

Worker Safety Resources CD-ROM, 2nd Edition Table of Contents

How to use the Worker Safety Resources CD-ROM

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References

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 OSHA Z-List (Note: Includes old transitional limits)
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 OSHA 1910.0146 Confined Spaces
 OSHA 1910.120 Hazwoper
 OSHA 1910.1450 Laboratory Standard
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How to Read and Understand an MSDS

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ANSI Color Coding Chart for Filters, Cartridges, and Canisters Used With Air Purifying Respirators

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OSHA 1910.120 Hazwoper

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References

How to Read and Understand an MSDS
Signs and Symptoms of Overexposure
OSHA Z-list
ANSI Z87.1 Selection Criteria for Protective Devices
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OSHA 1910.1450 Laboratory Standard

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OSHA 1910.1200 HazCom

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References

How to Read and Understand an MSDS
 Signs and Symptoms of Overexposure to Hazardous Materials
 What Makes a Hazardous Material Hazardous

Regulations

OSHA 1910.132 General Requirements
 OSHA 1910.133 Eye and Face Protection
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Chemicals Covered by the Process Safety Management Standard

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OSHA 1910.119 Process Safety Management of Highly Hazardous Chemicals

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- How to Read and Understand an MSDS
- Signs and Symptoms of Overexposure
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- Title VII of the Civil Rights Act of 1984

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Personal Protective Equipment

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Safety and Health Dictionary

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1998

March, April, May, June, July, August, September, October, November,
December

1999

January, February, March, April, May, June, July, August, September, October,
November, December

Regulations

EPA

- 40CFR 0171 Certification of Pesticide Applicators
- 40CFR 0261 Hazardous Waste Criteria
- 40CFR 0262 Standards for Generators of Hazardous Waste

OSHA

- 29CFR 1904 Recording and Reporting Occupational Injuries and Illnesses
- 29CFR 1910.20 Access to Employee Exposure and Medical Records
- 29CFR 1910.95 Occupational Noise Exposure
- 29CFR 1910.106 Flammable and Combustible Liquids
- 29CFR 1910.119 Process Safety Management of Highly Hazardous Chemicals
- 29CFR 1910.120 Hazwoper
- 29CFR 1910.132 PPE General Requirements
- 29CFR 1910.133 Eye and Face Protection
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- 29CFR 1910.137 Electrical Protective Devices
- 29CFR 1910.138 Hand Protection
- 29CFR 1910.146 Confined Spaces
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- 29CFR 1910.301-399 Subpart S Electrical
- 29CFR 1910.1000 Z-List Air Contaminants
- 29CFR 1910.1001 Asbestos
- 29CFR 1910.1002 Coal Tar Pitch
- 29CFR 1910.1003 13 Carcinogens
- 29CFR 1910.1004 alpha-Naphthylamine
- 29CFR 1910.1006 Methyl chloromethyl ether
- 29CFR 1910.1007 3,3'-Dichlorobenzidine (and its salts)
- 29CFR 1910.1008 bis-Chloromethyl ether
- 29CFR 1910.1009 beta-Naphthylamine
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- 29CFR 1910.1016 N-Nitrosodimethylamine
- 29CFR 1910.1017 Vinyl Chloride
- 29CFR 1910.1018 Inorganic Arsenic
- 29CFR 1910.1020 Access to employee exposure and medical records
- 29CFR 1910.1025 Lead
- 29CFR 1910.1027 Cadmium
- 29CFR 1910.1028 Benzene
- 29CFR 1910.1029 Coke Oven Emissions
- 29CFR 1910.1030 Bloodborne Pathogens
- 29CFR 1910.1043 Cotton Dust
- 29CFR 1910.1044 1,2 dibromo-3-chloropropane
- 29CFR 1910.1045 Acrylonitrile
- 29CFR 1910.1047 Ethylene Oxide
- 29CFR 1910.1048 Formaldehyde
- 29CFR 1910.1050 Methylenedianiline
- 29CFR 1910.1051 1,3-Butadiene
- 29CFR 1910.1052 Methylene Chloride
- 29CFR 1910.1096 Ionizing radiation
- 29CFR 1910.1200 HazCom
- 29CFR 1910.1201 Retention of DOT markings, placards and labels
- 29CFR 1910.1450 Laboratory Standard

29CFR 1926.95 PPE for Construction Workers
CRA
42USC Civil Rights Act Title VII

Material Safety Data Sheets (MSDSs)

Chemical Labels

References

How to Read and Understand an MSDS
Signs and Symptoms of Overexposure
OSHA Z-List (Note: Includes old transitional limits)
What Makes a Hazardous Material Hazardous
ANSI Z87.1 Selection Criteria for Protective Devices
List of Incompatible Chemicals
List of Ergonomic Injuries, Causes & Remedies
Chemicals Covered by the Process Safety Management Standard
ANSI Color-Coding Chart for Filter Cartridge/Canister
Hazards of Common Construction Chemicals
Classes and Divisions Within WHMIS and TDG
Health Hazards of Materials Found in Health Care Facilities
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MSDS Request Letter
Suggested Menus for One Week
Tradename Products Cross Reference

2. Understanding Your Circadian Rhythms



“Sorry boss, but the trouble with my biological clock is that it didn’t come with an alarm.”

Understanding how circadian rhythms affect your life as a shiftworker is an important first step toward developing coping strategies. Let’s begin with the basics: What are circadian rhythms?

Daily Rhythms

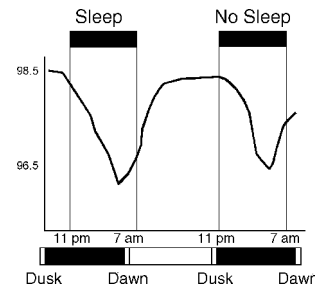
Circadian comes from a Latin phrase meaning “about a day.” Human circadian rhythms refer to aspects of our physiology that fluctuate over a period of about 24 hours. Virtually every function in the human body follows a circadian pattern.

Examples include the sleep/wake cycle, body temperature, digestive secretions and hormone production. The chart on the following page shows the circadian rhythm for body temperature. Note that your body temperature falls at night, whether or not you sleep.

Not surprisingly, you feel different at different times

of the day. At your circadian peaks, during the daytime:

- Your energy level increases.
- Your body temperature rises.
- Your digestive system gears up in anticipation of a meal.
- Your coordination and physical ability are enhanced.
- Your eyes focus easily.



Your body temperature is controlled by circadian rhythms.

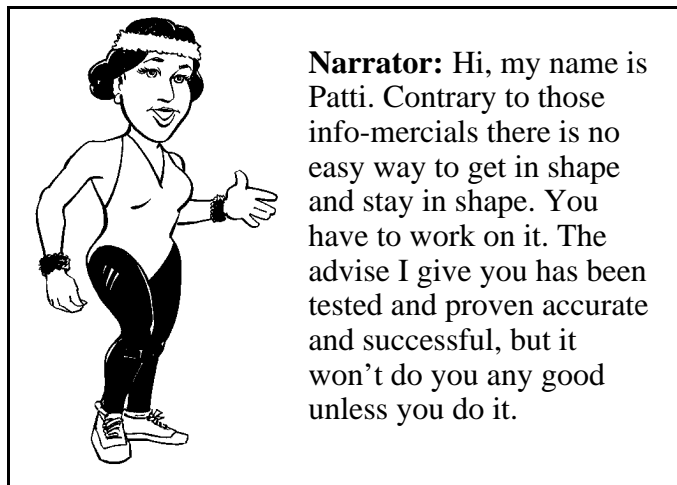
During your circadian dips, in the mid-afternoon and overnight hours:

- Waves of sleepiness wash over you at intervals.
- Your head feels heavy.
- You don’t feel hungry.
- Your reaction time becomes much slower than normal.
- Your memory is not as sharp.

The Biological Clock

Two forces control your circadian rhythms - your internal “biological clock” and external cues.

What people call the biological clock is actually a small cluster of nerve cells in the brain. Its scientific name is the suprachiasmatic nucleus (SCN). We know that the SCN is a biological clock because



6. What To Do When Eating Out



Eating out can be tough for anyone trying to avoid fat and excess calories! It is not realistic to believe you can live in our society without eating out. Restaurants are a part of our cultural experience.

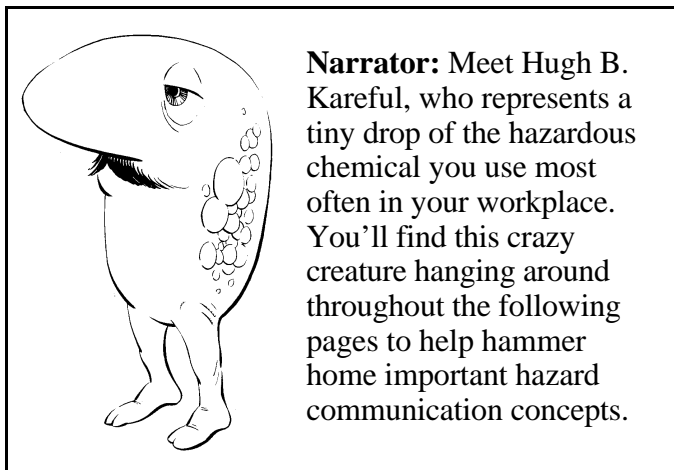
Surviving The Fine Restaurants

Learn to deal with the challenge of eating at restaurants. Most importantly avoid the mindset that the opportunity to dine out is somehow a special occasion, and is therefore exempt from all the sound

eating rules practiced at home.

There are many things you can do to ensure yourself a tasty dining experience while still eating sensibly. Here are tips to help you:

- Never skip meals to save calories for dining out. This forces your body to conserve fuel by lowering the metabolism. You will also give yourself permission to overeat later.
- Avoid the salad bar, especially if you know you won't control your choices. Choose a side salad instead.
- When ordering a salad, get the dressing on the side. That way you can control the amount. Avoid the heavy, cheesy dressings. Instead, order a lite "vinaigrette."
- Choose low-fat entrees like chicken, fish, or turkey. The more simply an entree is prepared, the fewer calories and fat it *usually* provides.
- Communicate with your waiter! The chef may have some latitude to prepare entrees without oil or butter.
- Avoid creamed soups and sauces like Alfredo. Typically made with cream and/or cheese, they can contain lots of fat.
- Choose an appetizer like a veggie platter that is fat-free or low fat. Avoid the dips; they just put the fat back in. Choose a low-fat dressing as a dip.
- Always include two vegetable choices with dinner, and ask for them to be prepared fat-free.
- Learn to enjoy the flavor of a baked potato without it being smothered under sour cream or butter. Sprinkle on a little Parmesan cheese or just add some fresh-ground pepper.
- If your sandwich comes with chips or fries, ask if you can substitute a salad, soup, veggies, or low-fat cottage cheese. If not, go without.
- Real coffee lovers can't stand the sweet,



Narrator: Meet Hugh B. Kareful, who represents a tiny drop of the hazardous chemical you use most often in your workplace. You'll find this crazy creature hanging around throughout the following pages to help hammer home important hazard communication concepts.

2. How Chemicals Can Hurt You

This handout answers the following questions

- What is a chemical hazard?
- What are physical hazards of chemicals?
- What are health hazards of chemicals?
- What are acute and chronic effects of chemicals?
- How do chemicals enter my body?
- How does dose and a person's physical characteristics help determine the hazard of a chemical exposure?

One of the most important things you need to learn is that there's a world of difference between 'chemicals' and 'hazardous chemicals'. For instance, how do you think most people would describe chemicals? Probably as some mysterious liquids bubbling in big vats or glowing green slime oozing out of pipes in an industrial plant, right? Most people associate chemicals with materials in bottles, cans, and drums produced by industry, but actually, all matter (the 'stuff' composing our world) is chemical in nature. Chemicals are everywhere!

Not all chemicals are hazardous. For example, water (H₂O) and table salt (NaCl) are chemicals found in your daily life, and they're not usually considered

hazardous. In fact, your body depends on the presence of hundreds of different chemicals in its tissues and blood every day to keep you functioning properly. On the other hand, some chemicals have hazardous properties that can cause injury, illness, or even death, as well as damage to property or the environment if handled improperly.

What Makes a Material Hazardous?

According to the Occupational Safety and Health Administration (OSHA), a chemical is considered hazardous if it is:

- Determined to be cancer-causing, toxic, corrosive, an irritant, a strong sensitizer, flammable, or reactive, and thereby poses a threat to your health and the environment.
- Specifically listed under the *Occupational Safety and Health Act*, 29 CFR (Code of Federal Regulations) part 1910, Subpart Z.
- Assigned a threshold limit value (TLV) by the American Conference of Governmental Industrial Hygienists (ACGIH).

You can best recognize which chemicals are hazardous and which ones aren't by understanding what hazards are associated with the chemicals.

Remember that there are two general categories in which you can place all chemical hazards. The first category is health hazards. In order for a chemical to cause a health hazard, it must first come in contact with your body. And it's about as easy for a chemical to enter your body as it is for you to breathe. A good example of a chemical health hazard is the carcinogenic (cancer-causing) effect of cigarette smoke on the human lungs.

The second category of chemical hazards are physical hazards. Physical hazards don't require the presence of living tissue, just the right set of environmental conditions. Take a can of gasoline as an example. It can sit in your garage all winter and not bother anyone. But light a match near a heavy concentration of gasoline fumes and KABOOM, time for a new garage!

What to do if You Are the Victim of Sexual Harassment

The purpose of this topic is to summarize the various considerations that are available to you if you become a victim of sexual harassment.

These considerations are not in any particular order. Hopefully you will never have to use any of them. However, sexual harassment in the workplace will not just go away. To be informed and prepared is always the most sensible course of action.

A. Review Company Policies Regarding the Complaint Procedure

A responsible employer has a written complaint procedure and has distributed that procedure to all employees. The written complaint procedure is either in your current employee handbook, posted on the employee bulletin board, or there is a copy in the office of the person who is handling personnel matters for your company. Generally that person is the Director of Human Resources.

After reviewing that policy follow the instructions provided by your employer. The policy is written for your protection.

B. Report to Management or a Third Party

Your employer may have had the foresight to add a third party complaint reporting system to the internal complaint procedure. The third party is an outside service or agency not connected with the company. They are able to look at the facts without being influenced by any prior knowledge of the individuals involved. Even if you have reported a complaint of harassment to management or the

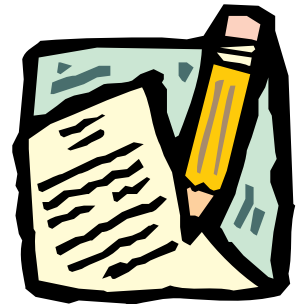


designated representative of management, you should also contact the third party reporting system. By taking this extra precaution you can be confident that you have reported the matter and that your company will be informed of the occurrence you have experienced or witnessed.

C. Personal Documentation

It is important to write down the events of a situation so you can recall exactly what happened. When an event is recorded in writing, the facts of the event are easily recalled at a later time.

Make notes that reflect the events you are recording. Make sure that the notes you are keeping show the date and time of the event and the date the notes were written down. Keep your notes in a safe place.



You may find that this documentation will be helpful for the person who is conducting the investigation into the facts you have reported or witnessed.

D. Just say, "No!"

It's a small word, but "no" can sometimes be very hard to say. But often, the best defense against one who is intent on harassing you is a polite but firm "No."

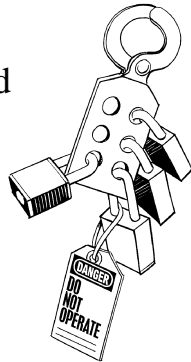
You have probably heard a well-known phrase from a country song that goes: "What part of 'no' don't you understand?" There are individuals who will not take "no" for an answer. If "no" doesn't work, inform management or management's designated representative immediately. Don't wait. If, in a later review of events it is shown that you waited before reporting harassing behavior, it may be contended that you did not feel harassed at the time after all.



Jimmy "the Mole" Molenski's *Ten Tips for* Working Safely in and Around **CONFINED SPACES**

1 **Never** enter a confined space before all hazards (atmospheric, engulfment, and mechanical) have been identified and procedures have been developed to deal with them.

2 **Always** isolate the confined space from all unwanted energy sources or hazardous substances using blanking, blinding, double block and bleed, or lock out/tag out methods.



3 **Always** maintain proper mechanical ventilation in the confined space and make sure ventilation equipment doesn't interfere with entry, exit, and rescue procedures.

4 **Never** introduce hazards, such as welding, cleaning solvents, etc., in a confined space without first making provisions for these hazards and incorporating the provisions into the written permit system.

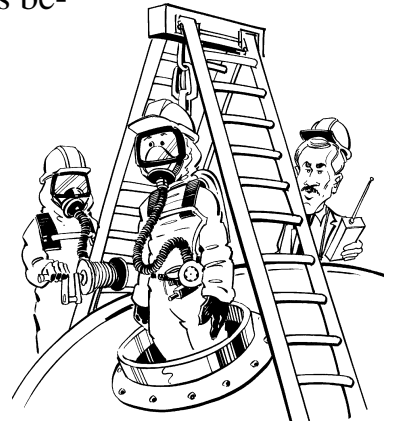
5 **Always** monitor for atmospheric hazards (oxygen, combustibles, toxics) prior to and during entry.



6 **Always** provide barriers, as necessary, to warn unauthorized personnel and to keep entrants safe from external hazards.

7 **Never** re-enter a non permit confined space once a hazard has been detected until the space has been re-evaluated and applicable procedures are in place.

8 **Always** provide constant communications between entrants and outside attendants, and remember to have backup communications if using two-way radios.



9 **Always** wear the personal protective equipment issued to you; be familiar with the use and limitations of that equipment; and be sure it's properly maintained.

10 **Never** attempt rescue of confined space entrants unless you are part of a designated rescue service and have the proper knowledge, skills, and equipment to effect safe rescue.

Construction Safety

Topic 1. Introduction to Construction Safety (and Narrator, Barry Kade)

Last Revision 2/96

1. Introduction to Construction Safety (and Narrator Barry Kade)



Welcome! Glad you could pay us a visit. My name's Barry Kade; call me Barry. Your boss asked me to show you how we handle safety on this job. Well, you came to the right place. Glad you stopped by when you did. I have a new crew starting here this morning, so why don't you join us over here and come along? I'm going to be walking and talking around the site so I can point out some of the most important safety issues workers face in the construction industry. Then, when you go back to your job, you'll know how to gear up your own safety program to suit the particular site where you're working.

See, every construction site is different, and every site should have it's own specific safety program! Safety rules are the same for all of us, but they're going to be slightly different on every job. So even if the work going on at your site is different than what you see here, you can bet that on your next job—or the next—you'll bump into the situations I'll tell you about. The main thing we emphasize here is that there are safety rules for every situation,

and workers are expected to follow those rules if they want to be safe.

To help you remember this stuff after I've stopped talking, I've made short checklists of the rules for each category of safety we'll talk about and included them with each topic.

Please, ask questions!

Here's Barry's Safety Rule Number One for construction workers: If you don't understand something, all you have to do is **ask!** Ask your supervisor as soon as the question pops into your head! After you're injured is too late.

There are employees on this project who've been working together with me for years. We watch out for one another, and when new workers come on, we watch out for them too. All the workers out here have to be careful and considerate, know their trade, and follow the safety rules. We've all had times when we've screwed up the work, that's sort of part of the job. But we can't afford even one injury. That's why we go over this safety information ahead of time.

About OSHA

I like to tell everyone at this stage about OSHA. That's the Occupational Safety and Health Administration. It's part of the US Department of Labor, and they make safety and health rules to protect American workers in all industries, especially ours. So a lot of what we're going to be talking about is not just good safety ideas, it's also OSHA code. It's law! And even though we might gripe from time to time about following their rules, I think you'd agree with the logic behind OSHA's mission: to save lives and prevent injuries.

OSHA requires that we employers maintain and enforce safety rules. We need your full cooperation to achieve compliance with this Federal Law.

It's like cooperating with speed limits. Speed and you eventually either get caught and fined, get hurt



Construction Safety

Topic 1. Introduction to Construction Safety (and Narrator, Barry Kade)

Last Revision 2/96

(or hurt others!) or both. Sometimes, you even lose your license. So, when I ask for your cooperation, remember that I asked nicely.

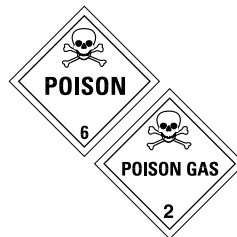
COMMON LABORATORY SIGNS AND SYMBOLS YOU SHOULD KNOW



Biohazard. Biomedical or infectious materials.



Carcinogen. Material that causes cancer or considered capable of causing cancer in humans.



Poison. Gas or vapor from a liquid where a small amount mixed with air is dangerous to life. Includes irritating materials known or suspected to be toxic to humans. Also used on DOT signs.



Combustible. Used by DOT, NFPA and others. Materials that ignite easily and have low flash points.



Pyrophoric. Any solid, liquid, gas or vapor that ignites easily and burns rapidly. Also used on DOT signs.



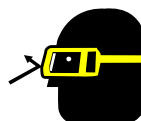
Compressed Gas. Any gas contained under pressure. Includes gas canisters, dissolved gas, liquified by compression or refrigeration. Also used on DOT signs.



Radioactive. Source of ionizing radiation. Also used on DOT signs.



Corrosive. Causes visible destruction or irreversible alterations to living tissue by chemical action. Can cause severe corrosion in steel. Also used on DOT signs.



Safety Goggles Required.



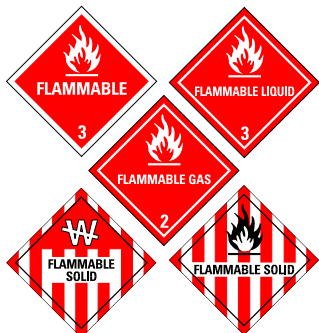
No Smoking.



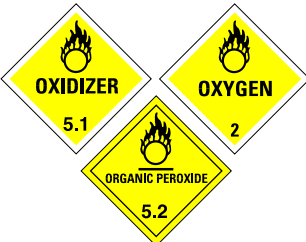
Water Reactive. Reacts with water to release a flammable gas or to present a health hazard.



Explosive. Produces sudden, almost instantaneous release or pressure, gas, and heat when subjected to abrupt shock, pressure, or high temperature. Also used on DOT signs.



Flammable. Any solid, liquid, vapor, or gas that ignites easily and burns rapidly. Also used on DOT signs.



Oxidizer and Oxidizing Agent. DOT defined. Yields oxygen readily to stimulate combustion of organic matter. Contact causes caustic burns. Also used on DOT signs.

Cryogenic. Extremely low temperature.

Embryotoxin. Harmful to developing embryo at a concentration that has no adverse effect on the pregnant female.

MUT or Mutagen. Induces genetic changes (mutations) in the DNA of chromosomes.

TER or Teratogen. Causes physical defects in a developing embryo.

Reactive Material. Chemical or mixture that vigorously polymerizes, decomposes, condenses or becomes self-reactive from shock, pressure, or temperature.

Reproductive Health Hazard/Toxin. Harmful effect on adult male or female reproductive system, developing fetus, or child

Sensitizer. On first exposure causes little or no reaction. On repeated exposure may cause a marked response not necessarily limited to the contact site. Common types include contact dermatitis and respiratory sensitization.



U.S. Department of Labor
Occupational Safety & Health Administration

1910.1200 - Hazard Communication.

- **Standard Number:** 1910.1200
- **Standard Title:** Hazard Communication.
- **SubPart Number:** Z
- **SubPart Title:** Toxic and Hazardous Substances

Produced by USDOL OSHA - Directorate of Safety Standards &
Directorate of Health Standards
Maintained by USDOL OSHA - OCIS

INTERP

(a)

"Purpose."

(a)(1)

The purpose of this section is 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 programs, which are to include container labeling and other forms of warning, material safety data sheets and employee training.

..1910.1200(a)(2)

(a)(2)

This occupational safety and health standard is intended to address comprehensively the issue of evaluating the potential hazards of chemicals, and communicating information concerning hazards and appropriate protective measures to employees, and to preempt any legal requirements of a state, or political subdivision of a state, pertaining to this subject. Evaluating the potential hazards of chemicals, and communicating information concerning hazards and appropriate protective measures to employees, may include, for example, but is not limited to, provisions for: developing and maintaining a written hazard communication program for the workplace, including lists of hazardous chemicals present; labeling of containers of chemicals in the workplace, as well as of containers of chemicals being shipped to other workplaces; preparation and distribution of material safety data sheets to employees and downstream employers; and development and implementation of employee training programs regarding hazards of chemicals and protective measures. Under section 18 of the Act, no state or political subdivision of a state may adopt or enforce, through any court or agency, any requirement relating to the issue addressed by this Federal standard, except pursuant to a Federally-approved state

CONFINED SPACE ENTRY PERMIT

BOX 6: AIR QUALITY CHECKLIST

1. Purging/Ventilation	Yes	or	No		Yes	or	No
A. Purging performed	_____		_____	Ventilation Performed	_____		_____
B. Purge Method Used	_____		_____	Initial Ventilation (20 air exchanges/min.)	_____		_____
Nitrogen	_____		_____	General Ventilation Maintained	_____		_____
Steam	_____		_____	General Ventilation Rate:	_____		_____
Water	_____		_____				
Other _____	_____		_____				
_____	_____		_____				

2. Atmospheric Tests Performed

(CAUTION: Toxic, flammable gases or vapors may stratify in confined space. Be sure to test at various levels and locations within confined space. Always check oxygen content first.)

TEST FOR:	Range	Reading	Acceptable Yes No	Purge/Ventilate? Retest or take required Precaution?	Time Readings
% Oxygen	19.5% - 23.5%	_____	_____	_____	_____
Explosive (Gas/Vapor)	<10% LEL	_____	_____	_____	_____
Explosive (Dust)	<LEL (5-ft. Visibility)	_____	_____	_____	_____
Hydrogen Sulfide	10ppm*	_____	_____	_____	_____
Carbon Monoxide	35ppm**	_____	_____	_____	_____
_____		_____	_____	_____	_____
_____		_____	_____	_____	_____
_____		_____	_____	_____	_____

Air Monitoring Conducted By: (1) _____ (2) _____ (3) _____
* NIOSH Ceiling Limit ** OSHA Vacated 1989 8-hour TWA

BOX 7: RESCUE/EMERGENCY SERVICES	BOX 8: COMMUNICATION
---	-----------------------------

Provided by _____

In-Plant Rescue/Emergency Personnel:

Name _____	Phone Number _____
_____	_____
_____	_____

Attendant/Entrant: (Check all that apply.) Yes or No

___ Visual _____

___ Radio _____

___ Other (specify) _____

Methods of Summoning: (Check all that apply) Yes or No

Radio _____

Phone (specify) _____

Other (specify) _____

BOX 9: AUTHORIZATION

Entry Authorized by:

Name: _____ Date: _____

Signature: _____ Time: _____

Post entry permit at entrance to permit space.

Outside Emergency Services:

Fire Dept. _____

Ambulance _____

Hospital _____

Other _____

BOX 10: CANCELLATION

Entry Canceled by:

Name: _____ Date: _____

Signature: _____ Time: _____

Verification of Emergency Services - Initials _____

<i>This form may be duplicated without prior permission from Genium publishing Corp.</i>	Return completed entry permit to Environmental Safety and Health Office.
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CONFINED SPACE ENTRY PERMIT

BOX 6: AIR QUALITY CHECKLIST

1. Purging/Ventilation	Yes	or	No		Yes	or	No
A. Purging performed	_____		_____	Ventilation Performed	_____		_____
B. Purge Method Used	_____		_____	Initial Ventilation (20 air exchanges/min.)	_____		_____
Nitrogen	_____		_____	General Ventilation Maintained	_____		_____
Steam	_____		_____	General Ventilation Rate:	_____		_____
Water	_____		_____				
Other _____	_____		_____				
_____	_____		_____				

2. Atmospheric Tests Performed

(CAUTION: Toxic, flammable gases or vapors may stratify in confined space. Be sure to test at various levels and locations within confined space. Always check oxygen content first.)

TEST FOR:	Range	Reading	Acceptable Yes No	Purge/Ventilate? Retest or take required Precaution?	Time Readings
% Oxygen	19.5% - 23.5%				_____
Explosive (Gas/Vapor)	<10% LEL				_____
Explosive (Dust)	<LEL (5-ft. Visibility)				_____
Hydrogen Sulfide	10ppm*				_____
Carbon Monoxide	35ppm**				_____

Air Monitoring Conducted By: (1) _____ (2) _____ (3) _____
* NIOSH Ceiling Limit ** OSHA Vacated 1989 8-hour TWA

BOX 7: RESCUE/EMERGENCY SERVICES	BOX 8: COMMUNICATION
---	-----------------------------

Provided by _____

In-Plant Rescue/Emergency Personnel:

Name _____	Phone Number _____
_____	_____
_____	_____

Attendant/Entrant: (Check all that apply.) Yes or No

____ Visual _____

____ Radio _____

____ Other (specify) _____ _____

Methods of Summoning: (Check all that apply) Yes or No

Radio _____

Phone (specify) _____

Other (specify) _____

BOX 9: AUTHORIZATION
BOX 10: CANCELLATION

Outside Emergency Services:

Fire Dept. _____

Ambulance _____

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Other _____

Verification of Emergency Services - Initials _____

Entry Authorized by:

Name: _____ Date: _____

Signature: _____ Time: _____

Post entry permit at entrance to permit space.

Entry Canceled by:

Name: _____ Date: _____

Signature: _____ Time: _____

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Return completed entry permit to
Environmental Safety and Health Office.





Section 1 - Chemical Product and Company Identification

44

Product/Chemical Name: Zinc Oxide

Chemical Formula: ZnO

CAS No.: 1314-13-2

Synonyms: Amalox, Chinese White, flowers of zinc, philosopher's wool, zinc monoxide, zinc white

Derivation: Prepared by vaporization of metallic zinc and oxidation of the vapors with preheated air (French process) or roasting Franklinite with coal followed by oxidation (American process).

General Use: In cosmetics, sun-block ointments, driers, quick-setting cements, dental-closing waxes, electrostatic copying paper and electronics as a semiconductor; as a pigment in white paints (replacing lead carbonate), reagent in analytical chemistry, flame retardant, UV absorber in plastics, and in the manufacture of opaque and transparent glass, enamels, auto tires, white glue, matches, and porcelains.

Vendors: Consult the latest Chemical Week Buyers' Guide. (73)

Section 2 - Composition / Information on Ingredients

Zinc oxide: 99.5+ % (medicinal grade), 90 - 99 % (technical grade)

Trace Impurities: Include cadmium, arsenic, lead, and mercury.

OSHA PELs

8 hr TWA: 15 mg/m³ (total dust),
5 mg/m³ (respirable fraction),
5 mg/m³ (fume)

ACGIH TLVs

TWA: 10 mg/m³ (total dust, no
asbestos and <1 % crystalline silica)
TWA: 5 mg/m³ (fume)
STEL: 10 mg/m³ (fume)

NIOSH REL

10-hr TWA: 5 mg/m³, ceiling:
15 mg/m³ (dust)
10-hr TWA: 5 mg/m³, STEL:
10 mg/m³ (fume)

DFG (Germany) MAK

TWA: 5 mg/m³ (respirable dust)
Category III: Substances with
systemic effects
Onset of Effect: > 2 hr
Half-life: > shift length (strongly
cumulative)

Peak Exposure Limit:

50 mg/m³, 30 minute average value,
1/shift

Section 3 - Hazards Identification

☆☆☆☆☆ Emergency Overview ☆☆☆☆☆

Zinc oxide exists as yellowish-white, odorless crystals with a bitter taste. It becomes more toxic when it is heated and produces fumes. The fine particles in the fume can be inhaled into the smallest regions of the lungs and produce flu-like symptoms. This syndrome is typically referred to as "metal fume fever," "zinc-chills," or "brass-founders' ague." It is noncombustible, but the finely divided powder can present an explosion hazard.

Wilson Risk Scale
R 1
I 3
S 2
K 1

Potential Health Effects

Primary Entry Routes: Inhalation.

Target Organs: Respiratory and central nervous systems, gastrointestinal tract.

Acute Effects

Ingestion: Zinc oxide is relatively non-toxic via ingestion because it is poorly absorbed through the digestive tract. However, ingestion of large amounts of zinc oxide dusts (either directly or swallowing with mucous if excess amounts are inhaled) can cause gastritis from formation of zinc chloride via reaction with the hydrochloric acid normally present in the stomach. Peptic ulcers occurring in workers are indicative of gastrointestinal damage.

Eye: None specified.

Skin: Prolonged skin contact can block the sweat glands and cause a papular (bumpy) rash to form.

Inhalation: "Metal fume fever" symptoms include throat dryness and irritation, a sweet or metallic taste, constricted chest, dry cough, chills, fatigue, headache, muscle cramps, low back pain, and occasionally blurred vision, nausea, and vomiting. Fever, sweating, difficulty breathing, leukocytosis (abnormally high number of circulating white blood cells) and rales (noise produced when breathing is difficult) are also possible. Most workers develop an immunity to these attacks. However, this is generally lost over the weekend and must be rebuilt on subsequent return to work. Only the freshly formed fume causes these symptoms, presumably because older fume adheres to other airborne particles and becomes too large to reach the deeper regions of the lungs.

Carcinogenicity: IARC, NTP, and OSHA do not list zinc oxide as a carcinogen. The EPA has given it a class D designation, indicating inadequate evidence or no data given.

Medical Conditions Aggravated by Long-Term Exposure: Respiratory disorders.

HMIS
H 1
F 0
R 0

PPE*
*Sec. 8

Chronic Effects: Gastrointestinal disturbances and latent liver dysfunction were reported in 15 of 25 workers exposed to 50 mg/m³ (length of exposure not indicated).

Other: Zinc oxide causes hemolysis (cell breakage) in human red blood cells.

Section 4 - First Aid Measures

Inhalation: Remove exposed person to fresh air and support breathing as needed.

Eye Contact: *Do not* allow victim to rub or keep eyes tightly shut. Gently lift eyelids and flush immediately and continuously with flooding amounts of water for at least 15 minutes. Consult a physician if pain or irritation persists.

Skin Contact: *Quickly* remove contaminated clothing. Rinse with flooding amounts of water for at least 15 min. Wash exposed area with soap and water. For reddened or blistered skin, consult a physician.

Ingestion: Never give anything by mouth to an unconscious or convulsing person. Contact a poison control center. Unless the poison control center advises otherwise, have the *conscious and alert* person drink 1 to 2 glasses of water, then induce vomiting.

After first aid, get appropriate in-plant, paramedic, or community medical support.

Notes to Physicians: Treatment is symptomatic and supportive.

Section 5 - Fire-Fighting Measures

Flash Point: Noncombustible

Autoignition Temperature: Noncombustible

LEL: None reported.

UEL: None reported.

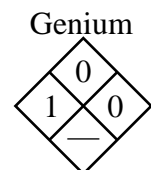
Extinguishing Media: Use agents suitable for surrounding fire.

Unusual Fire or Explosion Hazards: Finely divided powder presents an explosion hazard.

Hazardous Combustion Products: Zinc oxide *fume* may be released when heated.

Fire-Fighting Instructions: Do not release runoff from fire control methods to sewers or waterways.

Fire-Fighting Equipment: Because fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in pressure-demand or positive-pressure mode.



Section 6 - Accidental Release Measures

Spill /Leak Procedures: Notify safety personnel. Cleanup personnel should protect against contamination.

Small Spills: Carefully scoop up or vacuum (with appropriate filter). Damp mop any residue.

Large Spills

Containment: For large solution spills, dike far ahead for later reclamation or disposal. Do not release into sewers or waterways.

Cleanup: Flush dry spills to containment area for later reclamation or disposal. Damp mop any residue.

Regulatory Requirements: Follow applicable OSHA regulations (29 CFR 1910.120).

Section 7 - Handling and Storage

Handling Precautions: Avoid excessive dust generation.

Storage Requirements: Store in air-tight containers in a cool, dry, well-ventilated area away from incompatibles (Sec. 10).

Section 8 - Exposure Controls / Personal Protection

Engineering Controls: Enclose processes whenever possible to avoid dust dispersion into work area.

Ventilation: Provide general or local exhaust ventilation systems to maintain airborne concentrations below OSHA PEL (Sec. 2). Local exhaust ventilation is preferred because it prevents contaminant dispersion into the work area by controlling it at its source.⁽¹⁰³⁾

Administrative Controls: Consider preplacement and periodic medical exams of exposed workers with emphasis on the respiratory and gastrointestinal tract.

Respiratory Protection: Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a MSHA/NIOSH-approved respirator. For ≤ 50 mg/m³, use any dust, mist, or fume respirator, any supplied-air respirator (SAR) or any SCBA. For ≤ 125 mg/m³, use any powered, air-purifying respirator with a dust, mist, and fume filter or any SAR operated in continuous-flow mode. For ≤ 250 mg/m³, use any air-purifying, full facepiece respirator with a high-efficiency particulate filter, any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter, any SAR with a tight-fitting facepiece and operated in continuous-flow mode, or any SAR or SCBA with a full facepiece. For ≤ 2500 mg/m³, use any SAR operated in pressure-demand or other positive-pressure mode. For emergency or nonroutine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA. *Warning! Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.* If respirators are used, OSHA requires a written respiratory protection program that includes at least: medical certification, training, fit-testing, periodic environmental monitoring, maintenance, inspection, cleaning, and convenient, sanitary storage areas.

Protective Clothing/Equipment: Wear chemically protective gloves, boots, aprons, and gauntlets to prevent prolonged or repeated skin contact. Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133). Because contact lens use in industry is controversial, establish your own policy.

Safety Stations: Make available in the work area emergency eyewash stations, safety/quick-drench showers, and washing facilities.

Contaminated Equipment: Launder contaminated work clothes before reuse. Remove this material from your shoes and clean personal protective equipment.

Comments: Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9 - Physical and Chemical Properties

Physical State: Solid

Appearance and Odor: White to yellowish-white, odorless powder or hexagonal crystals with a bitter taste.

Vapor Pressure: ~ 0 mm Hg at 68 °F (20 °C)

Formula Weight: 81.38

Density: 5.67 g/mL

Water Solubility: 1.6 mg/L at 84.2 °F (29 °C)

Other Solubilities: Soluble in dilute mineral acids, ammonia, ammonium chloride, ammonium carbonate, and fixed alkali solutions. Insoluble in ethyl alcohol.

Boiling Point: Sublimes at normal pressure.

Melting Point: 3587 °F (1975 °C)

pH: 6.95 (American Process), 7.37 (French process)

Refraction Index: 2.0041

Section 10 - Stability and Reactivity

Stability: Zinc oxide is stable at room temperature in air-tight containers under normal storage and handling conditions. It gradually absorbs carbon dioxide from air to form zinc carbonate.

Polymerization: Hazardous polymerization does not occur.

Chemical Incompatibilities: Include aluminum + hexachloroethane, chlorinated rubber (at 419 °F/ 215 °C), linseed oil, magnesium (reduced explosively upon heating), hydrogen fluoride, and zinc chloride or phosphoric acid (forms cement-like products due to formation of oxy-salts).

Conditions to Avoid: Exposure to incompatibles.

Hazardous Decomposition Products: Excessive heating of zinc oxide can produce toxic zinc oxide *fumes*.

Section 11- Toxicological Information

Toxicity Data:*

Eye Effects:

Rabbit, eye: 500 mg/24 hr caused mild irritation.

Skin Effects:

Rabbit, skin: 500 mg/24 hr caused mild irritation.

Mutagenicity:

Hamster embryo: 300 µg/L caused sister chromatid exchange.

E Coli: 3000 ppm caused DNA damage.

Acute Inhalation Effects:

Human, inhalation, TC_{LO}: 600 mg/m³ caused cough and difficulty breathing.

Acute Oral Effects:

Human, oral, LD_{LO}: 500 mg/kg

Mouse, oral, LD₅₀: 7950 mg/kg

Reproductive Effects:

Rat, oral: 6846 mg/kg administered from 1 to 22 days of pregnancy caused homeostasis abnormalities in the newborns and stillbirths.

* See NIOSH, *RTECS* (ZH4810000), for additional toxicity data.

Section 12 - Ecological Information

Ecotoxicity: Data not found.

Environmental Degradation: Data not found.

Section 13 - Disposal Considerations

Disposal: Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

Container Cleaning and Disposal: Triple rinse containers and dispose of rinse water as you would other zinc oxide waste.

Section 14 - Transport Information

DOT Transportation Data (49 CFR 172.101): Not listed

Section 15 - Regulatory Information**EPA Regulations:**

RCRA Hazardous Waste Number: Not listed

Listed as a (zinc and compounds) CERCLA Hazardous Substance (40 CFR 302.4) per CWA, Sec. 307(a)

CERCLA Reportable Quantity (RQ): Not given for the broad class

SARA 311/312 Codes: 2

Listed as a (zinc fume or dust) SARA Toxic Chemical (40 CFR 372.65)

SARA EHS (Extremely Hazardous Substance) (40 CFR 355): Not listed

OSHA Regulations:

Listed as a (zinc fume and dust) Air Contaminant (29 CFR 1910.1000, Table Z-1, Z-1-A)

Section 16 - Other Information

References: 73, 103, 124, 132, 133, 136, 139, 148, 149, 167, 187

Prepared By M Gannon, BA

Industrial Hygiene Review PA Roy, MPH, CIH

Medical Review W Silverman, MD

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CAS # 1314-13-2

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Zinc Oxide

Amolox; flowers of zinc; philosopher's wool; zinc monoxide; zinc white

Yellow-white crystals; odorless. May cause mechanical irritation to eyes/skin/respiratory tract. Prolonged skin contact may cause bumpy rash. Fumes formed upon heating can cause flu-like symptoms. Chronic: gastrointestinal, liver disturbances.



Target Organs



Eyes



Skin



Respiratory System



Gastro intestinal



Liver

3 9 10

Personal Protective Equipment



Safety Glasses



Gloves



Apron

8

Check to see

is respirator required?

Emergency Procedures



First Aid

4

Inhalation: Remove to fresh air and support breathing as needed. Eyes/Skin: Remove contaminated clothing. Flush with plenty of water for at least 15 min. Ingestion: Give a cupful of water. Induce vomiting as directed by medical personnel.



Fire

5

Noncombustible. Use extinguishing agents suitable for surrounding fire.



Spills & Leaks

6

Notify safety personnel, isolate and ventilate area. Do not sweep! Carefully scoop up or vacuum (with HEPA filter). Damp mop any residue. Cleanup personnel should protect against exposure.

Consult MSDS 0045 for more information