be set in the correct position to maintain an adequate face velocity across the hood
- C. Safety features and equipment
 - 1. eye washes: must continue to flow once activated
 - a. must be near work area.
 - b. must be used for a minimum of fifteen minutes
 - c. someone must assist
 - 2. fire extinguishers
 - a. must be in the proper location, and unobstructed
 - b. must be in good condition
 - c. must be inspected monthly for these two features

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3. safety showers: used to extinguish fires and for chemical spills on clothing. Clothing must be removed.
4. buddy system - at least two people should work in an area at a time
5. storage of lab equipment
 - a. segregate glassware from heavy metal objects
 - b. dispose of broken glassware in a designated, rigid-walled container
6. Proper chemical storage
 - a. do not store chemicals alphabetically
 - b. store only compatibles together
 - c. limit the amount of flammable storage on the benchtops
 - (1) no more than two gallons in the open
 - (2) safety cans used if you must exceed that amount
 - d. properly label all samples and chemicals.
 - (1) identity of contents
 - (2) date material was acquired
 - (3) disposal date
 - (4) responsible staff member
 - (5) hazardous characteristics
 - (6) pertinent safety information
 - e. all chemicals must be inventoried
 - (1) ensures against expired outdates

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(2) ensures against reordering duplicate materials

- f. order only what you need
- g. properly dispose of material in an environmentally acceptable manner
- h. Material Safety Data Sheets (MSDS) must be available. MSDS's include:
 - (1) physical property data
 - (2) safety information
 - (3) toxicology information
 - (4) must be stored in a centralized location for others to use.

II. Recognizing safety hazards

A. Situational remedy: Labeling and storage of laboratory chemicals during lab usage

- 1. limit the amount of solvent on the bench
- 2. move containers away from the edges and corners
- 3. make sure all materials are properly labeled
- 4. toxic materials should be stored in the hood
- 5. store bulk solvents in proper safety cans

B. Situational remedy: equipment procedures in hoods

- 1. provide for spill containment underneath any reaction flasks in the hood
- 2. use proper relief devices
- 3. inspect equipment before use for any unsafe conditions such as frayed cords

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4. use an alternative method for preventing drafts across the mouth of the flask
 5. make sure the sash is at the correct height to maintain adequate face velocity across the hood
- C. Situational remedy: segregating and storing equipment in drawers
1. always keep sharp implements and syringes properly guarded
 2. segregate glassware from metal objects
 3. dispose of broken glassware
 4. store mercury thermometers with care elsewhere
 5. do not keep damaged fittings
- discard or repair
- D. Situational remedy: Mark in lab
1. always wear safety glasses
 2. handle glassware properly
 3. shield any vacuum glassware
 4. never eat, drink, or smoke in the lab
- E. Situational remedy: poor housekeeping
1. store mercury thermometers carefully
 2. always keep clear access to safety equipment
 3. limit use of extension cords - use with care
 4. inspect safety equipment on a routine regular basis
 5. clean and dispose of all chemical containers properly

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- III. Summary: The laboratory can be a hazardous environment if proper safety procedures are not followed.