

# Preventing Exposure to Hazardous Chemicals in Laboratories



A Division of the  
Department of Consumer  
and Business Services

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## Preface

This publication provides an overview of the [OSHA laboratory standard](#), including ways to prevent exposures to hazardous chemicals in laboratories, but it is not a substitute for the requirements of the rule. More information is available on [Oregon OSHA's A-Z Laboratory topic page](#).

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## Background

- OSHA's traditional approach for controlling workplace exposures to hazardous chemicals has been:
- To develop substance-specific standards, such as lead or benzene.
- To enforce the permissible exposure limits (PELs) for specific chemicals, such as the [Oregon Rules for Air Contaminants](#).
- To require employers to inform and train employees about how to work safely with chemicals through a hazard communication program.

This traditional approach works well in most industrial settings, where workers may be exposed to particular hazardous chemicals over a traditional 8-hour day. However, laboratory workers may be required to handle many more chemicals – such as volatile organic compounds, formaldehyde, strong bases and acids – but in smaller quantities, and for shorter periods of time than workers in general industry. Although most are preventable, exposures and accidents occur every year in labs, resulting in chemical-related injuries and illnesses ranging from skin and eye irritation to burns, chronic diseases, or death.

OSHA's laboratory standard focuses on the unique nature of laboratory work, emphasizing knowledge, prudent work practices, and effective personal protection. This performance-oriented standard aims to reduce worker injuries and illnesses in a cost-effective way by allowing employers in industrial, clinical, and academic labs the flexibility to implement safe work practices and procedures specific to their workplaces.



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## Scope of the standard

The laboratory standard applies only to relatively small quantities of hazardous chemicals used in a workplace laboratory on a non-production basis.

“Laboratory use” of hazardous chemicals must meet all of the following conditions:

- Chemical manipulations are carried out on a “laboratory scale.”
- Multiple chemical procedures or chemicals are used.
- The procedures involved are not part of a production process, nor in any way simulate a production process.
- Protective laboratory practices and equipment are available and in common use to minimize the potential for employee exposure to hazardous chemicals.

Any hazardous chemical use that does not meet the “laboratory use” conditions is covered under other Oregon OSHA rules. This includes other hazardous chemical use within a laboratory, such as:

- Chemicals used in building maintenance of a laboratory.
- The production of a chemical for commercial sale, even in small quantities.
- Quality control testing of a product.

“Laboratory scale” means work with substances in which the containers used for reactions, transfers, and other handling of substances are designed to be easily and safely manipulated by one person. For this type of laboratory use, OSHA’s laboratory standard applies instead of all other health standards in Subdivision 2/ Z of the Oregon OSHA rules. For instance, the [Hazard Communication Standard](#) does not apply to this type of chemical use, so the requirements of the substance-specific standards in 2/Z would not apply except:

- You must obey the part of an applicable standard that prohibits eye and skin contact.
- You must not exceed the Permissible Exposure Limits (PELs) in the Air Contaminant rules or substance-specific standards.
- You must follow the exposure monitoring and medical surveillance requirements of the laboratory standard if an action level listed in an applicable rule is routinely exceeded.

The laboratory standard does not apply if there is no potential for employee exposure. For example, using a “dip-and-read” test comparing reaction color; or using a commercially prepared test kit – with all of the reagents needed to conduct the test contained in the kit. Neither does it apply to workplaces that produce commercial quantities of chemicals or otherwise do not meet the definition of laboratory use.

The Hazard Communication Standard and other relevant standards in Division 2/Z apply to all general industry occupational exposures to hazardous chemicals not covered by the laboratory standard.

## Chemical-hygiene plan

The requirement for a written, employer-developed plan is at the core of the standard. This gives employers flexibility to provide the type of protections appropriate to their specific workplace. The written plan must specify training and information required by the standard; it must also specify work practices, standard operating procedures, appropriate control methods, adequate protective equipment, medical surveillance, and special precautions for work with particularly hazardous substances. Some employers may be able to meet requirements for the written plan with their existing safety and health plans. Employers must evaluate the effectiveness of their plans at least annually and update them when new hazards are introduced or when necessary. The plan must be available to workers and their designated representatives.

The employer must designate a chemical hygiene officer and, if appropriate, set up a chemical hygiene committee to provide technical guidance in developing and implementing the written plan. The chemical hygiene officer typically has a variety of duties such as monitoring processes, procuring chemicals, advising special projects or facility upgrades, and advising administrators on improved chemical hygiene policies and practices.





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## Employee information and training

As part of the written plan, employers must provide an information and training program for their laboratory employees. The program must alert workers to the hazards of the chemicals present in their work areas. Training must be provided at the time of a worker's initial assignment and prior to a new exposure situation. The frequency of refresher training is up to the employer, but the criteria should be stated in the written plan.

**Information** — At a minimum, must make the following information available:

- OSHA's laboratory standard and appendices.
- The employer's workplace-specific, chemical hygiene plan.
- OSHA's permissible exposure limits (PELs) or recommended occupational exposure limits.
- Signs and symptoms associated with exposure to the hazardous chemicals used in the laboratory.
- Reference material on the hazards, safe handling, storage and disposal of hazardous chemicals found in the laboratory including, safety data sheets received from the chemical supplier.

**Training** — Must include these elements:

- Details about how the chemical hygiene plan is implemented in the workplace.
- Physical and health hazards of chemicals used in the work area.
- Requirements for employer-implemented control measures that provide worker protection, including engineering controls, work practices, emergency procedures, and appropriate personal protective equipment.
- Methods such as continuous monitoring devices, visual appearance, or smells by which workers can detect the presence of hazardous chemicals and the limitations of these methods.
- Information about how to properly use and evaluate the performance of fume hoods and other engineering controls, performance of fume hoods and other protective equipment.

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## Medical examinations and consultation

The standard doesn't mandate medical surveillance for all lab workers, but employers must provide any worker who works with hazardous chemicals an opportunity for medical attention:

- If they exhibit signs or experience symptoms associated with exposure to a hazardous chemical used in the lab.
- If they are routinely exposed above the action level or, if there's no action level, above the Permissible Exposure Limit (PEL) of an Oregon OSHA-regulated substance that has exposure monitoring or medical surveillance requirements.
- If they are exposed to a spill, leak, explosion, or other accident involving a hazardous chemical.

Medical attention must be provided at no cost to the employee, without loss of pay, and at a reasonable time and place. It includes any follow-up examination and treatment recommended by the examining doctor. In these cases, employers must give the doctor specific information about the hazardous chemicals, the conditions under which the exposure occurred, and the signs and symptoms experienced by the worker.

Employers must get a written report from the doctor about recommended follow-up examinations, related test results, medical conditions of the worker that might increase risk, and a statement that the employee was informed of the medical examination or consultation results.





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## Methods of control and personal protective equipment

As part of the chemical hygiene plan, employers must develop criteria for determining and implementing control measures to reduce worker exposure to hazardous chemicals in labs. Traditionally, these measures have included engineering controls, work practice controls, and personal protective equipment (PPE). Engineering controls include ventilation, fume hoods, glove boxes, and local exhaust systems. Work practice controls include restricting areas for food and drink, and prohibiting mouth pipetting. Controls may also include working in a way that minimizes exposure to hazardous chemicals and maximizes the effectiveness of engineering controls.

Oregon OSHA policy requires that engineering and work practice controls reduce employee exposure below PELs. Respiratory protection may be used as an interim measure or when engineering or work practice controls aren't feasible.

Respiratory equipment must meet the requirements of [Division 2/I, 1910.134](#) or [Division 4/I, 437-004-1041](#) for agricultural employers, which specify the proper way to select, fit, use, and maintain respiratory protection. Other PPE that may be required in labs includes chemical goggles or safety glasses, lab coats or whole body coverings, and appropriate gloves.



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## Safeguards for particularly hazardous substances

In the chemical hygiene plan, employers must consider including additional protective measures for work involving select carcinogens, reproductive toxins, and substances with a high degree of acute toxicity. See the [laboratory standard](#) for definitions. Chemical hygiene plans must include the following:

- Establish a designated work area with appropriate signs warning of hazards associated with the substance.
- Requirements to use a fume hood or equivalent containment device.
- Procedures for decontaminating the designated area.
- Procedures for the safe handling and removal of contaminated waste.

### Hazard identification Division 2/Z, 1910.1450(h)

Employers must make sure that the labels on hazardous chemical containers shipped to their facilities are not removed or defaced. Employers must also maintain SDSs received with chemical shipments and ensure they are available to workers. SDSs are documents providing specific information about the hazards and appropriate precautions for the safe use of the chemicals.

- When employers develop chemical substances in their lab, they must:
- Provide appropriate training on the hazards.
- Assume the substance is hazardous.
- Provide an SDS according to [Division 2/Z, 1910.1200\(g\)](#) if the substance leaves the facility.



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## Recordkeeping

Employers must establish and maintain an accurate record of any measurements taken to monitor employee exposures and any medical consultation and examinations including tests or written opinions required by this standard.

Employers must also ensure that these records are kept, transferred, and made available according to Oregon OSHA's [Division 2/Z, 1910.1020](#) exposure and medical records rule. Under 1910.1020, exposure records must be kept for 30 years. Medical records must be kept for at least the duration of employment, plus 30 years. There's an exception for employees who have worked less than one year that allows employers to provide these records to the workers upon termination instead of keeping them.



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## The Appendices

Appendices to the laboratory standard are not part of the rule, but provide non-mandatory guidelines and recommendations. Appendix A is from the 2011 edition of the National Research Council publication, *Prudent Practices in the Laboratory: Handling and Management of Chemical Hazards*. Appendix B contains references intended to help employers to develop their chemical hygiene plan. Appendices A and B, are available with [Division 2/Z, 1910.1450 Occupational Exposure to Hazardous Chemicals in Laboratories](#).

## Summary

Laboratory standard requirements provide employers and employees in labs with a flexible, viable alternative to traditional substance-specific regulation. Compliance with this regulation, including implementing a chemical hygiene plan, provides workers with the information and training necessary to improve workplace safety and health and to reduce the number of chemical-related injuries and illnesses in labs.



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## Pertinent rules and related publications

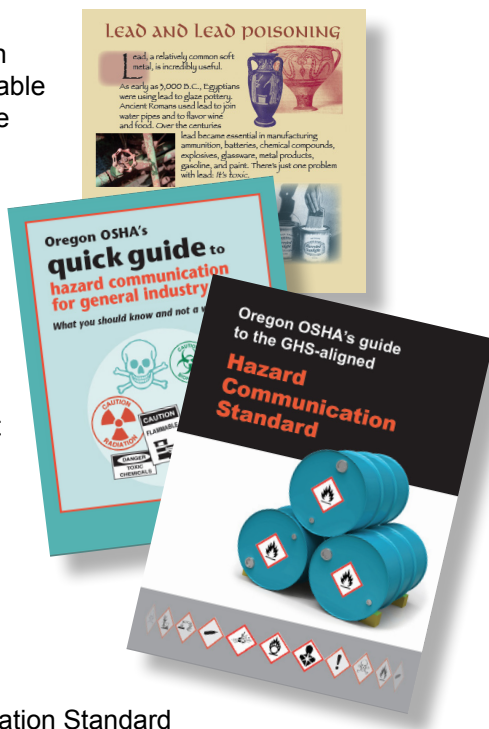
A variety of [Oregon OSHA's Hazard Communication Publications](#) are online and in print. Oregon rules and publications are available from the [Oregon OSHA Resource Center](#). The following rules are available for viewing or download on the [Oregon OSHA's rules page](#).

### General Industry

- [Division 2/Z, 1910.1450](#) Occupational Exposure to Hazardous Chemicals in Laboratories
- [Division 2/H](#), Hazardous Materials
- [Division 2/I](#), Personal Protective Equipment
- [Division 2/K](#), Medical and First Aid
- [Division 2/Z, OAR 437-002-0382](#)  
Oregon Rules for Air Contaminants
- [Division 2/Z, OAR 437-002-0391](#)  
Oregon Rules for Carcinogens in Labs
- [Division 2/Z, 1910.1020](#) Access to Employee Exposure and Medical Records
- [Division 2/Z, 1910.1200](#) Hazard Communication Standard

### Agriculture

- [Division 4/Z, OAR 437-004-9860](#) Hazardous Chemicals in Laboratories
- [Division 4/A, OAR 437-004-0005](#) Access to Employee Exposure and Medical Records
- [Division 4/H](#) Hazardous Materials
- [Division 4/I](#) Protective Equipment
- [Division 4/K](#) Medical/ First Aid
- [Division 4/Z, OAR 437-004-9000](#) Air Contaminants
- [Division 4/Z, OAR 437-004-9800](#) Hazard Communication Standard for Agricultural Employers



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## *Oregon* OSHA Services

**Oregon OSHA offers a wide variety of safety and health services to employers and employees:**

### **Appeals**

**503-947-7426; 800-922-2689; [admin.web@oregon.gov](mailto:admin.web@oregon.gov)**

- Discusses Oregon OSHA's requirements and clarifies workplace safety or health violations.
- Discusses and negotiates settlement agreements to resolve disputed citations.

### **Conferences**

**503-378-3272; 888-292-5247; [oregon.conferences@oregon.gov](mailto:oregon.conferences@oregon.gov)**

- Co-hosts conferences throughout Oregon that enable employees and employers to learn and share ideas with local and nationally recognized safety and health professionals.

### **Consultative Services**

**503-378-3272; 800-922-2689; [consult.web@oregon.gov](mailto:consult.web@oregon.gov)**

- Offers no-cost, on-site safety and health assistance to help Oregon employers recognize and correct workplace safety and health problems.
- Provides consultations in the areas of safety, industrial hygiene, ergonomics, occupational safety and health programs, assistance to new businesses, the Safety and Health Achievement Recognition Program (SHARP), and the Voluntary Protection Program (VPP).

### **Enforcement**

**503-378-3272; 800-922-2689; [enforce.web@oregon.gov](mailto:enforce.web@oregon.gov)**

- Offers pre-job conferences for mobile employers in industries such as logging and construction.
- Inspects places of employment for occupational safety and health hazards and investigates workplace complaints and accidents.
- Provides abatement assistance to employers who have received citations and provides compliance and technical assistance by phone.



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## Public Education

**503-947-7443; 888-292-5247, Option 2; [ed.web@oregon.gov](mailto:ed.web@oregon.gov)**

- Provides online courses and materials covering management of basic safety and health programs, safety committees, accident investigation, technical topics, and job safety analysis.

## Standards and Technical Resources

**503-378-3272; 800-922-2689; [tech.web@oregon.gov](mailto:tech.web@oregon.gov)**

- Develops, interprets, and gives technical advice on Oregon OSHA's safety and health rules.
- Publishes safe-practices guides, pamphlets, and other materials for employers and employees
- Manages the Oregon OSHA Resource Center, which offers safety videos, books, periodicals, and research assistance for employers and employees.

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**For more information, call the Oregon OSHA office nearest you.**

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