

HAZARD COMMUNICATION TRAINING

in accordance with 29 CFR1910.1200

INSTRUCTOR MANUAL



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This publication was supported by Cooperative Agreement ES006185 from NIEHS. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of NIEHS.

This training program was originally developed for CPWR - The Center for Construction Research and Training by Mizula, LLC of Hollis, NH and the Lippy Group, LLC of Baltimore, MD. This current version of the training program, incorporating updated Safety Data Sheets, was produced by CPWR - The Center for Construction Research and Training.

Acknowledgments

CPWR would like to thank the following individuals for their contribution to this work:

- James August, MPH
- Jonathan Rosen, CIH
- Mike Cooper, CIH, CSP, MPH
- Andrew Kingston
- Darrel VanWagner
- Bruce Lippy, Ph.D., CIH, CSP
- Bernard Mizula, CIH

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Notes for instructors

Course delivery and classroom management

This is a four hour hazard communication course that satisfies the general training requirements of OSHA's hazard communication standard 29CFR1910.1200. If this course is not tailored for participants' specific worksite, some additional training will be required at their worksite, such as what chemicals are in their work area, where Safety Data Sheets (SDSs) and the employer's written Hazcom program are located.

The course is based on good adult education techniques, like involving students in small group activities. This approach will foster participation from the class and allow students to draw on their work experience to learn material and solve problems.

We encourage you to be an instructor who *facilitates* the course. Try to use the activities and questions included in the presentations to draw out students' experiences related to chemical use in the workplace and then to help them fill in the missing pieces.

If you are an experienced trainer, you should expect to study, review and prepare for this course for at least two to four hours per hour you will be teaching. There is a great deal of information in this course, including a robust set of instructor's notes embedded in the PowerPoint. The PowerPoint was designed in a new format called "Assertion-Evidence." It is advisable to review the slides several times to become familiar with them and how the assertion evidence format works. You may also want to review supporting material, such as CPWR's 40-hour Site Worker course to brush up on hazard controls, chemistry, units of measurement, etc.

Go over the student manual with your students. Hopefully, it will serve as a reference they can use after the course. It expands on the material presented in the PowerPoint slides. It also contains activities and provides space to record answers. Encourage them to write answers in all of the spaces because it is a good way to learn the material. We have tried to make this easier for you. Every time you see the blue toolbox icon, it means there is an activity in their student manual that they should do. There is a glossary and the entire OSHA Hazcom standard in the appendices.



Allocated time

CPWR considers four hours to be the minimum time needed to effectively facilitate this course, including activities and report backs. If the class has a particular interest or gets a useful discussion going, adjust time as you see fit. There is no minimum hazcom training time under the standard but, as stated by OSHA, “The employer, however, maintains the responsibility to ensure that their employees are adequately trained and are equipped with the knowledge and information necessary to conduct their jobs safely.”

Course delivery

Work hard to get the students involved; this may be the only opportunity they have to learn about chemicals on their jobs. If you find you are running short on time, you may have to do some of the following to manage the time:

- Eliminate one or more activities
- Assign activities so everything is covered, but no item is duplicated among the groups. (e.g. if there are 15 questions and five participants per group, have each group member work on only 3 questions each)
- Shorten report back time by having each group only give one response and then ask the class if “anyone has anything to add.”

Training materials for course

AV and classroom equipment

Laptop or PC for running presentations
Projector/screen
Remote slide advancer
Two easels and paper
Easel paper (graph and plain)
Markers (various colors for activities and discussion facilitation)
CPWR Hazard Communication Instructors Manual
CPWR Hazard Communication PowerPoint presentation
Wireless internet access (optional)

Materials for each student

CPWR Hazard Communication Student Manual
NIOSH Pocket Guide (optional)
Site-specific SDS (if possible, if not five are provided in Appendix B)

Materials for each group

Note paper
Pens/pencils
Markers (various colors for activities) one set per group

Assertion evidence presentation format

The PowerPoint follows the assertion evidence approach. Familiarize yourself with the assertion evidence method and structure of the PowerPoint slides. The slides will have a question or statement in the title (assertion) that will be supported by visual evidence (photo or graph, etc.) This approach gets away from bullets as much as possible. It just makes an assertion and backs it up with evidence. Many of the slides start with a question. Give students time to respond before presenting them with the answers by clicking.

The key to this approach is to deliver the assertion just as it is written so the student will be hearing and seeing the same message. This avoids the standard, poor delivery of most presentations, which requires the student to choose whether he or she wants to focus on what the instructor is saying or to read the slide. They can't do both. Research shows we don't multitask well at all.

The slides have robust instructor's notes to aid your delivery of the module, to provide background on topics, and to help you provide answers to questions posed in the slides or by students. Information inside brackets is intended as guidance to you, the instructor.

The following text was developed from the article, "**Rethinking the Design of Presentation Slides: The Assertion-Evidence Structure**" which may be found, along with other assertion evidence training aids, at <http://www.writing.engr.psu.edu/slides.html>.

Four key assumptions apply when using the assertion-evidence presentation format. These assumptions:

1. Slides are an appropriate visual aid for the presentation. Too often, slides are projected when no visual aid would better serve the presentation. You can darken the screen during a presentation by hitting “B” for black. Do this when you want the class to look and listen to you. Hit B again when you want to bring back the image. “W” works the same for a white screen.
2. The success of the presentation hangs on the audience understanding the content.
3. The slides projected during the presentation cannot afford to have as much text on them as the handout does, because the audience is not only reading the projected slides, but listening to the speaker as well.
4. Finally, the primary purpose of the slides is to help the audience understand the content, not to provide talking points for the speaker.

Group discussions and activities

This course contains several small group activities and a few small thought provoking questions/activities. There is not much room for error when understanding the hazards and risks of chemicals. However, some of the questions are open-ended and may have different solutions. It is important to allow students to present their solutions. As long as they defend their solutions well, it may just be one of many correct ways of dealing with a problem. As the instructor, you are the judge of the solutions and the evidence. Also, it is advisable that during your preparation to deliver the course, you complete each activity in the student manual on your own, providing your own answers to the exercises. This will give you a better understanding of the course and give you at least one “correct” example you created to use when presenting the course. Keep the student manual that you completed as your own, as well as the instructor manual, and use them to record notes and improvements or your own methods for presenting the course.

In this instructor guide, one selected answer is provided to each question.

Hazard Communication Training

4-hour course in accordance with 29 CFR1910.1200

Icebreaker

In your group (or as the whole class) discuss chemicals that you are exposed to on your job and discuss the harm they can cause. Do you know of any specific incidents involving chemicals?

This course is delivered in 8 sections:

1. Course introduction
2. Hazard Communication Standard (HCS) overview
3. Review of common health effects
4. Chemical overview
5. Measurement and exposure limits
6. Other ways of communicating hazards
7. Controlling hazards
8. Emergencies and first aid



After completing this course you will be able to:

1. Discuss the 5 key elements of OSHA's Hazard Communication Standard (Hazcom).
2. Describe your rights under OSHA's Hazcom standard.
3. Identify the new OSHA label symbols and explain what each means.
4. Describe the 4 routes of entry for chemicals and give an example of a chemical known to enter the body through each.
5. State three ways to find information about chemicals found on your jobsite.
6. Describe several methods to control chemical exposures and rank them for greater worker protection.
7. Using a product's safety data sheet, assess whether it is flammable, heavier than air and has an OSHA PEL.



Figure 1. Masonry instructor checking a Safety Data Sheet.

Section 1: Course Introduction

The OSHA Hazard Communication standard gives you the right to understand about the chemical hazards on your job and ways to protect yourself.



What this course will not do

This course will not train you to clean up spills and releases.

If you believe you have an emergency situation, follow your employer's emergency response plan to evacuate the area and notify someone who is authorized to respond. If your employer does not have an emergency response plan, tell your coworkers and get out of the area and notify the first supervisor you can.



This course will also not teach you about the specific chemical hazards on your job site. Your employer must do that.

Hazcom training will prepare you to find and use information about chemicals on your job, as well as prepare you to identify spills and releases of hazardous chemicals and to report them to qualified response personnel.

Activity 1: Test your group's knowledge of Hazcom

Time for activity: 10 minutes (5 for group work and 5 for report back)

Objective: The goal of this activity is to allow the instructor to determine the background knowledge of the students.



Task: In your groups, work together to answer the questions. The instructor will go over the correct answers.

True or False

1. The standard requires all employers to provide workers with information about the hazardous chemicals to which they are exposed.
2. Employers are required to provide workers with a safety data sheet (SDS) within the work shift in which it is requested.
3. Chemical importers, manufacturers, and distributors initiated the OSHA Hazard Communication standard because they were concerned about liability.
4. Employers are required to provide annual training in hazard communication.

True

True

False

False

Fill in the blank using the answers to the right.

5. How many workers die each year from occupational injuries?
6. How many workers die each year from occupational diseases caused by chemical exposures?
7. How many chemical-specific standards does OSHA enforce?
8. How many chemical products are used in the workplace?

b.

e.

a.

e.

Answers

- a. 500
- b. 5,000
- c. 10,000
- d. 50,000
- e. > 50,000

Every day around four construction workers die on the job.

This shows the deaths on construction jobs in 2017 as tracked by CPWR:

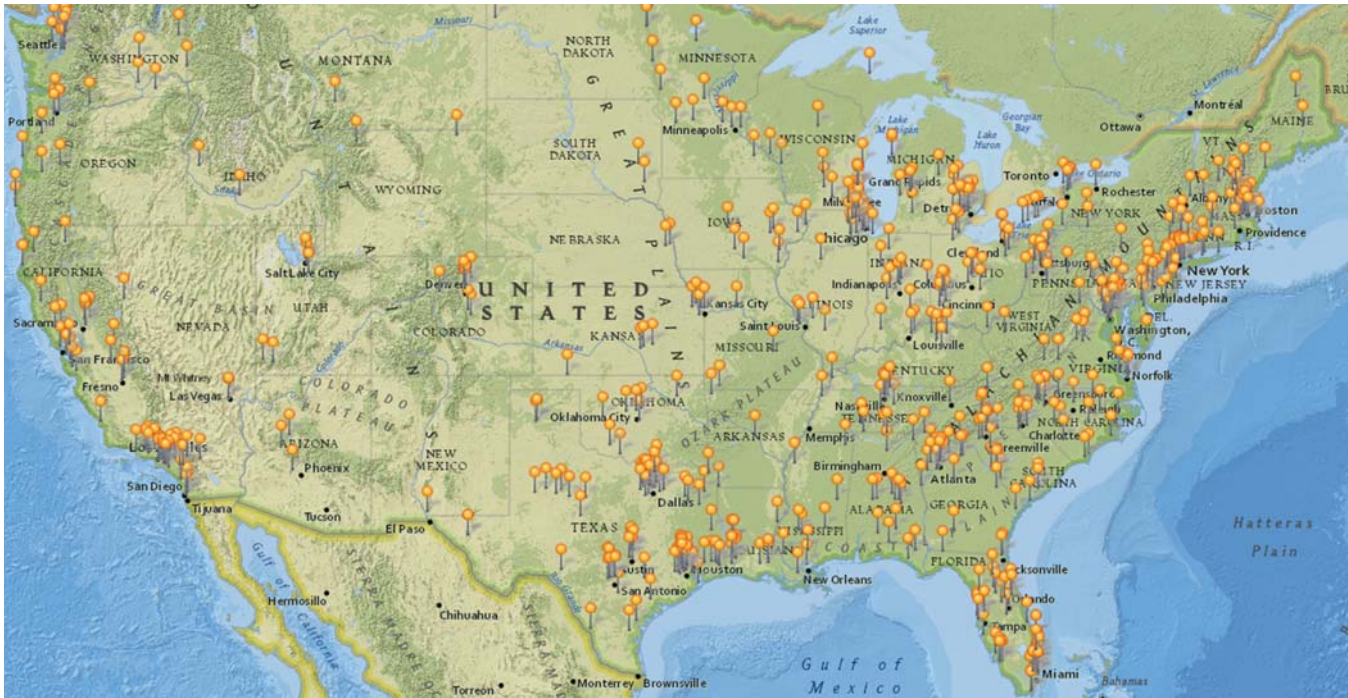


Figure 2

Section 2: Hazard Communication Standard Overview

What led up to OSHA developing the Hazcom Standard in 1983?

In 1952 and 1969, the Cuyahoga River caught fire. In fact, At least 13 fires have been reported on the Cuyahoga River beginning in 1868. The largest river fire in 1952 caused over \$1 million in damage to boats and a riverfront office building. Fires erupted on the river several more times before June 22, 1969, when a river fire captured the attention of Time magazine, which described the Cuyahoga as the river that “oozes rather than flows” and in which a person “does not drown but decays”. The 1969 Cuyahoga River fire helped spur an avalanche of water pollution control activities, resulting in the Clean Water Act and the creation of the federal Environmental Protection Agency. (Source: Wikipedia)

Unions and environmental groups led the fight for protections from hazardous chemicals.

In 1977, 60 workers at a chemical plant in California making the pesticide DBCP (1,2-dibromo-3-chloropropane) were found to be sterile. During lunch time and breaks, employees started talking about the problems they had trying to start a family. They started to notice no employees in their particular area of the plant were successful. These employees went to their doctors, and found out they were all sterile. Several years earlier, a University of California researcher found that DBCP was a reproductive hazard. This was published information but workers were never informed about this particular hazard. Fortunately for these workers, the effects were not long term. The DBCP case triggered legislative hearings which resulted in California passing a new statute in the California Labor Code in 1981. This statute is commonly known as the Hazard Communication Regulation. The new regulation required the California Department of Industrial Relations to create a list of hazardous substances. It required manufacturers to develop material safety data sheets (SDS) for hazardous substances which they manufactured and to provide a copy of the SDS to employers who purchased the hazardous substances from them.

State chemical “right-to-know” laws led to the original OSHA Hazcom standard in 1983.

Why is the hazard communication standard important? (Discuss this in your group.)

Hazcom standards help workers:

- Reduce their risks to chemicals
- Avoid dangerous chemicals
- Obtain proper education about chemicals
- Select proper PPE

32 million workers are potentially exposed to chemicals according to OSHA.

Roughly one-quarter of workplace diseases and injuries are caused by chemicals, according to the International Labor Organization

Hazcom was the second most cited standard in FY 2017. There were 4,176 citations.

The Hazard Communication Standard is also known as:

- Hazcom
- Right to Know
- OSHA 29 CFR 1910.1200
- OSHA 29 CFR 1926.59 (construction)

OSHA describes the HCS as a largely performance-oriented standard that gives employers the flexibility to adapt the rule to the needs of the workplace, instead of having to follow specific, rigid requirements. The Hazard Communication Standard (HCS) is based on a simple concept: workers have both a need and a right to know the identities of the chemicals they are exposed to and the hazards associated with these chemicals. They also need to know what protective measures are available to prevent adverse effects from occurring. The HCS is designed to provide employees with the information they need.

Knowledge acquired under the HCS will help employers provide safer workplaces for their workers. When employers have information about the chemicals being used, they can take steps to reduce exposures, substitute less hazardous materials, and establish proper work practices. These efforts will help prevent the occurrence of work-related illnesses and injuries caused by chemicals.

The HCS addresses evaluating hazards and communicating the findings to workers. Evaluation requires the professional judgment of experienced experts. That's why the HCS is designed so that employers who simply use chemicals, rather than produce or import them, are not required to evaluate the hazards of those chemicals. Hazard determination is the responsibility of the producers and importers of the materials. Producers and importers of chemicals are then required to provide the hazard information to employers who purchase their products.

Employers who don't produce or import chemicals need only focus on those parts of the rule that deal with establishing a workplace program and communicating information to their workers. This course is a general guide for such employers to help them determine what's required under the rule. It is not a substitute for the regulatory requirements, but rather provides a simplified outline of the steps an average employer would follow to meet those requirements.

OSHA has a separate Hazcom standard for construction, 1926.59, but it is identical to 1910.1200.

This is the whole standard: “The requirements applicable to construction work under this section are identical to those set forth at 1910.1200.”

OSHA revised its standard to be part of the Global Harmonization System (GHS), effective 5-25-12.



Figure 3

The GHS, first adopted by the Sub-Committee on the Globally Harmonized System of Classification and Labeling of Chemicals (SCEGHS) in December 2002, is an initiative to establish international consensus on criteria for classifying chemical hazards for international distribution, and to create consistent requirements for SDSs. It is a common approach to defining and classifying hazards, and communicating information on labels and safety data sheets. There are 16 sections in the safety data sheets. The GHS provides the underlying basis for the establishment of national, comprehensive chemical safety programs. Its target audience includes workers, consumers, transport workers, and emergency responders.

OSHA is allowing a phase-in period for the requirements.

- December 1, 2013: Employers must train workers on the new label and SDS format
- June 1, 2015: Manufacturers, importers and employers must implement all provisions, except:
- December 1, 2015: GHS-compliant shipping labels must be used
- June 1, 2016: Employers must implement their updated Hazcom programs

Why was GHS created?

Before global harmonization, there were many different hazard communication regulations in place throughout the world. This caused tremendous difficulty and extra costs for multi-national chemical manufactures who needed to comply with a host of labeling requirements and caused confusion for workers who traveled to different countries.

What are the five key elements in the OSHA Hazcom standard?

1. Employers must have a written Hazcom Program.
2. Containers must be labeled and labels must follow a consistent format.
3. SDSs must be available for hazardous substances in the workplace.
4. Workers must be trained.
5. Employers must have an updated chemical inventory.

Hazcom programs must have all of these parts.



Figure 4

Written Hazard Communication Program, First major requirement of OSHA's Hazcom Standard, 1910.1200 (e)

What is a Hazcom Program?

Employers must develop, implement, and maintain at the workplace a written, comprehensive Hazcom program. A program is the employer's procedure for meeting the requirements of a particular regulation, in this case, the Hazcom regulation. Workers have the right to review the Hazcom program on work time and to ask questions about it! A written hazard communication program ensures that all employers receive the information they need to inform and train their workers properly and to design and put in place worker protection programs. It also provides necessary hazard information to employees, so they can participate in, and support, the protective measures in place at their workplaces.

Often during construction there is more than one employer working on the site at the same time. In that case all employers must provide information to one another about the hazardous chemicals they are using. This sharing of information helps prevent worker exposure to chemical hazards from another employer. One important thing to remember is that the Hazcom standard gives workers the right to information concerning chemicals in their work area, not just ones they work with directly.

The written Hazcom program must be available at the job site and must include the following information:

- A list of the hazardous chemicals known to be present
- The methods the employer will use to inform workers about labels and SDSs
- The methods the employer will use to inform employees of the hazards of non-routine tasks
- Methods the employer will use to provide the other employers on-site access to SDSs on multi-employer sites

At **multiple employer** sites, like almost all construction sites, written hazard communication programs must:

- Explain how SDSs will be provided to other employers
- List the methods employers will use to inform other employers of measures taken to protect workers during normal operating conditions and in foreseeable emergencies
- Explain how employers will inform other employers of the labeling systems being used

Workers have rights under Hazcom!

You have the right under OSHA's Hazcom standard to:

- Review the written program.
- Receive information regarding hazardous substances.
- Have your physician or union rep receive information on your behalf.
- Exercise your rights without getting fired or other punishment.

Labels, the second major requirement under the OSHA Hazcom standard, are found at 1910.1200(f)

OSHA now requires that labels contain all four elements below, product identifier and supplier identification:

1. **Signal word** means a word used to indicate the relative level of severity of hazard and alert the reader to a potential hazard on the label. The signal words used are “danger” and “warning.” “Danger” is used for the more severe hazards, while “warning” is used for the less severe.
2. **Hazard statement** means a statement assigned to a hazard class and category that describes the nature of the hazard(s) of a chemical, including, where appropriate, the degree of hazard.
3. **Hazard pictograms** means a composition that may include a symbol plus other graphic elements, such as a border, background pattern, or color, that is intended to convey specific information about the hazards of a chemical. Eight pictograms are designated under this standard for application to a hazard category.
4. **Precautionary statement** means a phrase that describes recommended measures that should be taken to minimize or prevent adverse effects resulting from exposure to a hazardous chemical, or improper storage or handling.

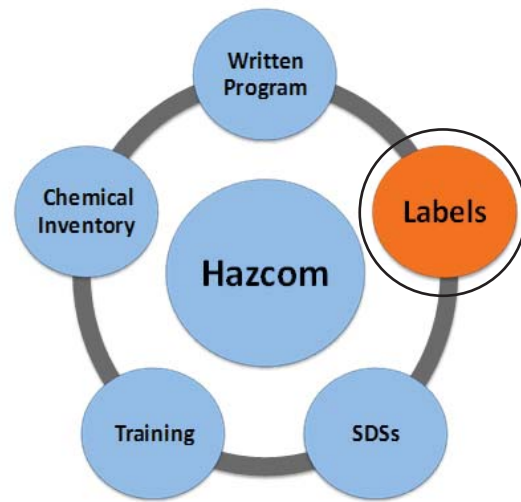


Figure 5

Additional information must be included on labels.

1. Product Identifier is the name or number used for a hazardous chemical on a label or in the SDS
2. Supplier Identifier is the name, address, and telephone number of the chemical manufacturer, importer, or other responsible party
3. Supplemental Information is any additional information

One of two signal words is required on labels to emphasize hazard. Which communicates greater hazard?

Danger Warning

Labels must also contain standard precautionary statements to describe how to prevent harm. Example Precautionary Statements:

- “Only use non-sparking tools”
- “Store in a cool, well ventilated and locked place”
- “Do not breathe vapors”
- “Wear protective gloves”

Let’s Review Figure 1, an example label provided by OSHA



Figure 6

There are 9 symbols called pictograms that we will discuss.












Figure 7

The top row are physical hazards and the bottom row are health hazards, except for the final environmental pictogram.

If you pour anything into a container it must be labeled unless you are going to use it immediately and control it.




Figure 8

Pictogram Name	Pictogram	Chemicals covered
Flame		Flammables Self Reactives Pyrophorics Self-heating Emits Flammable Gas Organic Peroxide
Oxidizer		Oxidizers
Exclamation Mark		Irritant Dermal Sensitizer Acute Toxicity (harmful) Narcotic Effects Respiratory Tract Irritation
Exploding Bomb		Explosives Self Reactives Organic Peroxides
Corrosion		
Gas Cylinder		Gases under pressure
Health Hazard		Carcinogen Respiratory Sensitizer Reproductive Toxicity Target Organ Toxicity Mutagenicity Aspiration Toxicity
Skull and Crossbones		Acute Toxicity (severe)
Environmental pollutant		Part of GHS, but not 1910.1200. OSHA does not have jurisdiction over environmental matters

Group Exercise: Match pictograms with their meanings

Without looking at the previous page, write the appropriate letter for the pictogram that corresponds to each chemical category.

*There are two broad categories of self-reactives: those that will explode and those that will burn. If heating may cause an explosion, the signal word must be danger. If the signal word is warning, the chemical can still catch on fire with enough heating, but it won't explode.

D	Flammables	
F	Narcotic effects	
C	Oxidizers	
D or E*	Self reactives	
D	Self-heating	
F	Irritant	
D	Organic peroxides	
E	Explosives	
G	Gases under pressure	
B	Carcinogen	
F	Dermal sensitizer	
F	Acute toxicity (harmful)	
F	Respiratory tract irritation	
D or E*	Self Reactives	
H	Corrosives	
B	Respiratory sensitizer	
B	Reproductive toxicity	
B	Target organ toxicity	
B	Mutagen	

Safety Data Sheets, third major requirement of OSHA's Hazcom standard 1910.1200 (g)

Safety Data Sheets must use a format with 16 sections, based on ANSI Z400.1.

1. Identification includes the product identifier, the name of the manufacturer or distributor along with the phone number and an emergency number. It also lists the recommended use of the product as well as restrictions.
2. Hazard(s) identification includes all the dangers about the chemical.
3. Composition/information on ingredients lists the different chemicals in the product and any trade secret claims.
4. First-aid measures describe the important symptoms, immediate or delayed health effects, and required treatment.
5. Fire-fighting measures list the proper ways to extinguish fires, the equipment, and chemical hazards from fire.
6. Accidental release measures explain the emergency procedures, protective equipments and proper methods of containment and cleanup.
7. Handling and storage describe precautions for safe handling and storage, including other chemicals that are not compatible with the product.
8. Exposure controls/personal protection lists OSHA's Permissible Exposure Limits, Threshold Limit Values along with appropriate engineering controls and personal protective equipment
9. Physical and chemical properties list the product's characteristics such as vapor density, flash point or explosive limits.
10. Stability and reactivity refer to the chemical's stability and the possibility of hazardous reactions.
11. Toxicological information includes the ways the chemical can enter the body the various health effects it can cause.
12. Ecological information refers to damage the chemical can cause to the environment but is not enforced by OSHA.
13. Disposal considerations cover possible dangers when disposing the chemical but is not enforced by OSHA.



Figure 9

14. Transport information concerns potential hazards when transporting the chemical but is not enforced by OSHA.
15. Regulatory information is not enforced by OSHA.
16. Other information includes the date the SDS was prepared or the last revision.

Whenever the employer receives a new or revised SDS that could impact your health, you must be informed within 30 days after receipt.

OSHA requires that, “Such information shall be provided to employees on a timely basis, not to exceed 30 days after receipt, if the new information indicates significantly increased risks to, or measures necessary to protect, employee health as compared to those stated on a material safety data sheet previously provided.”

Activity: Reviewing an SDS

Time for activity: 15 minutes (10 for group work and 5 for report back)



Objective: The goal of this activity is to practice reviewing a SDS. A SDS is one of the main tools in hazard communication. This activity will allow you to review a SDS on a chemical commonly found on construction jobs. There are five SDSs in Appendix B.

Task: Take a few minutes to review and become familiar with your assigned SDS. In your group, work together to answer the following questions about the provided SDS. Select a spokesperson to report back your group's answers to the class. Note to instructor: these are actual exposures for the specific task noted.

Trade	Task	Product	Chemical of Concern	Available Exposure Data
Carpenter	Coating wood	MINWAX Fast Drying Polyurethane	Light Aliphatic Hydrocarbon	61 ppm (15-minute sample)
	Gluing	Loctite PL300 Foamboard Construction Adhesive	Limestone	<0.025 mg/m ³
Painter	Applying Paint	Sherwin Williams PRO INDUSTRIAL™ Multi-Surface Acrylic Eg-Shel	2-Butoxyethanol	0.04 to 367 ppm
Sheet Metal Worker	Duct installation	3M Fastbond 900 Sealer	Ethylbenzene	5.0 ppm
Masonry	Repair joints or seal cracks	Sikaflex Crack Flex Sealant	Isocyanate	<0.001 to <0.002 ppm
Roofers	Coal tar application	Tremfix Coal Tar Roofing Pitch	Coal tar pitch volatiles	0.14 to 1.93 mg/m ³

1. What health effects may be experienced when using this product?

Answers in Appendix: Pages B-34 through B-35

2. Are exposures likely to be over the OELs? The PELs?

Answers in Appendix: Pages B-34 through B-35

Note to instructor: these are actual exposures for the specific task noted.

3. Is your product flammable? If so, what flammable category?

Answers in Appendix: Pages B-34 through B-35

4. Are there additional chemicals that you are concerned about?

Answers in Appendix: Pages B-34 through B-35

Employee Information and Training

Fourth major requirement of OSHA's Hazcom Standard, 1910.1200 (h)

Employers shall provide employees with effective information and training on hazardous substances in their work area at the time of their initial assignment, and whenever a new hazard is introduced into their work area. In other words, the employer is legally not allowed to let workers work with a chemical they know nothing about!



Figure 10

Workers must be trained on:

- The Hazard Communication Standard and its requirements
- Any operations in their work area where hazardous substances are present
- Physical and health hazards of the substances in the work area

Workers must also be trained on:

- Methods and observations that may be used to detect the presence or release of a hazardous substance in the work area
- Measures they can take to protect themselves from these hazards
- The details, location and availability, of their employer's written Hazcom program
- Location and availability of SDSs
- Special worker rights under the Hazcom Standard
- Labeling systems



Figure 11. SDS manual in tough-to-find location

Workers must also be trained on general hazard categories (corrosives, carcinogens, etc.) of hazardous chemicals used in the workplace. You are not required to receive training on every individual chemical you may work with, but you must receive training that covers the general hazardous categories, since these will all act on you in the same manner.

Is there an annual Hazcom training requirement?

Yes No

Section 3: Review of Common Health Effects

There is a range of health effects caused by chemicals.

Simple chemical asphyxiants

If a chemical replaces so much air that there isn't enough oxygen to breathe it can cause **simple asphyxiation**.

There are many simple asphyxiants.

Which of these can be found on a construction job?

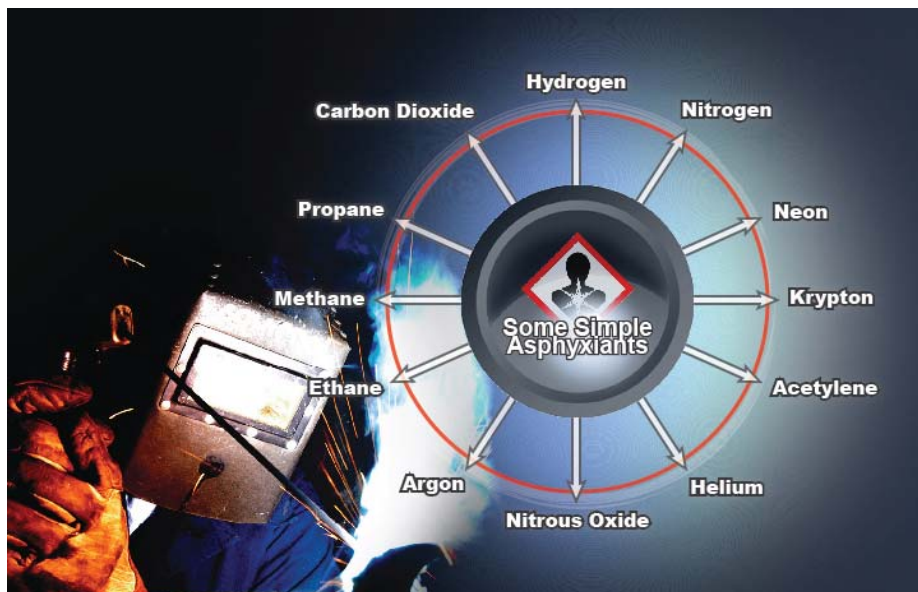


Figure 12



Figure 13. Confined Space.

Two workers died in this particular confined space in 2006. The case study by the Chemical Safety Board has a video of the incident that uses computer simulation to explain the deaths. This is the Valero Delaware City refinery asphyxiation death of two contractor employees who were preparing to reassemble a pipe on a pressure vessel while it was being purged with nitrogen. The first worker, in an attempt to retrieve a roll of duct tape from inside the vessel, was overcome by nitrogen, collapsed in the vessel and died. His co-worker, the crew foreman, was asphyxiated while attempting to rescue him.

Link to the case study:

http://www.csb.gov/assets/document/Valero_Case_Study.pdf

Link to the video:

http://www.csb.gov/investigations/detail.aspx?SID=25&Type=2&pg=1&F_All=y

Chemical asphyxiants reduce the blood's ability to carry oxygen which can lead to suffocation.

Some examples:

- Hydrogen sulfide
- Carbon monoxide
- Hydrogen cyanide

Sensitizers and allergens set up a reaction in the body so that even minor exposures can cause a reaction.

Sensitizers and allergens cause a reaction in an individual. The reaction depends upon the affected individual. Once someone is sensitized or allergic to a chemical, much lower exposures can cause a reaction, and the reaction can become more severe.

What are some examples of sensitizers or allergens?

List several substances that can cause an allergic reaction in the space below.

- sprayed foam insulation with isocyanates
- oil-based paints
- wood dust
- poison oak and ivy (Rhus family plants)

Answers from previous question:

- Sprayed foam insulation containing isocyanates,
- oil-based paints,
- wood dust,
- poison oak and ivy (Rhus family plants)

Corrosives can severely damage the body.

Corrosives are widely used in chemical manufacturing as well as construction. Understand which products you are working with (such as etching concrete with hydrofluoric acid) before you begin work.

- Acids and bases are corrosive chemicals
- Corrosives can damage skin, eyes and the respiratory system
- The extent of skin damage depends on how long the corrosive is on the skin and the concentration of the corrosive.



Figure 14

Mutagens cause genetic changes and can lead to birth defects or other problems in following generations.

What are some examples of mutagens?

- Ionizing radiation
- Hydrogen peroxide
- Bromine

What are teratogens?



Figure 15

Teratogens are compounds that can harm the developing fetus, causing birth defects or death. The worst case of a teratogen exposure to a population is the Minamata Bay, Japan incident which was discovered in 1956. In this case, methyl mercury was used as a catalyst in a chemical process at Chisso Corps' chemical factory, which continued to dump the product from 1932 to 1968 into Minamata Bay.

Lead has been shown to a powerful teratogen, causing learning disabilities and other problems in children living in houses with lead-based paint. Dr. Herbert Needleman conducted an innovative study using the baby teeth of children to identify high lead levels and followed them for years showing higher rates of dropping out of school, behavioral problems and trouble with the law.

Here is a link to a Wikipedia account of his work:

http://en.wikipedia.org/wiki/Herbert_Needleman

Cancer-causing chemicals must be listed on an SDS even if the amount is only 0.1 percent of the product.

Carcinogens are cancer-causing compounds. Some chemicals are known or presumed human carcinogens, others are only suspected to be carcinogens. Manufacturers are required to list any carcinogens in their products, even if the amount is as low as 0.1% of the product. NIOSH states there is no known safe exposure level for carcinogens so employers and workers should try for NO exposure!

Here are a few known and suspect carcinogens:

- Asbestos
- Benzene
- Beryllium
- Cadmium
- Asphalt fume (suspect)
- Silica

Chemical effects on the body depends on many factors.

There are many factors that can play a role in how a chemical or a combination of chemicals harm workers. Therefore it is best to reduce all chemical exposures to as low as possible. Below is a short list of factors that affect a chemical's effect on the body:

- The physical form of the chemical
- How chemicals get into the body (route of entry)
- The dose
- Chemical toxicity
- Individual's reaction to the chemical (age, sex, race, weight, etc.)

The dose makes the poison.

"All substances are poisons; there is none which is not a poison. The right dose differentiates a poison from a remedy." Paracelsus (1493-1541)

A sixteenth-century Swiss chemist named Paracelsus gave us the most basic rule of toxicology: "The dose makes the poison." Practically every substance on earth (including water and Vitamin C) can kill you if they are concentrated enough in your stomach or your bloodstream.



Figure 16. Portrait of Paracelsus

The dose response curve shows how people respond to toxic chemicals

During studies of chemical effects, a dose-response curve is developed for a specific effect within a population. Most dose-response curves take on a characteristic "S" shape, as shown.

For instance, let's take a very common substance, caffeine. If a person consumes 10 grams at one time, that amount would be fatal. However, caffeine is a common substance which is found in our food and beverages.

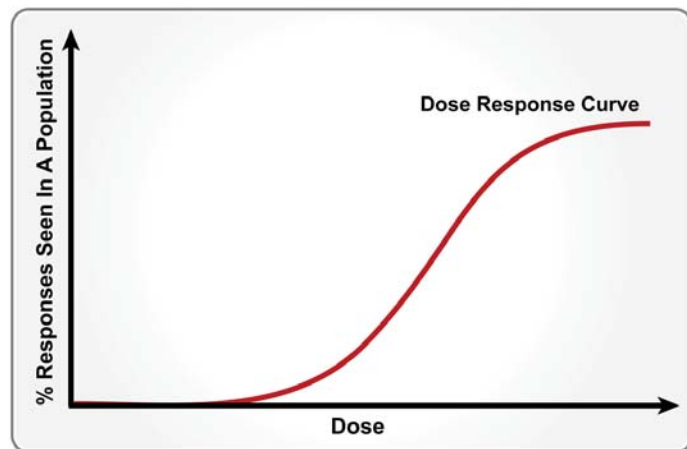


Figure 17. Dose Response Curve.

What might affect a person's impairment from alcohol along with the number of alcoholic drinks consumed? Might there be individual differences for effects from workplace chemicals, too?

How do chemicals enter your body?

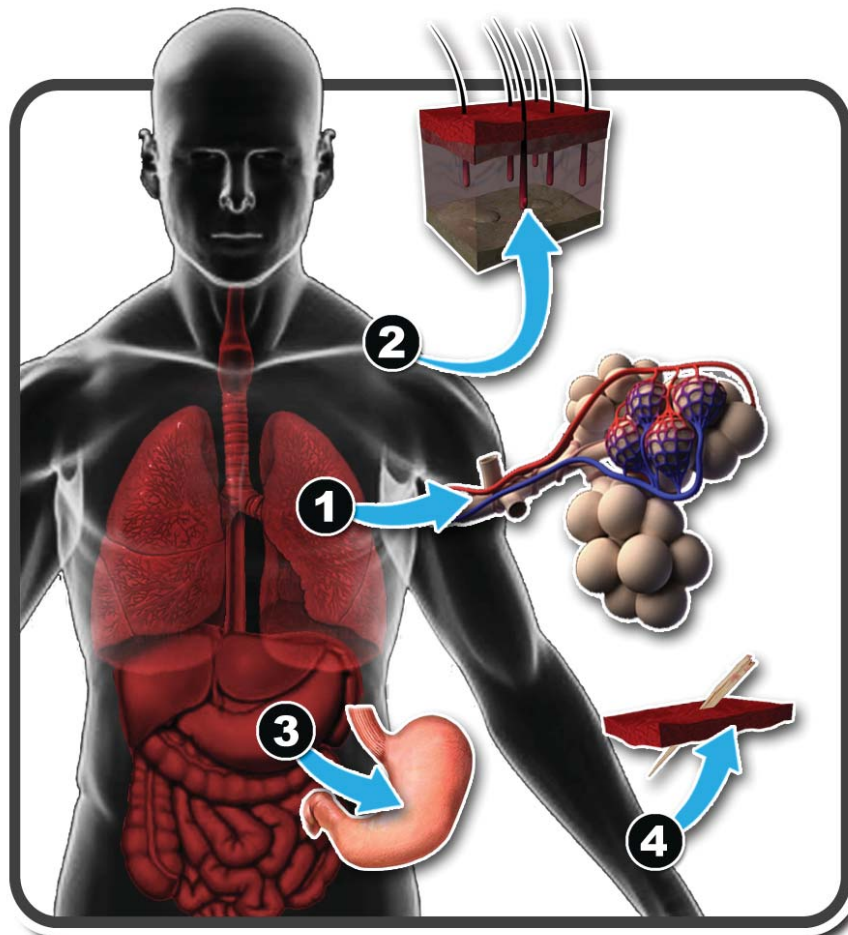


Figure 18. There are four major routes in which chemicals can enter your body.

Chemicals are only a hazard when you have been exposed to them. There are four major routes in which chemicals can enter your body. The **most common** type of exposure is through **breathing (inhalation)**. You inhale the chemical, which would then enter your lungs, where it would be absorbed into your bloodstream. We breathe approximately 20 to 25 thousand breaths in one day, which averages a total volume of 10,000–14,000 liters (13 -18 cubic yards) of air in a day.

The **second most common** type of workplace chemical exposure is **absorption** through the skin. For certain chemicals, once it is absorbed through the skin, it goes into the bloodstream.

The **third most common** type of chemical exposure is through **ingestion**, where the chemical enters the body through your mouth and is absorbed through the digestive tract. To minimize the ingestion route, good hygiene practices need to be observed—wash your face and hands prior to eating and drinking.

The **fourth most common** type of chemical exposure is through **injection** in which the chemical enters the body through a sharp object like a needle, nail or rebar.

1. Inhalation is the main route of entry

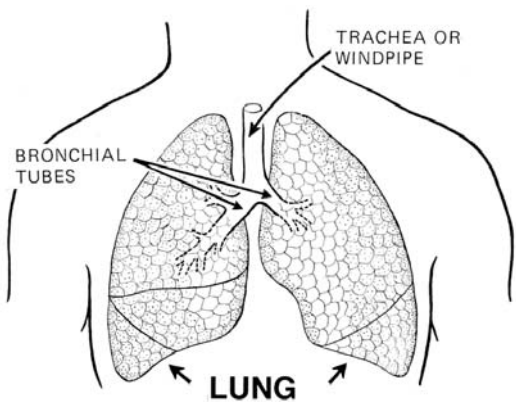


Figure 19

The lungs are a critical route of entry for exposure to workplace chemical hazards. If one could take the average set of human lungs and spread them out, they would cover an area the size of a tennis court (140 m²). This means that there is an enormous surface area within the lungs where chemicals can interact with tissue.

The lungs are also important to consider because of the large volume of air (and pollutants in the air) that passes through them continually, as well as the thin membranes in the gas exchange region (alveoli).

- Gases and vapors can reach the deep lungs
- Particle and droplet size affects where the chemical settles in the respiratory tract
- Where the chemical settles in the respiratory tract influences symptoms and diseases

2. Absorption is the next most common route

The skin has a protective coating of oils which acts as a natural barrier. Fat soluble can pass through the skin and are absorbed into the blood stream. Significant amounts of chemicals are most likely to be absorbed when a large area of skin is in direct contact with a liquid, mist or dust for long periods of time. For some highly toxic substances, dangerous levels may be absorbed from skin contact with gases or vapors. Hydrogen cyanide is an example of a gas that can be absorbed. Once in the blood, chemicals are carried throughout the body and can harm other organs. Still other chemicals, such as corrosives, may affect the skin on direct contact. Damaged or very wet skin will allow substances to pass more readily into the blood. A concentrated chemical will pass more easily through the skin's barrier.

Chemicals also can be absorbed through mucous membranes in the eyes or nose.

- If chemicals get onto the outside of your body they may be able to pass through
- Some areas are more at risk than others such as the eye, reproductive areas, and forehead.
- Open wounds can increase absorption
- Chemical properties affect absorption

Are all areas of the skin equally protective?

Yes

No

Rates of absorption Relative to the Forearm (1)

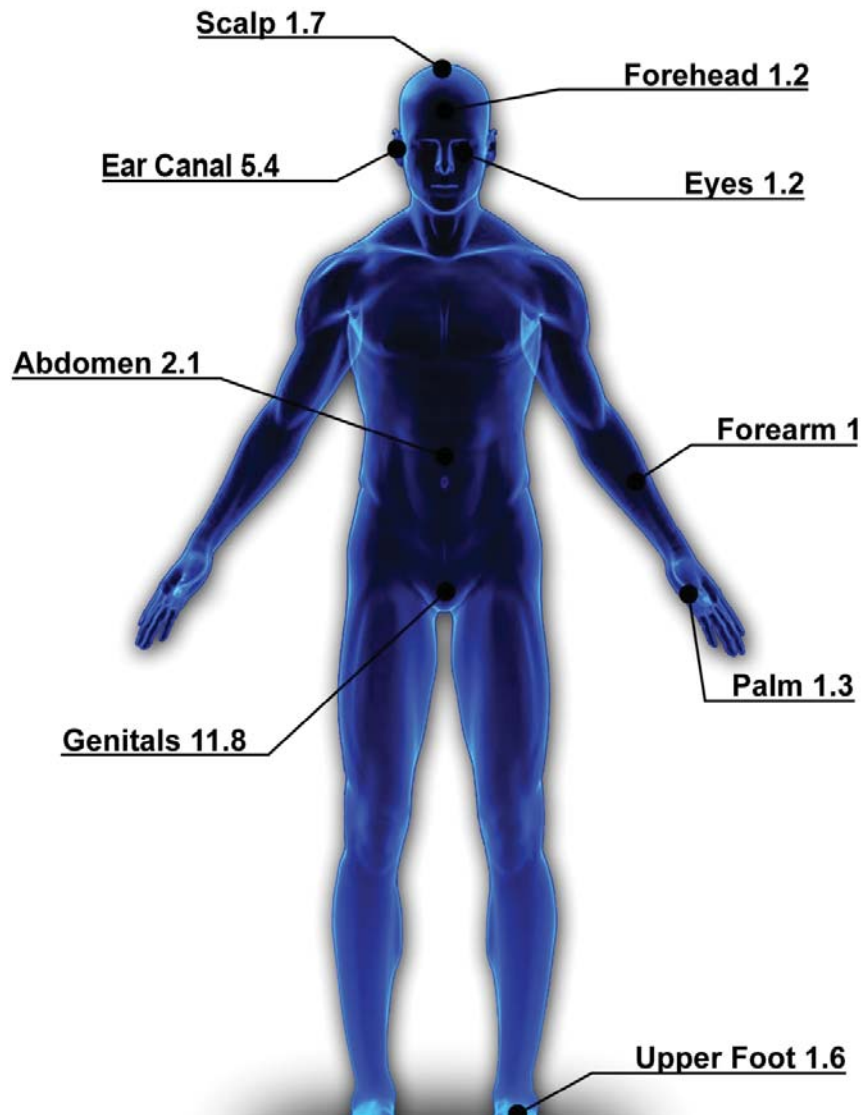


Figure 20

3. Ingestion

Chemicals that are swallowed are absorbed in the digestive tract

Many substances can enter the body through the mouth and digestive tract. This is a less common route of entry than the respiratory system or the skin. A person's hands may be covered with a toxic dust, say lead, and she could then eat, smoke, or apply cosmetics and inadvertently "eat" the dust.



Figure 21. Workers take a lunch break at Ground Zero.

4. Injection

Construction workers have plenty of opportunities for accidental injection of chemicals

List several ways workers might absorb, inhale, ingest or inject chemicals. Write your answers below.



Figure 22. Nail protruding from wood.

Absorb: Spill solvents onto bare skin or open cuts; work without gloves and get chemicals on hand

Inhale: Work with dusty processes or solvents that have a high vapor pressure

Ingest: Transfer contamination from unwashed hands onto food or drink; leaving open containers of food where dust can settle

Inject: Force contamination into the skin through high pressure washing; step on contaminated nails; cut skin on protruding metal

Chemical exposures are either acute or chronic. What is the difference?

Acute exposure is a short term or immediate high dose. Acute exposures can lead to disease or injury that develops immediately or within days. Generally, the effects wear off soon after the exposure ends. Sometimes, however, a permanent illness, such as asthma from chemicals, or cell death from ionizing radiation, can be caused by such an exposure. Eye and throat irritation from Portland cement dust is an example of an acute effect.

- High exposure over a short time (instantaneous to a few days)
- After exposure stops, damage may reverse...or not

Chronic exposure is a repeated, low-to-mid dose of chemical which may lead to disease that develops slowly, over a period of months or years or manifests itself years after exposure. Asbestosis and cancer are examples of chronic illnesses.

- Low exposure over a long time period (years)
- Can cause disease or other irreversible effects

What chronic conditions can result from cement finishing?

What is a latency period? What is a classic example?

Write the answer here:

A latency period is the time between an exposure and the emergence of a health problem, usually a period of years. The classic example is asbestos-related diseases like asbestosis and mesothelioma, which can take up to 25 years from initial exposure to appear.

What is the difference between local and systemic harm?

Some chemicals harm the body at the site of their exposure, such as an acid burn. Other chemicals can affect entire body systems, such as lead and alcohol. Some can do both, such as alcohol and organic solvents you use at work.

Multiple chemicals may have unique effects when combined in your body.



Figure 23. World Trade Center cleanup.

Examples:

- Alcohol and solvents
- Asbestos and cigarette smoke
- Exposures at the WTC cleanup

Section 4: Overview of Chemical Hazards

As mentioned in the last section, training workers about the different hazard categories is mandatory.

All chemicals are found in one of three forms.

Chemicals, or hazardous materials, come in all forms, shapes and sizes. Recognizing the potential forms of a chemical gives you clues as to how it may pose a danger to you and your coworkers. Chemicals are found in three states: solid, liquid and gas. You can even have a chemical in different states depending on environmental conditions such as pressure and temperature. For example, under normal conditions, water is a liquid between 32° F and 212° F. Below 32° F it is a solid (ice) and above 212° F it is a gas (steam). You can find most of this information on an SDS or product label, but not always.

Each chemical form can have different “types” or categories. Write an example for each from one of your recent jobs.

1. Solid Example: _____
2. Liquid Example: _____
3. Gas Example: _____

Besides determining if a chemical is in a solid, liquid or gaseous state, we can also look at the common forms chemical products come in as the following list shows:

Solids

- Dusts
- Fibers
- Fumes

Liquids

- Aerosols
- Mist
- Gels
- Adhesives

Gases

- Acetylene
- Oxygen
- Carbon monoxide
- Nitrogen

Solids

There are many solids that you may be exposed to if you are in construction work. Take a moment to think of all the construction materials you use on the job where “dust” can get into the air and reach your breathing zone and enter your body.

Mixing cement/concrete/mortar/grout, cutting, sanding or grinding any material, even sweeping the floor could create a great deal of dust.



Figure 24. Dust from sanding

By understanding that solid materials that you work with may reach your breathing zone, you are aware of the hazard and can take steps to protect yourself.

Liquids

Liquids can come into direct contact with your skin or eyes and harm that area or be absorbed into your body. Liquids can be sprayed and form mists or evaporate and form vapors which can be inhaled. Mists can settle on your skin and be absorbed or settle and contaminate food or drinks. Any time you use a liquid or gel, your skin and eyes are at risk of exposure. Paints, adhesives and fuels can form vapors and reach your breathing zone.

Gases and Vapors

Gases are chemicals that are in the gas phase at room temperature (70° F). Vapors evaporate from substances that are liquids or solids at room temperature. **Gases and vapors that a worker breathes can reach the lungs and cause harm.**



Figure 25. Vapors and dust from asphalt

It is important to understand these physical properties of chemicals.

By understanding some physical properties of chemicals you will better understand how a chemical may act in the environment and therefore you will be able to protect yourself. Take vapor density for example. Maybe you are cleaning a mechanical component in a confined space with an organic solvent possessing a high vapor density. You can assume that it would start to settle toward the floor as it evaporates. How would this fact help protect you? You could assume that without good ventilation, organic vapors will become trapped in the space and build up to levels that may be harmful to you!

Important physical properties to consider include:

- **pH (corrosive power)**

The pH scale is a simple way to define acids and bases. This scale assigns a number from 0 to 14 to a solution. Any solution with a pH less than 7 is an acid. Any substance with a pH greater than 7 is a base. A solution with a pH of 7 is neutral. **With corrosives, concentration is critical:**

Acetic Acid:

**90% solution destroys skin (pH<2),
6% is vinegar we put it on salads (pH~4.5)**

- **Vapor pressure (VP) (chemical's volatility)**

The vapor pressure is a measure of how much vapor is given off by a chemical at a given temperature. The higher the vapor pressure the more likely it is that you will have significant quantities of a chemical in the air above the liquid. Vapor pressure is measured by seeing how "hard" the vapor of a material "pushes" against the sides of a closed container. The more heat that is applied to a liquid, the greater its vapor pressure will become. Vapor pressure is measured in millimeters of mercury (mmHg). Vapor pressure is usually reported for the chemical at room temperature. At higher temperatures the vapor pressure will increase rapidly. If a chemical has a high vapor pressure, more of it will be in the air compared to a chemical with a low vapor pressure.

Low Vapor Pressure — less than 1 mmHg @ 68° F
Moderate vapor Pressure — between 1 and 10 mmHg @ 68° F
High Vapor Pressure — higher than 10 mmHg @ 68° F

What does the vapor pressure of sulfuric acid tell us about hazards from spills?

Sulfuric acid VP = 0.001 mm Hg

- **Flash Point (FI.P.)**

The minimum temperature of a liquid at which sufficient vapor is given off to form an ignitable mixture with air near the surface of the liquid. In other words, the temperature where enough fuel will vaporize to have an explosion or fire.

What is the unit for flash point?

Degrees Fahrenheit

Flash Point Class Exercise (optional)

Using whatever resources are available, look up and record the flash point for the chemicals below and put in order of most to least flammable.

If internet access is available, you can use:

- The NIOSH Pocket Guide: <http://www.cdc.gov/niosh/npg/>
- WISER, the Wireless Information System for Emergency Responders: <http://wiser.nlm.nih.gov/>
- WISER is available as a free app, as well, so check it out on your smart phone.



Chemical	Flash Point	Order of Flammability
Diesel fuel	Diesel fuel = 136 degrees F	4 (least flammable)
Gasoline	Gasoline = -45 degrees F	1 (most flammable)
Benzene	Benzene = 12 degrees F	2
Turpentine	Turpentine = 95 degrees F	3

- Ingredients for a fire (Fire Tetrahedron)**

Flammability is the ability of a solid, liquid or gas to ignite and produce a flame. Four elements are required in specific ratios for combustion to occur: fuel, oxygen, heat, and a chain reaction. This relationship is described by the fire tetrahedron. The fire can be extinguished by taking away any one element of the fire tetrahedron.

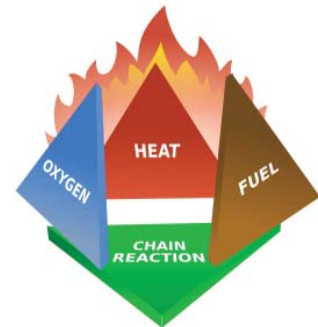


Figure 26. Fire Tetrahedron.

This used to be a fire triangle, but chain reaction was added because the reaction must continue if a fire is to be sustained. Think about lighting a cigarette lighter beneath a 2 by 4 for a second . There is heat, oxygen and fuel, but no chain reaction. If the 2 by 4 was ground into sawdust, the reaction would go forward because the ratios were right.

- Explosive limits**

The range or limit that the vapors will be mixed sufficiently in air to ignite. Each chemical (that can burn) will have a lower and upper explosive limit (LEL and UEL respectively). If a fuel is within its flammable range and there is sufficient oxygen and an ignition source, you will have an explosion or fire.

Optional Exercise: Look up and record the lower and upper explosive limit for these chemicals.

Chemical	Lower explosive limit %	Upper explosive limit %
Kerosene	0.75	5
Gasoline	1.4	7.6
Methylene chloride (furniture stripper)	13	23

- **Vapor Density (VD) and Relative Gas Density (RgasD)**

Vapor density tells you if the vapor of a liquid goes up or down in air. Vapor density is measured in comparison with air (air =1). If a chemical has a vapor density greater than one, it means that the vapor will tend to sink to the ground and roll along just like a liquid, collecting in invisible puddles and pools in low lying areas. The material may be nontoxic, but it still may be able to collect in low areas or confined spaces at high enough levels to cause an explosive atmosphere, or to replace oxygen in the air.

What is the rule about vapor density for most chemicals encountered in construction work?

Heavier than air

Lighter than air

These are not all the physical properties of chemicals but they are the ones that most affect workers' health and safety. Many of these can be identified on a chemical's SDS or in the National Institute for Occupational Safety and Health (NIOSH) Pocket Guide.

Section 5: Measurement and Exposure Limits

We will now briefly review measurement of chemicals, units of measure and exposure limits.

Why do we monitor?

Air monitoring is required to be reviewed under Hazcom training. If you are at a job site and are receiving Hazcom training, you should be made aware, in some type of training, that the work site has the capability to monitor for the chemical exposures you may face. If you have any questions concerning air monitoring, please see a supervisor, union steward or site health and safety professional.

There are two types of monitoring: real-time and samples that are sent to a lab.

Real-time equipment can give immediate chemical exposure measurements.

- Combustible gases
- Toxic vapors and gases
- Oxygen



Figure 27

But OSHA requires sampling from a worker's breathing zone!

Personal monitoring determines a specific employee's exposure.

Recognizing these units will help you understand exposure results.

Common units of measure include:

- Parts per million (ppm)
- Parts per billion (ppb)
- Milligrams per cubic meter (mg/m³)
- Percent (%)
- Fibers per cubic centimeter (fibers/cc)

Parts per million (ppm) is a very small amount; an example is 4 drops of ink in a 55 gallon drum. Parts per billion (ppb) is one thousand times less than ppm.

Gram is a measure of weight.

- 1 paperclip = 1 gram
- Milligram (mg) = one-thousandth of a gram (1,000th)
- Microgram (µg) = one millionth of a gram (1,000,000th)



Figure 28

Cubic centimeter is a measure of volume.

A thimble holds around 3 cubic centimeters of air.



Figure 29

OSHA has Permissible Exposure Limits (PELs), but it is critical to remember...

- Most are from 1968 American Conference of Governmental Industrial Hygienist's (ACGIH) Threshold Limit Values (TLVs)
- Current TLVs are often lower
- NIOSH Recommended Exposure Limits (RELs) are usually lower
- Most chemicals have no exposure limits set

What are the main exposure limits?

Exposure limits are a way to compare a worker's exposure on the job with an assumed "safe" limit, which was derived from scientific study. It can be argued that many exposure limits are too low and most chemicals do not have an exposure limit. However, they are all we have to assist us in protecting workers. Some exposure limits are guidelines (usually more protective) and some are the Law (though usually not as protective as guidelines). Below are the three main exposure limits used to protect workers.

- OSHA Permissible Exposure Limits (PELs). PELs are the Law!
- ACGIH Threshold Limit Values (TLVs)
- NIOSH Recommended Exposure Limits (RELs)

Most exposure limits are based on an average over eight hours.

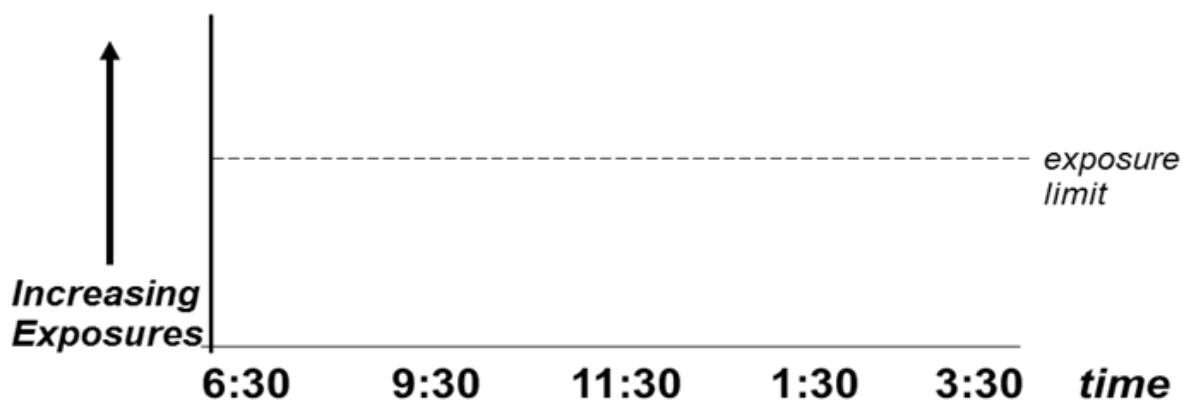


Figure 30

Exposure limits are based on 8-hour or 10-hour averages, ceilings (cannot exceed), or 15-minute peak exposures. Exposures must be kept below OSHA PELs. Most exposure limits are for airborne exposures. **Some chemicals have ceilings that can't be exceeded.** Exposure limits do not take into account exposure from multiple chemicals.

Section 6: Other Ways to Communicate Hazards

Types of labeling systems

There are different types of labeling systems that should be in place to help you recognize when hazardous chemicals are present in the work area. These labeling systems are:

- HMIS
- NFPA 704 M
- DOT placards
- Product labels



Figure 31

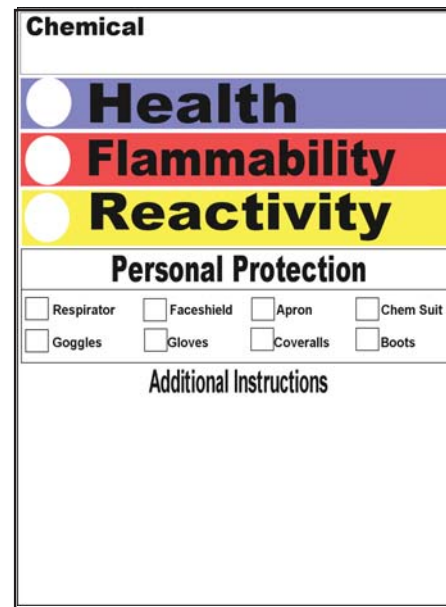


Figure 32

Hazardous Materials Identification System (HMIS)

Color-coded HMIS ranks hazards and recommends PPE.

The Hazardous Materials Identification System (HMIS) uses rectangular labels which may be found on bulk storage units or smaller containers at a site. The HMIS system addresses four topics. For health, flammability and reactivity, a number from 0 to 4 is assigned based on the severity of the hazards, just like NFPA. The higher the number, the more severe the hazard. The fourth designation is for Personal Protective Equipment. These PPE recommendations apply to normal use and may not be adequate for an emergency. Although chronic health effects usually are not rated, they may be indicated after the health hazard rating or by written warnings in the upper white section of the label.

HMIS labels also contain the name of the product and more specific hazard information including:

- Routes of entry
- Health hazards
- Target organs and effects
- Physical hazards.

NFPA 704 M diamond is widely used.

Originally developed to quickly warn fire fighters about potential chemical hazards in a fire, the National Fire Protection Association (NFPA) labeling system provides important information to the construction worker. However, use of the NFPA labels is not required by OSHA. The NFPA label is a diamond containing four smaller diamonds of different colors. The colors of the smaller diamonds are red (flammability), blue (health hazard), yellow (reactivity hazard), and white (specific hazards). The red, blue, and yellow squares contain a hazard rating from 0 to 4, which indicates the severity of the hazard, with 4 being the most dangerous. The white square is reserved for symbols that represent specific hazards, such as to not mix with water or radiation.



Figure 33. NFPA 704 M Diamond

For this example chemical,

1. What is the greatest hazard, health, fire or reactivity?

Reactivity is the greatest risk with a score of 3, "Shock and heat may detonate."

2. What is the specific hazard?

The specific hazard is that it is radioactive. This is a really hazardous chemical!

Department of Transportation requires placards on vehicles carrying hazardous chemicals.

The Department of Transportation (DOT) requires trucks and trailers, railroad cars, and many marine vessels to display placards indicating the hazards presented by material in shipment. Labels, which are smaller, are usually found on packages, carboys, and other smaller containers being transported or stored. These placards and labels are in addition to what OSHA requires.

HAZMAT placards

Placards are diamond-shaped, 10 3/4-inches square, point-on-point fixtures. They should be located on all four sides of a vehicle carrying a quantity of hazardous materials that requires placarding.

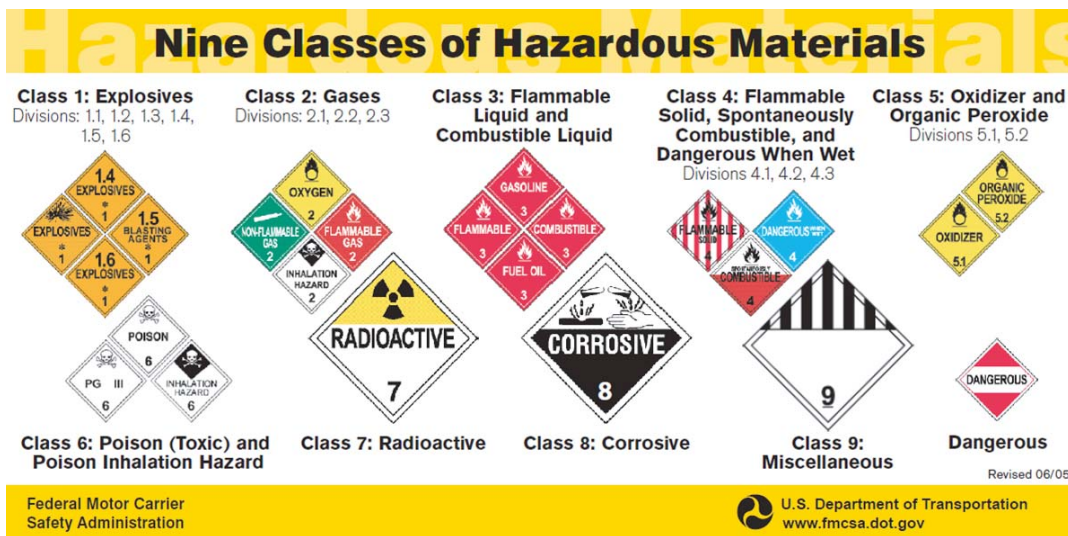


Figure 34

Placards provide recognition information in a number of ways:

- Background color
- Symbol at the top
- Hazard class wording or identification number in the center
- United Nations (UN) hazard class number at the bottom

For transportation, pictograms will have the background and symbol colors currently used.

Section 7: Controlling Hazards

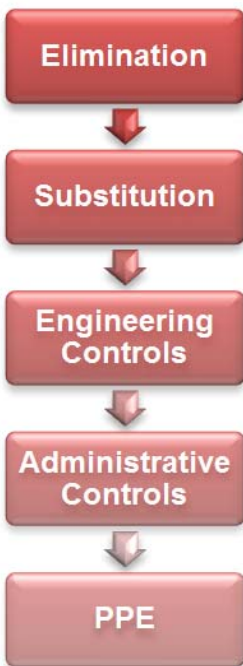


Figure 35

The hierarchy of controls can protect you from hazardous chemicals.

The hierarchy of controls is a list of methods, in order from most desirable to least desirable, which emphasizes controlling a hazard at its source. This is done by giving preference to eliminating the hazard altogether; then to the use of the engineering controls. These types of strategies should be used first, where possible, because they are less subject to human error and because they are less disruptive and uncomfortable for people to use and for people working in the area. Whichever methods you use, remember that in each case their effectiveness should be monitored regularly.

The overall idea is to design or redesign the workplace to fit the needs of workers. Training workers and providing Personal Protective Equipment is necessary but, creating as safe and healthy a workplace as possible is the ultimate goal. Achieving the goal requires methods such as substituting less dangerous chemicals or processes in place of harmful ones, designing workstations to cause less harm to workers, and by integrating health and safety of the workplace into the design stages of workplaces and work process development.

Eliminate or substitute chemicals you currently use with less harmful ones.

Are there any chemicals you could eliminate or substitute at your job? Is it possible to make that substitution? Green chemistry and green jobs may be a good avenue for substitution or elimination. However, **just because it is “green”, does not always mean it is safe!**



Figure 36. JobCorp student using a soy-based spray foam.

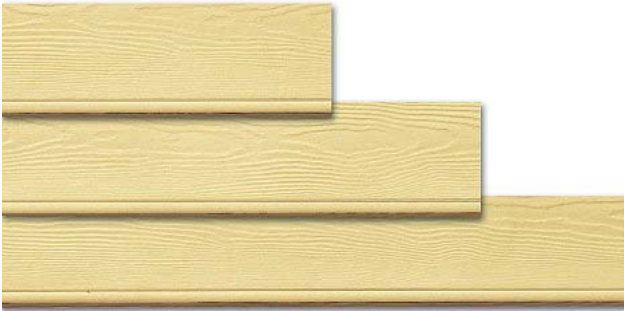


Figure 37

- **Hardiplank: 10-50% silica**
- **Weatherboard: 45-55% silica**

Fiber-cement board is a concrete-like material used in roof shingles, panel units, floor underlayment, and siding. It is strong, durable, mold and weather resistant, and non-combustible. It is however potentially dangerous to workers due to its crystalline silica composition. Workers who cut it or work with it in such a way as to produce dust are at risk of silica exposure. Other workers in proximity to this work may also be affected by the silica hazard.

WISHA is the Washington Industrial Safety and Health Act enforcement group. *WISHA inspection data* showed 5 of 7 workers using circular saws outdoors on fiber-cement siding were exposed above ACGIH-TLV for silica

Use engineering controls to reduce chemical exposures.

There are wet method engineering controls to reduce dust exposures on construction jobs.



Figure 38

Ventilation controls are effective for construction dust exposures.



Figure 39. Tuck-pointing without controls



Figure 40. Tuck-pointing with controls

CPWR's Construction Solutions can help you select effective controls for your trade.

<http://www.cpwrconstructionsolutions.org>



work hazards, and options for making work safer

Select Work Activity:

- [Carpentry](#)
- [Drywall, Glass & Floor Coverings](#)
- [Electrical](#)
- [Excavation & Demolition](#)
- [General Labor](#)
- [Heavy Equipment](#)
- [Insulation & Lagging](#)
- [Masonry, Tile, Cement & Plaster](#)
- [Paints & Coatings](#)
- [Pipes & Vessels](#)
- [Reinforced Concrete](#)
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- [Structural Steel](#)

Designed for owners, contractors, and workers, Construction Solutions is a database of information on health hazards, and practical control measures to reduce or eliminate those hazards. The information has been compiled from public sources including published research findings.



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Figure 41. CPWR Construction Solutions

eLCOSH is a great source of training materials and information for workers.

<http://www.elcosh.org>

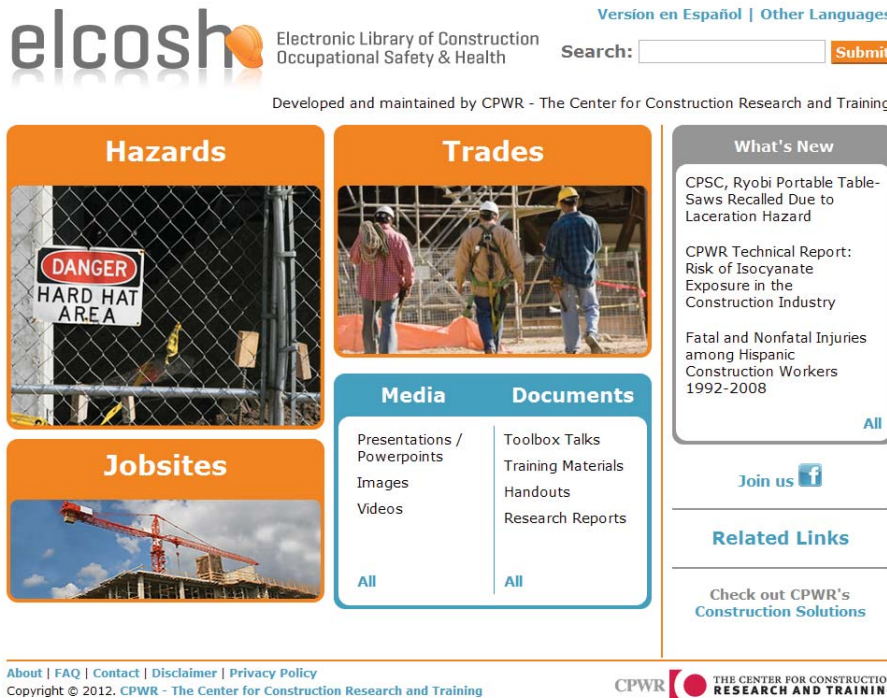


Figure 42. eLCOSH website.

Administrative controls can also reduce chemical exposures.

Administrative controls are any procedure that significantly limits daily exposure by control or manipulation of the work schedule or manner in which work is performed. Administrative controls are not as effective as engineering controls but many are quick and inexpensive to implement.

- Training and information
- Signage
- Maintain equipment to prevent leaks and releases
- Standard Operating Procedures (SOPs)
- Worker rotation
- Scheduling tasks when chemical use is low



Figure 43. Signage is an administrative control.

Personal Protective Equipment is at the bottom of the hierarchy of controls. Why?



Here are some possible answers:

- The toxin is always there
- If the PPE fails, you have no protection
- The employer must do an assessment to make sure the PPE is correct
- PPE is uncomfortable

PPE is a required component of training for the Hazcom standard; 29 CFR 1910.1200(h)(3)(iii).

NIOSH-approved respirators can protect your lungs from chemical exposure.

After exhausting the controls process, you may be left with using PPE as your only protection.



Figure 44

On most SDSs, a list of recommended PPE will be given, but it may only state something close to the following: “For handling of chemical, use appropriate gloves and respirator.” Now what does “appropriate” mean? They may not spell out or list which type of PPE you will need. You may have to find that information in some of the other recourses we mentioned or hopefully, your industrial hygienist, or other competent person, has already chosen the correct PPE for you to use.

Employers must have a respiratory protection program that includes medical clearance, fit testing and proper selection.

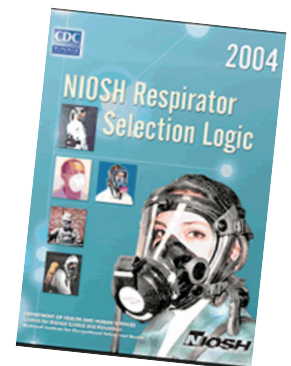


Figure 45

Whenever you use PPE, be sure to

- Use PPE that has been selected for a given hazard and fits correctly
- Don PPE only if you've been trained
- Always inspect PPE before use
- NEVER use damaged PPE
- Only use PPE as a last resort to control hazards!

Are there any health and safety issues from wearing PPE?**Yes! The following are often a problem:**

- Heat stress
- Limited movement
- Limited vision
- Limited hearing
- Claustrophobia

Section 8: Emergencies and First Aid

Learn about first aid arrangements on your jobsite and read labels and SDSs before using chemicals.

What happens if you encounter a leak?

The differences between an emergency and an “incidental spill” are level of hazard, risk, familiarity and training. REMEMBER, you are not trained for emergency response. Inform your supervisor of unusual odors, spills, or releases, etc. Inform coworkers and leave an area of a large spill or chemical release. Follow your employer’s spill response program for further information.

You must be trained to respond to a fire of any size. Learn about the policy on fighting fires at your site.



Figure 45. Photo courtesy Whiting Turner Construction Company and GW University.

What if you have been exposed to a chemical?

1. Let your supervisor and union know.
2. Find out which chemical(s) were involved.
3. Follow the first aid directions in the SDS.
4. Get medical attention as needed.
5. Call health and safety to evaluate situation and cause of exposure before returning to work

Now that you have had this class, what actions will you take at your jobsite to find out more about the chemicals you work with?



You should promote discussion and hopefully get some answers like:

1. Look for the book of SDSs on our site and look up products I work with
2. Look at the labels on the products I use
3. See what plans we have for cleaning up spills
4. Find out where we are all supposed to assemble if there is an emergency on our site.

Resources

European Chemicals Agency, (2001). <http://echa.europa.eu/>

OSHA, (2011). 29 CFR 1910.1200. Hazard Communication Standard. <http://www.osha.gov/dsg/hazcom/standards.html>

OSHA, (2008). Chemical Hazard Communication. Document 3084.

DiNardi, Salvatore, Silk, Jennifer. (1997). The Occupational Environment-Its Evaluation and Control. AIHA Press; Chapter 40.

United Nations, (2003). Globally Harmonized System of Classification and Labeling of Chemicals (GHS) "The Purple Book".

Appendix A: Glossary

ACGIH: American Conference of Governmental Industrial Hygienists. ACGIH develops and publishes recommended occupational exposure limits for chemical substances and physical agents.

Acid: Any chemical that undergoes dissociation in water with the formation of hydrogen ions. Acids have a sour taste and may cause severe burns. They turn litmus paper red and have pH values of 0 to 6.

Acute effect: Adverse effect on a human or animal body that takes place soon after exposure.

Acute toxicity: Adverse effects resulting from a single dose of or exposure to a substance.

Air-line respirator: A respirator that is connected to a compressed breathable air source by a small-diameter hose. The air is delivered continuously or intermittently in a sufficient volume to meet the wearer's breathing requirements.

APR: Air-Purifying Respirator. A respirator that uses chemicals to remove specific gases and vapors from the air or that uses a mechanical filter to remove particulate matter. An air-purifying respirator must be used only when there is sufficient oxygen to sustain life and the air contaminant level is below the concentration limits of the device.

Alkali: Any chemical substance that forms soluble soaps with fatty acids. Alkalis are also known as bases and may cause severe burns. Alkalis turn litmus paper blue and have pH values from 8 to 14.

Asbestosis: Chronic lung disease caused by inhaling airborne asbestos fibers.

Asphyxiant: Vapor or gas that causes unconsciousness or death by suffocation. Most simple asphyxiants are harmful to the body only when they become so concentrated that they reduce oxygen in air (normally 20.9 %) to dangerous levels (16 percent or lower). Some chemicals, such as carbon dioxide, function as chemical asphyxiants by reducing the blood's ability to carry oxygen.

Base: Substances that usually liberate OH anions when dissolved in water. Bases react with acids to form salts and water. Bases have a pH greater than 7, turn litmus paper blue, and may be corrosive to human tissue. A strong base is called alkaline or caustic.

Carbon dioxide (CO₂): Heavy, colorless gas produced by combustion and decomposition of organic substances and as a by-product of chemical processes. Will not burn, relatively nontoxic, and unreactive. Can cause oxygen-deficient environments in large concentrations. Is useful as fire-extinguishing agent to block oxygen and smother fire.

Carbon monoxide (CO): Colorless, odorless, flammable, and very toxic gas produced by the incomplete combustion of carbon compounds and as a byproduct of many chemical processes. A chemical asphyxiant, it reduces the blood's ability to carry oxygen.

Carcinogen: Substance or agent capable of causing or producing cancer in mammals.

CAS: An assigned number that identifies a chemical. CAS stands for Chemical Abstracts Service, an organization that indexes information published in Chemical Abstracts by the American Chemical Society and that provides index guides by which information about particular substances may be located in the abstracts. The CAS number is a concise, unique means of material identification.

Ceiling (C): Maximum allowable human exposure limit for airborne substances; not to be exceeded even momentarily.

CFR: Code of Federal Regulations. A collection of the regulations established by law.

Chemical: Any element, chemical compound, or mixture of elements and/or compounds.

Chemical manufacturer: An employer in a workplace in which chemicals are produced for use or distribution.

Chemical name: Scientific name that clearly identifies the chemical for hazard evaluation purposes.

Chemical reactivity: Ability of a material to chemically change. Undesirable and dangerous effects, such as heat, explosions, or the production of noxious substances, can result.

Chronic effect: Adverse effect on a human or animal body with symptoms that develop slowly over a long period of time or that recur frequently.

Chronic exposure: Long-term contact with a substance.

Combustible liquids: Term used by NFPA and DOT to classify certain liquids that will burn, on the basis of flash points. NFPA and DOT generally define “combustible liquids” as having a flash point of 100° F or higher. They do not ignite as easily as flammable liquids; however, they can be ignited under certain conditions, and must be handled with caution.

Container: Any bag, barrel, bottle, box, can, cylinder, drum, reaction vessel, storage tank, or the like that contains a hazardous chemical. Under hazard communication rules (1910.1200), pipes or piping systems, and engines, fuel tanks, or other operating systems in a vehicle are not considered to be containers.

Corrosive: Liquid or solid that causes visible destruction or irreversible alterations in skin tissue at site of contact, or liquid that has severe corrosion rate on steel.

DOT: U.S. Department of Transportation

Dust: Solid particles suspended in air produced by some mechanical process, such as crushing, grinding, abrading, or blasting. Most dusts are inhalation, fire, or dust explosion hazards.

Employee (worker): A worker who may be exposed to hazardous chemicals under normal operating conditions or in foreseeable emergencies.

Employer: A person engaged in a business in which chemicals are either used, distributed, or produced for use or distribution, including a contractor or subcontractor.

Engineering controls: Systems that reduce potential hazards by isolating the worker from the hazard or by removing the hazard from the work environment. Methods include ventilation, isolation, and enclosure.

EPA: Environmental Protection Agency

Explosive: Material that produces a sudden, almost instantaneous release of pressure, gas, and heat when subjected to abrupt shock, pressure, or high temperature.

Exposure: An employee who is subjected during the course of employment to a chemical that is a physical or health hazard; includes accidental or possible exposure. “Subjected” includes any route of entry: inhalation, ingestion, skin contact, or absorption.

Exposure limits: Concentration in air of a chemical that is thought to be acceptable.

Flammable limits: Minimum and maximum concentrations of flammable gas or vapor between which ignition occurs.

Flash Point (F.P.): Temperature at which a liquid will give off enough flammable vapor to ignite. There are several methods for testing flash points; flash points for the same material may vary depending on the test method.

Fume: Airborne suspension consisting of minute solid particles arising from the heating of a solid.

Gas: Formless fluid that occupies the space of its enclosure. Can settle to the bottom or top of an enclosure when mixed with other materials. Can be changed to its liquid or solid state only by increased pressure and decreased temperature.

Hazardous chemical: Any chemical whose presence or use is a physical hazard or a health hazard.

Hazardous material: Any substance or mixture of substances having properties capable of producing adverse effects on the health or safety of a human being.

Hazardous Materials Identification System (HMIS): Developed by the NPCA to provide information about health, flammability, and reactivity hazards encountered in the workplace. A number is assigned to a material indicating the degree of hazard, from 0 for the least up to 4 for the most severe. Letters are used to designate personal protective equipment.

Health hazard: A chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees.

Ingestion: Taking in a substance through the mouth.

Inhalation: Breathing in a substance as a gas, vapor, fume, mist, or dust.

Irritant: Substance that will cause an inflammatory response or reaction of the eye, skin, or respiratory system.

Label: Any written, printed, or graphic sign or symbol displayed on containers of hazardous chemicals; includes identity of the material, appropriate hazard warnings, and name and address of the chemical manufacturer, importer, or other responsible party.

Latency period: Time that elapses between exposure and the first manifestations of disease or illness.

Local effects: Toxic or irritation effects that occur at the site of contact with a chemical or substance.

Local ventilation: Drawing off and replacement of contaminated air directly from its source.

Lower Explosive Limit (LEL): Lowest concentration (percentage of the substance in air) that will produce a flash of fire when heat, electric arc, or flame is present.

Mist: Suspended liquid droplets in the air generated by condensation from the gaseous to the liquid state or by mechanically breaking up the liquid by splashing or atomizing.

mm Hg: A measure of pressure in millimeters of a mercury column above a reservoir, or difference of level in a U-tube.

NFPA: National Fire Protection Association

NIOSH: National Institute for Occupational Safety and Health

Oxidizer: Substance that yields oxygen readily to stimulate the combustion of organic matter.

parts per million (ppm): Unit for measuring concentration of a gas or vapor in air. Parts of the gas or vapor in a million parts of air. Also used to indicate the concentration of a particular substance in a liquid or solid.

(PEL): The PEL indicates the permissible concentration of air contaminants to which nearly all workers may be repeatedly exposed 8 hours a day, 40 hours a week, over a working lifetime (40 years), without adverse effects.

Personal Protective Equipment (PPE): Devices or clothing worn to help isolate a worker from direct exposure to hazardous materials.

pH: Scale of 0 to 14 representing acidity or alkalinity of aqueous solution. Pure water has pH of 7.

Physical hazard: A chemical for which there is scientifically valid evidence that it is a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable (reactive) or water reactive.

Recommended exposure limit (REL): A exposure limit from NIOSH. The highest allowable airborne concentration that is not expected to injure a worker. Expressed as a ceiling limit or as a time-weighted average, usually for a 10-hour work shift.

Reproductive hazard: Any agent that has a harmful effect on the adult male or female reproductive system or the developing fetus or child.

Respiratory system: Breathing system, including the lungs and air passages, as well as the associated system of nerves and circulatory supply.

Respiratory protection: Devices that will protect the wearer's respiratory system from overexposure by inhalation of airborne contaminants. Respiratory protection is used when a worker must work in an area where he/she might be exposed to concentration in excess of the allowable exposure limit.

Routes of entry: Means by which material may gain access to the body (inhalation, absorption, ingestion, or penetration).

Safety data sheet (SDS): means written or printed material concerning a hazardous chemical that is prepared in accordance with paragraph (g) of this section.

SCBA: Self-contained breathing apparatus

Sensitization: State of immune-response reaction in which further exposure elicits an immune or allergic response. A person previously exposed to a certain material is more sensitive when he experiences further contact with it.

Sensitizer: Substance that, on first exposure, causes little or no reaction in humans or test animals but that, on repeated exposure, may cause a marked response not necessarily limited to the contact site.

Solvent: Substance, usually liquid, in which other substances are dissolved. Water is the most common solvent.

STEL: Short-term exposure limit.

Teratogen: Substance or agent to which exposure of a pregnant female can result in malformation of the fetus.

Threshold Limit Value (TLV): Established by ACGIH. Airborne concentration of a material to which nearly all persons can be exposed day after day, without adverse effects. TLVs are expressed in three ways:

1. TLV-C Ceiling limit: concentration that should not be exceeded even instantaneously.
2. TLV-STEL Short-term exposure limit: maximum concentration for a continuous 15-minute exposure period.
3. TLV-TWA Time-weighted average: concentration for a normal 8-hour work day or 40-hour work week.

Toxicity: Sum of adverse effects resulting from exposure to a material, generally by the mouth, skin, or respiratory tract.

Toxicology: Study of the nature, effects, and detection of poisons in living organisms. Also, substances that are usually harmless but toxic under certain conditions.

Upper Explosive Limit (UEL): Highest concentration (percentage of the substance in air) that will produce a flash of fire when heat, electric arc, or flame is present.

Vapor: Gaseous state of a material suspended in air that would be a liquid or solid under ordinary conditions.

Vapor density: Weight of vapor or gas compared to an equal volume of air; expression of the density of the vapor or gas.

Vapor pressure: Pressure exerted by a saturated vapor above its liquid in a closed container.

Work area: A room or defined space in a workplace where hazardous chemicals are produced or used and where employees are present.

Workplace: An establishment at one geographical location containing one or more work areas.

Appendix B: Safety Data Sheets

The following pages of this appendix contain examples of safety data sheets (SDS's) concerning the following chemicals:

- MINWAX Super Fast-Drying Polyurethane for Floors B-2
- Loctite PL300 Foamboard Construction Adhesive B-18
- PRO INDUSTRIAL Multi-Surface Acrylic Eg-Shel Coating, Extra White B-23
- 3M Polyurethane Sealant 540 B-34
- Sikaflex Crack Flex Sealant B-50
- TremfixA.F. 5 US GL B-64

SAFETY DATA SHEET

13024/13034

Section 1. Identification

Product name : MINWAX® Super Fast Drying Polyurethane For Floors (350 VOC)
Semi-Gloss

Product code : 13024/13034

Other means of identification : Not available.

Product type : Liquid.

Relevant identified uses of the substance or mixture and uses advised against

Paint or paint related material.

Manufacturer : MINWAX Company
10 Mountainview Road
Upper Saddle River, NJ 07458

Emergency telephone number of the company : US/Canada: (216) 566-2917
Mexico: CHEMTREC México 01-800-681-9531. Available 24 hours and 365 days per year

Product Information Telephone Number : US/Canada: (800) 523-9299
Mexico: 01-800-71-73-123 / (52) 53-33-15-01

Regulatory Information Telephone Number : US / Canada: (216) 566-2902
Mexico: 01-800-71-73-123 / (52) 53-33-15-01

Transportation Emergency Telephone Number : US / Canada: (800) 424-9300
Mexico: SETIQ 01-800-00-214-00 / (52) 55-5559-1588 24 hours / 365 days a year

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : FLAMMABLE LIQUIDS - Category 3
SERIOUS EYE DAMAGE/ EYE IRRITATION - Category 2A
SKIN SENSITIZATION - Category 1
CARCINOGENICITY - Category 2
TOXIC TO REPRODUCTION (Fertility) - Category 2
TOXIC TO REPRODUCTION (Unborn child) - Category 2
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Respiratory tract irritation) - Category 3
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Narcotic effects) - Category 3
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) - Category 2
ASPIRATION HAZARD - Category 1

Percentage of the mixture consisting of ingredient(s) of unknown oral toxicity: 27.8%
Percentage of the mixture consisting of ingredient(s) of unknown dermal toxicity: 36.8%
Percentage of the mixture consisting of ingredient(s) of unknown inhalation toxicity: 36.8%

GHS label elements

Hazard pictograms :



Signal word : Danger

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Section 2. Hazards identification

Hazard statements	: Flammable liquid and vapor. Causes serious eye irritation. May cause an allergic skin reaction. Suspected of damaging fertility or the unborn child. Suspected of causing cancer. May be fatal if swallowed and enters airways. May cause respiratory irritation. May cause drowsiness or dizziness. May cause damage to organs through prolonged or repeated exposure.
Precautionary statements	
General	: Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand.
Prevention	: Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves. Wear eye or face protection. Wear protective clothing. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Use explosion-proof electrical, ventilating, lighting and all material-handling equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Keep container tightly closed. Use only outdoors or in a well-ventilated area. Do not breathe vapor. Wash hands thoroughly after handling. Contaminated work clothing must not be allowed out of the workplace.
Response	: Get medical attention if you feel unwell. IF exposed or concerned: Get medical attention. IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or physician if you feel unwell. IF SWALLOWED: Immediately call a POISON CENTER or physician. Do NOT induce vomiting. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. IF ON SKIN: Wash with plenty of soap and water. Wash contaminated clothing before reuse. If skin irritation or rash occurs: Get medical attention. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention.
Storage	: Store locked up. Store in a well-ventilated place. Keep cool.
Disposal	: Dispose of contents and container in accordance with all local, regional, national and international regulations.
Supplemental label elements	DELAYED EFFECTS FROM LONG TERM OVEREXPOSURE. Contains solvents which can cause permanent brain and nervous system damage. Intentional misuse by deliberately concentrating and inhaling the contents can be harmful or fatal. WARNING: This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. Please refer to the SDS for additional information. Keep out of reach of children. Do not transfer contents to other containers for storage.
Hazards not otherwise classified	: DANGER: Rags, steel wool, other waste soaked with this product, and sanding residue may spontaneously catch fire if improperly discarded. Immediately place rags, steel wool, other waste soaked with this product, and sanding residue in a sealed, water-filled, metal container. Dispose of in accordance with local fire regulations.

Section 3. Composition/information on ingredients

Substance/mixture	: Mixture
Other means of identification	: Not available.

CAS number/other identifiers

Ingredient name	% by weight	CAS number
Light Aliphatic Hydrocarbon	≥25 - ≤50	64742-47-8
Octamethylcyclotetrasiloxane	≥10 - ≤25	556-67-2
p-Chlorobenzotrifluoride	≤5	98-56-6
Decamethylcyclopentasiloxane	≤5	541-02-6
Vegetable Oil	≤5	68956-68-3
Amorphous Precipitated Silica	≤3	112926-00-8
Hydrotreated Heavy Petroleum Naphtha	<1	64742-48-9
Methyl Ethyl Ketoxime	≤0.3	96-29-7

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Section 3. Composition/information on ingredients

Zirconium 2-Ethylhexanoate	≤0.3	22464-99-9
Cobalt 2-Ethylhexanoate	≤0.3	136-52-7
Med. Aliphatic Hydrocarbon Solvent	≤0.3	64742-88-7
Xylene mixed isomers	≤0.3	1330-20-7
Heavy Aliphatic Solvent	≤0.3	64742-82-1
Calcium 2-Ethylhexanoate	≤0.3	136-51-6
2-(2-Methoxyethoxy)-ethanol	≤0.3	111-77-3

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

- Eye contact** : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.
- Inhalation** : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If necessary, call a poison center or physician. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.
- Skin contact** : Wash with plenty of soap and water. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Get medical attention. In the event of any complaints or symptoms, avoid further exposure. Wash clothing before reuse. Clean shoes thoroughly before reuse.
- Ingestion** : Get medical attention immediately. Call a poison center or physician. Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Aspiration hazard if swallowed. Can enter lungs and cause damage. Do not induce vomiting. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Most important symptoms/effects, acute and delayed

Potential acute health effects

- Eye contact** : Causes serious eye irritation.
- Inhalation** : Can cause central nervous system (CNS) depression. May cause drowsiness or dizziness. May cause respiratory irritation.
- Skin contact** : May cause an allergic skin reaction.
- Ingestion** : Can cause central nervous system (CNS) depression. May be fatal if swallowed and enters airways.

Over-exposure signs/symptoms

- Eye contact** : Adverse symptoms may include the following:
pain or irritation
watering
redness

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Section 7. Handling and storage

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination. See Section 10 for incompatible materials before handling or use.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits (OSHA United States)

Ingredient name	Exposure limits
Light Aliphatic Hydrocarbon	ACGIH TLV (United States, 3/2017). Absorbed through skin. TWA: 200 mg/m ³ , (as total hydrocarbon vapor) 8 hours.
Octamethylcyclotetrasiloxane	None.
p-Chlorobenzotrifluoride	None.
Decamethylcyclopentasiloxane	None.
Vegetable Oil	NIOSH REL (United States, 10/2016). TWA: 5 mg/m ³ 10 hours. Form: Respirable fraction TWA: 10 mg/m ³ 10 hours. Form: Total
Amorphous Precipitated Silica	OSHA PEL (United States, 6/2016). TWA: 5 mg/m ³ 8 hours. Form: Respirable fraction TWA: 15 mg/m ³ 8 hours. Form: Total dust
Hydrotreated Heavy Petroleum Naphtha	NIOSH REL (United States, 10/2016). TWA: 6 mg/m ³ 10 hours.
Methyl Ethyl Ketoxime	None. AIHA WEEL (United States, 10/2011). Skin sensitizer. TWA: 10 ppm 8 hours.
Zirconium 2-Ethylhexanoate	ACGIH TLV (United States, 3/2017). TWA: 5 mg/m ³ , (as Zr) 8 hours. STEL: 10 mg/m ³ , (as Zr) 15 minutes. NIOSH REL (United States, 10/2016). TWA: 5 mg/m ³ , (as Zr) 10 hours. STEL: 10 mg/m ³ , (as Zr) 15 minutes. OSHA PEL (United States, 6/2016). TWA: 5 mg/m ³ , (as Zr) 8 hours.
Cobalt 2-Ethylhexanoate	ACGIH TLV (United States, 3/2017). TWA: 0.02 mg/m ³ , (as Co) 8 hours. OSHA PEL (United States, 6/2016). TWA: 100 ppm 8 hours. TWA: 400 mg/m ³ 8 hours.
Med. Aliphatic Hydrocarbon Solvent	ACGIH TLV (United States, 3/2017). TWA: 100 ppm 8 hours. TWA: 434 mg/m ³ 8 hours. STEL: 150 ppm 15 minutes. STEL: 651 mg/m ³ 15 minutes. OSHA PEL (United States, 6/2016). TWA: 100 ppm 8 hours. TWA: 435 mg/m ³ 8 hours.
Xylene mixed isomers	None.
Heavy Aliphatic Solvent	None.
Calcium 2-Ethylhexanoate	None.
2-(2-Methoxyethoxy)-ethanol	None.

Occupational exposure limits (Canada)

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Section 5. Fire-fighting measures

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Small spill : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

Large spill : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Persons with a history of skin sensitization problems should not be employed in any process in which this product is used. Avoid exposure - obtain special instructions before use. Avoid exposure during pregnancy. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not swallow. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Take precautionary measures against electrostatic discharges. Empty containers retain product residue and can be hazardous. Do not reuse container.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

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Section 7. Handling and storage

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination. See Section 10 for incompatible materials before handling or use.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits (OSHA United States)

Ingredient name	Exposure limits
Light Aliphatic Hydrocarbon	ACGIH TLV (United States, 3/2017). Absorbed through skin. TWA: 200 mg/m ³ , (as total hydrocarbon vapor) 8 hours.
Octamethylcyclotetrasiloxane	None.
p-Chlorobenzotrifluoride	None.
Decamethylcyclopentasiloxane	None.
Vegetable Oil	NIOSH REL (United States, 10/2016). TWA: 5 mg/m ³ 10 hours. Form: Respirable fraction TWA: 10 mg/m ³ 10 hours. Form: Total
Amorphous Precipitated Silica	OSHA PEL (United States, 6/2016). TWA: 5 mg/m ³ 8 hours. Form: Respirable fraction TWA: 15 mg/m ³ 8 hours. Form: Total dust NIOSH REL (United States, 10/2016). TWA: 6 mg/m ³ 10 hours.
Hydrotreated Heavy Petroleum Naphtha	None.
Methyl Ethyl Ketoxime	AIHA WEEL (United States, 10/2011). Skin sensitizer. TWA: 10 ppm 8 hours.
Zirconium 2-Ethylhexanoate	ACGIH TLV (United States, 3/2017). TWA: 5 mg/m ³ , (as Zr) 8 hours. STEL: 10 mg/m ³ , (as Zr) 15 minutes. NIOSH REL (United States, 10/2016). TWA: 5 mg/m ³ , (as Zr) 10 hours. STEL: 10 mg/m ³ , (as Zr) 15 minutes. OSHA PEL (United States, 6/2016). TWA: 5 mg/m ³ , (as Zr) 8 hours.
Cobalt 2-Ethylhexanoate	ACGIH TLV (United States, 3/2017). TWA: 0.02 mg/m ³ , (as Co) 8 hours. OSHA PEL (United States, 6/2016). TWA: 100 ppm 8 hours. TWA: 400 mg/m ³ 8 hours.
Med. Aliphatic Hydrocarbon Solvent	ACGIH TLV (United States, 3/2017). TWA: 100 ppm 8 hours. TWA: 434 mg/m ³ 8 hours. STEL: 150 ppm 15 minutes. STEL: 651 mg/m ³ 15 minutes. OSHA PEL (United States, 6/2016). TWA: 100 ppm 8 hours. TWA: 435 mg/m ³ 8 hours.
Xylene mixed isomers	None.
Heavy Aliphatic Solvent	None.
Calcium 2-Ethylhexanoate	None.
2-(2-Methoxyethoxy)-ethanol	None.

Occupational exposure limits (Canada)

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Section 8. Exposure controls/personal protection

Ingredient name	Exposure limits
Solvent naphtha (petroleum), medium aliph.	<p>CA British Columbia Provincial (Canada, 6/2017). Absorbed through skin. TWA: 200 mg/m³, (as total hydrocarbon vapour) 8 hours.</p> <p>CA Alberta Provincial (Canada, 4/2009). Absorbed through skin. 8 hrs OEL: 200 mg/m³, (as total hydrocarbon vapour) 8 hours.</p> <p>CA Ontario Provincial (Canada, 7/2015). Absorbed through skin. TWA: 200 mg/m³, (as total hydrocarbon vapour) 8 hours.</p>
Methyl Ethyl Ketoxime	<p>AIHA WEEL (United States, 10/2011). Skin sensitizer. TWA: 10 ppm 8 hours.</p>
Zirconium 2-Ethylhexanoate	<p>CA Alberta Provincial (Canada, 4/2009). 8 hrs OEL: 5 mg/m³, (as Zr) 8 hours. 15 min OEL: 10 mg/m³, (as Zr) 15 minutes.</p> <p>CA British Columbia Provincial (Canada, 6/2017). TWA: 5 mg/m³, (as Zr) 8 hours. STEL: 10 mg/m³, (as Zr) 15 minutes.</p> <p>CA Quebec Provincial (Canada, 1/2014). TWA: 5 mg/m³, (as Zr) 8 hours. STEV: 10 mg/m³, (as Zr) 15 minutes.</p> <p>CA Ontario Provincial (Canada, 7/2015). STEL: 10 mg/m³, (as Zr) 15 minutes. TWA: 5 mg/m³, (as Zr) 8 hours.</p>
Cobalt 2-Ethylhexanoate	<p>CA Ontario Provincial (Canada, 7/2015). TWA: 0.02 mg/m³, (as Co) 8 hours. Form: Inorganic</p> <p>CA British Columbia Provincial (Canada, 6/2017). TWA: 0.02 mg/m³, (as Co) 8 hours.</p> <p>CA Quebec Provincial (Canada, 1/2014). Skin sensitizer. TWA: 0.02 mg/m³, (as Co) 8 hours.</p> <p>CA Saskatchewan Provincial (Canada, 7/2013). STEL: 0.06 mg/m³, (measured as Co) 15 minutes. TWA: 0.02 mg/m³, (measured as Co) 8 hours.</p>

Occupational exposure limits (Mexico)

Ingredient name	Exposure limits
Solvent naphtha (petroleum), medium aliph.	<p>ACGIH TLV (United States, 3/2017). Absorbed through skin. TWA: 200 mg/m³, (as total hydrocarbon vapor) 8 hours.</p>
Zirconium 2-Ethylhexanoate	<p>NOM-010-STPS-2014 (Mexico, 4/2016). TWA: 5 mg/m³, (as Zr) 8 hours. STEL: 10 mg/m³, (as Zr) 15 minutes.</p>
Cobalt 2-Ethylhexanoate	<p>NOM-010-STPS-2014 (Mexico, 4/2016). TWA: 0.02 mg/m³, (as Co) 8 hours.</p>

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Section 8. Exposure controls/personal protection

- Appropriate engineering controls** : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.
- Environmental exposure controls** : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.
- Individual protection measures**
- Hygiene measures** : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Contaminated work clothing should not be allowed out of the workplace. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.
- Eye/face protection** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles.
- Skin protection**
- Hand protection** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.
- Body protection** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.
- Other skin protection** : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Respiratory protection** : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use.

Section 9. Physical and chemical properties

Appearance

- Physical state** : Liquid.
- Color** : Not available.
- Odor** : Not available.
- Odor threshold** : Not available.
- pH** : Not available.
- Melting point/freezing point** : Not available.
- Boiling point/boiling range** : 138°C (280.4°F)
- Flash point** : Closed cup: 42°C (107.6°F) [Pensky-Martens Closed Cup]
- Evaporation rate** : 0.13 (butyl acetate = 1)
- Flammability (solid, gas)** : Not available.
- Lower and upper explosive (flammable) limits** : Lower: 0.75%
Upper: 10.5%

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Section 9. Physical and chemical properties

Vapor pressure	: 0.71 kPa (5.3 mm Hg) [at 20°C]
Vapor density	: 5 [Air = 1]
Relative density	: 0.95
Solubility	: Not available.
Partition coefficient: n-octanol/water	: Not available.
Auto-ignition temperature	: Not available.
Decomposition temperature	: Not available.
Viscosity	: Kinematic (40°C (104°F)): <0.205 cm ² /s (<20.5 cSt)
Molecular weight	: Not applicable.
Aerosol product	
Heat of combustion	: 16.259 kJ/g

Section 10. Stability and reactivity

Reactivity	: No specific test data related to reactivity available for this product or its ingredients.
Chemical stability	: The product is stable.
Possibility of hazardous reactions	: Under normal conditions of storage and use, hazardous reactions will not occur.
Conditions to avoid	: Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Do not allow vapor to accumulate in low or confined areas.
Incompatible materials	: Reactive or incompatible with the following materials: oxidizing materials
Hazardous decomposition products	: Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Octamethylcyclotetrasiloxane	LC50 Inhalation Vapor	Rat	36 g/m ³	4 hours
	LD50 Dermal	Rat	1770 mg/kg	-
	LD50 Oral	Rat	1540 mg/kg	-
p-Chlorobenzotrifluoride	LD50 Oral	Rat	13 g/kg	-
	Decamethylcyclopentasiloxane	Rat	>24134 mg/kg	-
Hydrotreated Heavy Petroleum Naphtha	LC50 Inhalation Vapor	Rat	8500 mg/m ³	4 hours
	LD50 Oral	Rat	>6 g/kg	-
Methyl Ethyl Ketoxime	LD50 Oral	Rat	930 mg/kg	-
	Zirconium 2-Ethylhexanoate	Rabbit	>5 g/kg	-
Cobalt 2-Ethylhexanoate	LD50 Oral	Rat	>5 g/kg	-
	LD50 Dermal	Rabbit	>5 g/kg	-
	LD50 Oral	Rat	1.22 g/kg	-
Xylene mixed isomers	LC50 Inhalation Gas.	Rat	5000 ppm	4 hours
	LD50 Oral	Rat	4300 mg/kg	-

Irritation/Corrosion

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Section 11. Toxicological information

Product/ingredient name	Result	Species	Score	Exposure	Observation
Octamethylcyclotetrasiloxane	Eyes - Mild irritant	Rabbit	-	24 hours 500 milligrams	-
	Skin - Mild irritant	Rabbit	-	24 hours 500 milligrams	-
Decamethylcyclopentasiloxane	Eyes - Mild irritant	Rabbit	-	24 hours 500 milligrams	-
	Skin - Mild irritant	Rabbit	-	24 hours 500 milligrams	-
Methyl Ethyl Ketoxime	Eyes - Severe irritant	Rabbit	-	100 microliters	-
Xylene mixed isomers	Eyes - Mild irritant	Rabbit	-	87 milligrams	-
	Eyes - Severe irritant	Rabbit	-	24 hours 5 milligrams	-
	Skin - Mild irritant	Rat	-	8 hours 60 microliters	-
	Skin - Moderate irritant	Rabbit	-	24 hours 500 milligrams	-
2-(2-Methoxyethoxy)-ethanol	Skin - Moderate irritant	Rabbit	-	100 Percent	-
	Eyes - Mild irritant	Rabbit	-	24 hours 500 milligrams	-
	Eyes - Moderate irritant	Rabbit	-	500 milligrams	-

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Classification

Product/ingredient name	OSHA	IARC	NTP
Amorphous Precipitated Silica	-	3	-
Cobalt 2-Ethylhexanoate	-	2B	Reasonably anticipated to be a human carcinogen.
Xylene mixed isomers	-	3	-

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Name	Category	Route of exposure	Target organs
Light Aliphatic Hydrocarbon	Category 3	Not applicable.	Respiratory tract irritation and Narcotic effects
p-Chlorobenzotrifluoride	Category 3	Not applicable.	Respiratory tract irritation
Hydrotreated Heavy Petroleum Naphtha	Category 3	Not applicable.	Respiratory tract irritation and Narcotic effects
Med. Aliphatic Hydrocarbon Solvent	Category 3	Not applicable.	Respiratory tract irritation and Narcotic effects
Xylene mixed isomers	Category 3	Not applicable.	Respiratory tract irritation

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Section 11. Toxicological information

Heavy Aliphatic Solvent	Category 3	Not applicable.	Respiratory tract irritation and Narcotic effects
2-(2-Methoxyethoxy)-ethanol	Category 3	Not applicable.	Respiratory tract irritation and Narcotic effects

Specific target organ toxicity (repeated exposure)

Name	Category	Route of exposure	Target organs
Light Aliphatic Hydrocarbon	Category 2	Not determined	Not determined
Hydrotreated Heavy Petroleum Naphtha	Category 2	Not determined	Not determined
Med. Aliphatic Hydrocarbon Solvent	Category 1	Not determined	Not determined
Xylene mixed isomers	Category 2	Not determined	Not determined
Heavy Aliphatic Solvent	Category 1	Not determined	central nervous system (CNS)
2-(2-Methoxyethoxy)-ethanol	Category 2	Not determined	Not determined

Aspiration hazard

Name	Result
Light Aliphatic Hydrocarbon	ASPIRATION HAZARD - Category 1
Hydrotreated Heavy Petroleum Naphtha	ASPIRATION HAZARD - Category 1
Med. Aliphatic Hydrocarbon Solvent	ASPIRATION HAZARD - Category 1
Xylene mixed isomers	ASPIRATION HAZARD - Category 1
Heavy Aliphatic Solvent	ASPIRATION HAZARD - Category 1

Information on the likely routes of exposure : Not available.

Potential acute health effects

- Eye contact** : Causes serious eye irritation.
- Inhalation** : Can cause central nervous system (CNS) depression. May cause drowsiness or dizziness. May cause respiratory irritation.
- Skin contact** : May cause an allergic skin reaction.
- Ingestion** : Can cause central nervous system (CNS) depression. May be fatal if swallowed and enters airways.

Symptoms related to the physical, chemical and toxicological characteristics

- Eye contact** : Adverse symptoms may include the following:
pain or irritation
watering
redness
- Inhalation** : Adverse symptoms may include the following:
respiratory tract irritation
coughing
nausea or vomiting
headache
drowsiness/fatigue
dizziness/vertigo
unconsciousness
reduced fetal weight
increase in fetal deaths
skeletal malformations
- Skin contact** : Adverse symptoms may include the following:
irritation
redness
reduced fetal weight
increase in fetal deaths
skeletal malformations

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Ingestion : Adverse symptoms may include the following:
nausea or vomiting
reduced fetal weight
increase in fetal deaths
skeletal malformations

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

Not available.

General : May cause damage to organs through prolonged or repeated exposure. Once sensitized, a severe allergic reaction may occur when subsequently exposed to very low levels.

Carcinogenicity : Suspected of causing cancer. Risk of cancer depends on duration and level of exposure.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : Suspected of damaging the unborn child.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : Suspected of damaging fertility.

Numerical measures of toxicity

Acute toxicity estimates

Route	ATE value
Oral	9269.8 mg/kg
Dermal	9326.9 mg/kg

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
Light Aliphatic Hydrocarbon Octamethylcyclotetrasiloxane	Acute LC50 2200 µg/l Fresh water	Fish - Lepomis macrochirus	4 days
	Chronic NOEC 1.7 to 15 µg/l Fresh water	Daphnia - Daphnia magna	21 days
	Chronic NOEC 4.4 µg/l Fresh water	Fish - Oncorhynchus mykiss - Egg	93 days
Methyl Ethyl Ketoxime Xylene mixed isomers	Acute LC50 843000 µg/l Fresh water	Fish - Pimephales promelas	96 hours
	Acute LC50 8500 µg/l Marine water	Crustaceans - Palaemonetes pugio	48 hours
2-(2-Methoxyethoxy)-ethanol	Acute LC50 13400 µg/l Fresh water	Fish - Pimephales promelas	96 hours
	Acute EC50 >930 ppm Fresh water	Daphnia - Daphnia magna	48 hours
	Acute LC50 7500000 µg/l Fresh water	Fish - Lepomis macrochirus	96 hours

Persistence and degradability

Product/ingredient name	Aquatic half-life	Photolysis	Biodegradability
Xylene mixed isomers	-	-	Readily

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Section 12. Ecological information

Bioaccumulative potential

Product/ingredient name	LogP _{ow}	BCF	Potential
Octamethylcyclotetrasiloxane	-	13400	high
Decamethylcyclopentasiloxane	-	7060	high
Hydrotreated Heavy Petroleum Naphtha	-	10 to 2500	high
Methyl Ethyl Ketoxime	-	2.5 to 5.8	low
Zirconium 2-Ethylhexanoate	-	2.96	low
Cobalt 2-Ethylhexanoate	-	15600	high
Xylene mixed isomers	-	8.1 to 25.9	low
Heavy Aliphatic Solvent	-	10 to 2500	high
Calcium 2-Ethylhexanoate	-	2.96	low

Mobility in soil






Soil/water partition coefficient (K_{oc}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Vapor from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Section 14. Transport information

	DOT Classification	TDG Classification	Mexico Classification	IATA	IMDG
UN number	UN1263	UN1263	UN1263	UN1263	UN1263
UN proper shipping name	PAINT	PAINT	PAINT	PAINT	PAINT
Transport hazard class(es)	3 	3 	3 	3 	3 
Packing group	III	III	III	III	III
Environmental hazards	No.	No.	No.	Yes. The environmentally hazardous substance mark is not required.	No.

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Semi-Gloss

Section 14. Transport information

<p>Additional information</p>	<p>This product may be re-classified as "Combustible Liquid," unless transported by vessel or aircraft. Non-bulk packages (less than or equal to 119 gal) of combustible liquids are not regulated as hazardous materials.</p> <p>ERG No. 128</p>	<p>Product classified as per the following sections of the Transportation of Dangerous Goods Regulations: 2.18-2.19 (Class 3).</p> <p>ERG No. 128</p>	<p>-</p> <p>ERG No. 128</p>	<p>The environmentally hazardous substance mark may appear if required by other transportation regulations.</p>	<p>Emergency schedules F-E, S-E</p>
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Special precautions for user : Multi-modal shipping descriptions are provided for informational purposes and do not consider container sizes. The presence of a shipping description for a particular mode of transport (sea, air, etc.), does not indicate that the product is packaged suitably for that mode of transport. All packaging must be reviewed for suitability prior to shipment, and compliance with the applicable regulations is the sole responsibility of the person offering the product for transport. People loading and unloading dangerous goods must be trained on all of the risks deriving from the substances and on all actions in case of emergency situations.

Transport in bulk according to Annex II of MARPOL and the IBC Code : Not available.

Proper shipping name : Not available.
Ship type : Not available.
Pollution category : Not available.

Section 15. Regulatory information

SARA 313

SARA 313 (40 CFR 372.45) supplier notification can be found on the Environmental Data Sheet.

California Prop. 65

WARNING: This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

International regulations

International lists

- Australia inventory (AICS):** Not determined.
- China inventory (IECSC):** Not determined.
- Japan inventory (ENCS):** Not determined.
- Japan inventory (ISHL):** Not determined.
- Korea inventory (KECI):** Not determined.
- Malaysia Inventory (EHS Register):** Not determined.
- New Zealand Inventory of Chemicals (NZIoC):** Not determined.
- Philippines inventory (PICCS):** Not determined.
- Taiwan Chemical Substances Inventory (TCSI):** Not determined.
- Thailand inventory:** Not determined.
- Turkey inventory:** Not determined.
- Vietnam inventory:** Not determined.

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Section 16. Other information

Hazardous Material Information System (U.S.A.)

Health	*	3
Flammability		2
Physical hazards		0

The customer is responsible for determining the PPE code for this material. For more information on HMIS® Personal Protective Equipment (PPE) codes, consult the HMIS® Implementation Manual.

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings and the associated label are not required on SDSs or products leaving a facility under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered trademark and service mark of the American Coatings Association, Inc.

Procedure used to derive the classification

Classification	Justification
FLAMMABLE LIQUIDS - Category 3	On basis of test data
SERIOUS EYE DAMAGE/ EYE IRRITATION - Category 2A	Calculation method
SKIN SENSITIZATION - Category 1	Calculation method
CARCINOGENICITY - Category 2	Calculation method
TOXIC TO REPRODUCTION (Fertility) - Category 2	Calculation method
TOXIC TO REPRODUCTION (Unborn child) - Category 2	Calculation method
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Respiratory tract irritation) - Category 3	Calculation method
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Narcotic effects) - Category 3	Calculation method
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) - Category 2	Calculation method
ASPIRATION HAZARD - Category 1	Calculation method

History

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Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United Nations

Notice to reader

It is recommended that each customer or recipient of this Safety Data Sheet (SDS) study it carefully and consult resources, as necessary or appropriate, to become aware of and understand the data contained in this SDS and any hazards associated with the product. This information is provided in good faith and believed to be accurate as of the effective date herein. However, no warranty, express or implied, is given. The information presented here applies only to the product as shipped. The addition of any material can change the composition, hazards and risks of the product. Products shall not be repackaged, modified, or tinted except as specifically instructed by the manufacturer, including but not limited to the incorporation of products not specified by the manufacturer, or the use or addition of products in proportions not specified by the manufacturer. Regulatory requirements are subject to change and may differ between various locations and jurisdictions. The customer/buyer/user is responsible to ensure that his activities comply with all country, federal, state, provincial or local laws. The conditions for use of the product are not under the control of the manufacturer; the customer/buyer/user is responsible to determine the conditions necessary for the safe use of this product. The customer/buyer/user

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Section 16. Other information

should not use the product for any purpose other than the purpose shown in the applicable section of this SDS without first referring to the supplier and obtaining written handling instructions. Due to the proliferation of sources for information such as manufacturer-specific SDS, the manufacturer cannot be responsible for SDSs obtained from any other source.

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Safety Data Sheet



Revision Number: 002.0

Issue date: 12/15/2014

1. PRODUCT AND COMPANY IDENTIFICATION

Product name:	Loctite® PL300® Foamboard Construction Adhesive	IDH number:	1421941
Product type:	Water based adhesive	Region:	United States
Restriction of Use:	None identified	Contact information:	Telephone: +1 (800) 624-7767
Company address:	Henkel Corporation One Henkel Way Rocky Hill, Connecticut 06067		MEDICAL EMERGENCY Phone: Poison Control Center 1-877-671-4608 (toll free) or 1-303-592-1711 TRANSPORT EMERGENCY Phone: CHEMTREC 1-800-424-9300 (toll free) or 1-703-527-3887

2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

WARNING: ABRASION COULD RELEASE RESPIRABLE PARTICLES OF SILICA QUARTZ, A CANCER HAZARD BY INHALATION. NORMAL USE OF THIS PRODUCT CAUSES NO SUCH RELEASE.

CAUSES SERIOUS EYE IRRITATION.

HAZARD CLASS	HAZARD CATEGORY
EYE IRRITATION	2A

PICTOGRAM(S)



Precautionary Statements

Prevention:	Wash thoroughly after handling. Wear eye and face protection.
Response:	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to remove. Continue rinsing. If eye irritation persists: Get medical attention.
Storage:	Not prescribed
Disposal:	Not prescribed

Classification complies with OSHA Hazard Communication Standard (29 CFR 1910.1200) and is consistent with the provisions of the United Nations Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

See Section 11 for additional toxicological information.

3. COMPOSITION / INFORMATION ON INGREDIENTS

Hazardous Component(s)	CAS Number	Percentage*
Limestone	1317-65-3	30 - 60
Quartz (SiO ₂)	14808-60-7	0.1 - 1

IDH number: 1421941

Product name: Loctite® PL300® Foamboard Construction Adhesive
Page 1 of 5

* Exact percentage is a trade secret. Concentration range is provided to assist users in providing appropriate protections.

4. FIRST AID MEASURES

Inhalation:	No specific treatment is necessary since material is not likely to be hazardous by inhalation.
Skin contact:	Wash affected area immediately with soap and water.
Eye contact:	Immediately flush eyes with plenty of water for at least 15 minutes. If symptoms develop and persist, get medical attention.
Ingestion:	Consult a physician if necessary.
Symptoms:	See Section 11.

5. FIRE FIGHTING MEASURES

Extinguishing media:	Carbon dioxide, foam, powder Water fog.
Special firefighting procedures:	Use water spray to keep fire exposed containers cool and disperse vapors.
Unusual fire or explosion hazards:	Closed containers may rupture (due to build up of pressure) when exposed to extreme heat.
Hazardous combustion products:	Oxides of carbon. Oxides of nitrogen.

6. ACCIDENTAL RELEASE MEASURES

Use personal protection recommended in Section 8, isolate the hazard area and deny entry to unnecessary and unprotected personnel.

Environmental precautions:	Not available.
Clean-up methods:	Absorb spill with inert material. Shovel material into appropriate container for disposal.

7. HANDLING AND STORAGE

Handling:	Avoid prolonged or repeated skin contact with this material. Keep out of the reach of children.
Storage:	For safe storage, store at or above 0 °C (32°F) Keep from freezing. Store in a cool, dry area. Keep containers closed when not in use.

For information on product shelf life, please review labels on container or check the Technical Data Sheet.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Employers should complete an assessment of all workplaces to determine the need for, and selection of, proper exposure controls and protective equipment for each task performed.

Hazardous Component(s)	ACGIH TLV	OSHA PEL	AIHA WEEL	OTHER
Limestone	10 mg/m ³ TWA Total dust.	5 mg/m ³ PEL Respirable fraction. 15 mg/m ³ PEL Total dust.	None	None
Quartz (SiO ₂)	0.025 mg/m ³ TWA Respirable fraction.	2.4 MPPCF TWA Respirable. 0.1 mg/m ³ TWA Respirable. 0.3 mg/m ³ TWA Total dust.	None	None

Engineering controls:	Use local ventilation if general ventilation is insufficient to maintain vapor concentration below established exposure limits.
Respiratory protection:	No personal respiratory protective equipment normally required.
Eye/face protection:	Safety goggles or safety glasses with side shields.
Skin protection:	Suitable protective clothing

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state:	pasty
Color:	Blue
Odor:	Mild, acrylic
Odor threshold:	Not available.
pH:	7.0 - 7.5
Vapor pressure:	15 mm hg (20 °C (68°F))
Boiling point/range:	100 °C (212°F)
Melting point/ range:	Not available.
Specific gravity:	1.224
Vapor density:	Heavier than air
Flash point:	not applicable
Flammable/Explosive limits - lower:	Not available.
Flammable/Explosive limits - upper:	Not available.
Autoignition temperature:	Not available.
Evaporation rate:	< 0.6 (Butyl acetate = 1)
Solubility in water:	Soluble
Partition coefficient (n-octanol/water):	Not available.
VOC content:	< 1 %; 33 g/l (calculated)
Viscosity:	280,000 - 380,000 mPa.s
Decomposition temperature:	Not available.

10. STABILITY AND REACTIVITY

Stability:	Stable under normal conditions of storage and use.
Hazardous reactions:	Will not occur.
Hazardous decomposition products:	Oxides of carbon. Oxides of nitrogen.
Incompatible materials:	None
Reactivity:	Not available.
Conditions to avoid:	Heat. Do not freeze.

11. TOXICOLOGICAL INFORMATION

Relevant routes of exposure: Skin contact

Potential Health Effects/Symptoms

Inhalation: Abrasion of cured material such as by sanding or grinding could release respirable particles of silica quartz, a cancer hazard by inhalation. Normal use of this product causes no such release.
Skin contact: May cause slight irritation to skin.
Eye contact: May cause slight irritation to eyes on contact.
Ingestion: Not expected to be harmful by ingestion. Ingestion of large amounts may produce gastrointestinal disturbances including irritation, nausea, and diarrhea.

Hazardous Component(s)	LD50s and LC50s	Immediate and Delayed Health Effects
Limestone	None	Nuisance dust
Quartz (SiO ₂)	None	Immune system, Lung, Some evidence of carcinogenicity

Hazardous Component(s)	NTP Carcinogen	IARC Carcinogen	OSHA Carcinogen (Specifically Regulated)
Limestone	No	No	No
Quartz (SiO ₂)	Known To Be Human Carcinogen.	Group 1	No

12. ECOLOGICAL INFORMATION

Ecological information: Not available.

13. DISPOSAL CONSIDERATIONS

Information provided is for unused product only.

Recommended method of disposal: Dispose of according to Federal, State and local governmental regulations.

Hazardous waste number: It is the responsibility of the user to determine if an item is hazardous as defined in the Resource Conservation and Recovery Act (RCRA) at the time of disposal. Product uses, transformations, mixtures, processes, etc., may render the resulting material hazardous, under the criteria of ignitability, corrosivity, reactivity and toxicity characteristics of the Toxicity Characteristics Leaching Procedure (TCLP) 40 CFR 261.20-24.

14. TRANSPORT INFORMATION

The transport information provided in this section only applies to the material/formulation itself, and is not specific to any package/configuration.

U.S. Department of Transportation Ground (49 CFR)

Proper shipping name: Not regulated
Hazard class or division: None
Identification number: None
Packing group: None

International Air Transportation (ICAO/IATA)

Proper shipping name: Not regulated
Hazard class or division: None
Identification number: None
Packing group: None

Water Transportation (IMO/IMDG)	
Proper shipping name:	Not regulated
Hazard class or division:	None
Identification number:	None
Packing group:	None

15. REGULATORY INFORMATION

United States Regulatory Information

TSCA 8 (b) Inventory Status:	All components are listed or are exempt from listing on the Toxic Substances Control Act Inventory.
TSCA 12 (b) Export Notification:	None above reporting de minimis
CERCLA/SARA Section 302 EHS:	None above reporting de minimis
CERCLA/SARA Section 311/312:	Delayed Health
CERCLA/SARA Section 313:	None above reporting de minimis
California Proposition 65:	This product contains a chemical known in the State of California to cause cancer. This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

Canada Regulatory Information

CEPA DSL/NDSL Status:	All components are listed on or are exempt from listing on the Canadian Domestic Substances List.
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16. OTHER INFORMATION

This safety data sheet contains changes from the previous version in sections: New Safety Data Sheet format.

Prepared by:	Mary Ellen Roddy, Sr. Regulatory Affairs Specialist
Issue date:	12/15/2014

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SAFETY DATA SHEET

B66W561

Section 1. Identification

Product name	: PRO INDUSTRIAL™ Multi-Surface Acrylic Eg-Shel Coating Extra White
Product code	: B66W561
Other means of identification	: Not available.
Product type	: Liquid.
Relevant identified uses of the substance or mixture and uses advised against	Not applicable.
Manufacturer	: THE SHERWIN-WILLIAMS COMPANY 101 W. Prospect Avenue Cleveland, OH 44115
National contact	: Sherwin-Williams Canada Inc. 180 Brunel Road Mississauga, Ontario L4Z 1T5 Canada
Emergency telephone number of the company	: US / Canada: (216) 566-2917 Mexico: SETIQ 01-800-00-214-00 / (52) 55-5559-1588 24 hours / 365 days a year
Product Information Telephone Number	: US / Canada: (800) 524-5979 Mexico: Not Available
Regulatory Information Telephone Number	: US / Canada: (216) 566-2902 Mexico: Not Available
Transportation Emergency Telephone Number	: US / Canada: (800) 424-9300 Mexico: SETIQ 01-800-00-214-00 / (52) 55-5559-1588 24 hours / 365 days a year

Section 2. Hazards identification

Classification of the substance or mixture	: CARCINOGENICITY - Category 2 SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) - Category 2 Percentage of the mixture consisting of ingredient(s) of unknown oral toxicity: 22.3% Percentage of the mixture consisting of ingredient(s) of unknown dermal toxicity: 22.3% Percentage of the mixture consisting of ingredient(s) of unknown inhalation toxicity: 23.4%
GHS label elements	
Hazard pictograms	: 
Signal word	: Warning
Hazard statements	: Suspected of causing cancer. May cause damage to organs through prolonged or repeated exposure.
Precautionary statements	
Prevention	: Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves. Wear eye or face protection. Wear protective clothing. Do not breathe vapor.

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B66W561	PRO INDUSTRIAL™ Multi-Surface Acrylic Eg-Shel Coating Extra White			SHW-85-NA-GHS-CA		

Section 2. Hazards identification

Response	: Get medical attention if you feel unwell. IF exposed or concerned: Get medical attention.
Storage	: Store locked up.
Disposal	: Dispose of contents and container in accordance with all local, regional, national and international regulations.
Supplemental label elements	WARNING: This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. FOR INDUSTRIAL USE ONLY. Please refer to the SDS for additional information. Keep out of reach of children. Do not transfer contents to other containers for storage.
Hazards not otherwise classified	: None known.

Section 3. Composition/information on ingredients

Substance/mixture	: Mixture
Other means of identification	: Not available.

CAS number/other identifiers

Ingredient name	% by weight	CAS number
Titanium Dioxide	22.3	13463-67-7
2-Butoxyethanol	3.29	111-76-2
Amorphous Silica	3.08	7631-86-9
2-(2-Butoxyethoxy)-ethanol	1.1	112-34-5

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact	: Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.
Inhalation	: Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.
Skin contact	: Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Continue to rinse for at least 10 minutes. Get medical attention. Wash clothing before reuse. Clean shoes thoroughly before reuse.
Ingestion	: Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact	: No known significant effects or critical hazards.
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Section 4. First aid measures

- Inhalation** : No known significant effects or critical hazards.
- Skin contact** : No known significant effects or critical hazards.
- Ingestion** : No known significant effects or critical hazards.

Over-exposure signs/symptoms

- Eye contact** : No specific data.
- Inhalation** : No specific data.
- Skin contact** : No specific data.
- Ingestion** : No specific data.

Indication of immediate medical attention and special treatment needed, if necessary

- Notes to physician** : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.
- Specific treatments** : No specific treatment.
- Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

- Suitable extinguishing media** : Use an extinguishing agent suitable for the surrounding fire.
- Unsuitable extinguishing media** : None known.

Specific hazards arising from the chemical : In a fire or if heated, a pressure increase will occur and the container may burst.

- Hazardous thermal decomposition products** : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
metal oxide/oxides

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

- For non-emergency personnel** : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.
- For emergency responders** : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

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Section 6. Accidental release measures

- Small spill** : Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.
- Large spill** : Stop leak if without risk. Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

- Protective measures** : Put on appropriate personal protective equipment (see Section 8). Avoid exposure - obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not ingest. If during normal use the material presents a respiratory hazard, use only with adequate ventilation or wear appropriate respirator. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.
- Advice on general occupational hygiene** : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

- Conditions for safe storage, including any incompatibilities** : Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination. See Section 10 for incompatible materials before handling or use.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits (OSHA United States)

Ingredient name	Exposure limits
Titanium Dioxide	ACGIH TLV (United States, 3/2017). TWA: 10 mg/m ³ 8 hours.
2-Butoxyethanol	OSHA PEL (United States, 6/2016). TWA: 15 mg/m ³ 8 hours. Form: Total dust ACGIH TLV (United States, 3/2017). TWA: 20 ppm 8 hours. NIOSH REL (United States, 10/2016). Absorbed through skin. TWA: 5 ppm 10 hours. TWA: 24 mg/m ³ 10 hours. OSHA PEL (United States, 6/2016). Absorbed through skin. TWA: 50 ppm 8 hours. TWA: 240 mg/m ³ 8 hours.
Amorphous Silica	NIOSH REL (United States, 10/2016). TWA: 6 mg/m ³ 10 hours.
2-(2-Butoxyethoxy)-ethanol	ACGIH TLV (United States, 3/2017). TWA: 10 ppm 8 hours. Form: Inhalable

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Section 8. Exposure controls/personal protection

	fraction and vapor
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Occupational exposure limits (Canada)

Ingredient name	Exposure limits
2-Butoxyethanol	<p>CA Alberta Provincial (Canada, 4/2009). 8 hrs OEL: 97 mg/m³ 8 hours. 8 hrs OEL: 20 ppm 8 hours.</p> <p>CA British Columbia Provincial (Canada, 6/2017). TWA: 20 ppm 8 hours.</p> <p>CA Ontario Provincial (Canada, 7/2015). TWA: 20 ppm 8 hours.</p> <p>CA Quebec Provincial (Canada, 1/2014). TWAEV: 20 ppm 8 hours. TWAEV: 97 mg/m³ 8 hours.</p> <p>CA Saskatchewan Provincial (Canada, 7/2013). STEL: 30 ppm 15 minutes. TWA: 20 ppm 8 hours.</p>
2-(2-butoxyethoxy)ethanol	<p>CA Ontario Provincial (Canada, 7/2015). TWA: 10 ppm 8 hours. Form: Inhalable fraction and vapour.</p>

Occupational exposure limits (Mexico)

Ingredient name	Exposure limits
2-Butoxyethanol	<p>NOM-010-STPS-2014 (Mexico, 4/2016). Absorbed through skin. TWA: 20 ppm 8 hours.</p>
2-(2-butoxyethoxy)ethanol	<p>ACGIH TLV (United States, 3/2017). TWA: 10 ppm 8 hours. Form: Inhalable fraction and vapor</p>

- Appropriate engineering controls** : If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.
- Environmental exposure controls** : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

- Hygiene measures** : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.
- Eye/face protection** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

Skin protection

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Section 8. Exposure controls/personal protection

- Hand protection** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.
- Body protection** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Other skin protection** : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Respiratory protection** : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use.

Section 9. Physical and chemical properties

Appearance

- Physical state** : Liquid.
- Color** : Not available.
- Odor** : Not available.
- Odor threshold** : Not available.
- pH** : 7.5
- Melting point/freezing point** : Not available.
- Boiling point/boiling range** : 100°C (212°F)
- Flash point** : Closed cup: >93.3°C (>199.9°F)
- Evaporation rate** : 0.09 (butyl acetate = 1)
- Flammability (solid, gas)** : Not available.
- Lower and upper explosive (flammable) limits** : Lower: 0.9%
Upper: 10.6%
- Vapor pressure** : 2.3 kPa (17.5 mm Hg) [at 20°C]
- Vapor density** : 1 [Air = 1]
- Relative density** : 1.26
- Solubility** : Not available.
- Partition coefficient: n-octanol/water** : Not available.
- Auto-ignition temperature** : Not available.
- Decomposition temperature** : Not available.
- Viscosity** : Kinematic (40°C (104°F)): >0.205 cm²/s (>20.5 cSt)
- Molecular weight** : Not applicable.

Aerosol product

- Heat of combustion** : 1.761 kJ/g

Section 10. Stability and reactivity

- Reactivity** : No specific test data related to reactivity available for this product or its ingredients.
- Chemical stability** : The product is stable.
- Possibility of hazardous reactions** : Under normal conditions of storage and use, hazardous reactions will not occur.

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Section 10. Stability and reactivity

Conditions to avoid : No specific data.

Incompatible materials : No specific data.

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
2-Butoxyethanol	LCLo Inhalation Vapor	Guinea pig	>3.1 mg/l	1 hours
	LD50 Dermal	Guinea pig	>2000 mg/kg	-
	LD50 Oral	Rat	1300 mg/kg	-
2-(2-Butoxyethoxy)-ethanol	LD50 Dermal	Rabbit	2700 mg/kg	-
	LD50 Oral	Rat	4500 mg/kg	-

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
Titanium Dioxide	Skin - Mild irritant	Human	-	72 hours 300 Micrograms Intermittent	-
2-Butoxyethanol	Eyes - Moderate irritant	Rabbit	-	24 hours 100 milligrams	-
	Eyes - Severe irritant	Rabbit	-	100 milligrams	-
	Skin - Mild irritant	Rabbit	-	500 milligrams	-
Amorphous Silica	Eyes - Mild irritant	Rabbit	-	24 hours 25 milligrams	-
2-(2-Butoxyethoxy)-ethanol	Eyes - Moderate irritant	Rabbit	-	24 hours 20 milligrams	-
	Eyes - Severe irritant	Rabbit	-	20 milligrams	-

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Classification

Product/ingredient name	OSHA	IARC	NTP
Titanium Dioxide	-	2B	-
2-Butoxyethanol	-	3	-
Amorphous Silica	-	3	-

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

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Section 11. Toxicological information

Name	Category	Route of exposure	Target organs
2-Butoxyethanol	Category 3	Not applicable.	Respiratory tract irritation and Narcotic effects
2-(2-Butoxyethoxy)-ethanol	Category 3	Not applicable.	Respiratory tract irritation and Narcotic effects

Specific target organ toxicity (repeated exposure)

Name	Category	Route of exposure	Target organs
2-Butoxyethanol	Category 2	Not determined	Not determined
2-(2-Butoxyethoxy)-ethanol	Category 2	Not determined	Not determined

Aspiration hazard

Not available.

Information on the likely routes of exposure : Not available.

Potential acute health effects

Eye contact : No known significant effects or critical hazards.
Inhalation : No known significant effects or critical hazards.
Skin contact : No known significant effects or critical hazards.
Ingestion : No known significant effects or critical hazards.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : No specific data.
Inhalation : No specific data.
Skin contact : No specific data.
Ingestion : No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.
Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.
Potential delayed effects : Not available.

Potential chronic health effects

Not available.

General : May cause damage to organs through prolonged or repeated exposure.
Carcinogenicity : Suspected of causing cancer. Risk of cancer depends on duration and level of exposure.
Mutagenicity : No known significant effects or critical hazards.
Teratogenicity : No known significant effects or critical hazards.
Developmental effects : No known significant effects or critical hazards.
Fertility effects : No known significant effects or critical hazards.

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Numerical measures of toxicity

Acute toxicity estimates

Route	ATE value
Oral	28022.2 mg/kg
Dermal	22885.8 mg/kg
Inhalation (vapors)	256.3 mg/l

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
Titanium Dioxide	Acute LC50 >1000000 µg/l Marine water	Fish - Fundulus heteroclitus	96 hours
2-Butoxyethanol	Acute EC50 >1000 mg/l Fresh water	Daphnia - Daphnia magna	48 hours
	Acute LC50 800000 µg/l Marine water	Crustaceans - Crangon crangon	48 hours
	Acute LC50 1250000 µg/l Marine water	Fish - Menidia beryllina	96 hours
2-(2-Butoxyethoxy)-ethanol	Acute LC50 1300000 µg/l Fresh water	Fish - Lepomis macrochirus	96 hours

Persistence and degradability

Product/ingredient name	Aquatic half-life	Photolysis	Biodegradability
2-Butoxyethanol	-	-	Readily
2-(2-Butoxyethoxy)-ethanol	-	-	Readily

Bioaccumulative potential

Not available.

Mobility in soil

Soil/water partition coefficient (K_{oc}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Section 14. Transport information

Date of issue/Date of revision : 7/4/2018	Date of previous issue : 3/1/2018	Version : 7	9/11
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Section 14. Transport information

	DOT Classification	TDG Classification	Mexico Classification	IATA	IMDG
UN number	Not regulated.	Not regulated.	Not regulated.	Not regulated.	Not regulated.
UN proper shipping name	-	-	-	-	-
Transport hazard class(es)	-	-	-	-	-
Packing group	-	-	-	-	-
Environmental hazards	No.	No.	No.	No.	No.
Additional information	-	-	-	-	-

Special precautions for user : Multi-modal shipping descriptions are provided for informational purposes and do not consider container sizes. The presence of a shipping description for a particular mode of transport (sea, air, etc.), does not indicate that the product is packaged suitably for that mode of transport. All packaging must be reviewed for suitability prior to shipment, and compliance with the applicable regulations is the sole responsibility of the person offering the product for transport. People loading and unloading dangerous goods must be trained on all of the risks deriving from the substances and on all actions in case of emergency situations.

Transport in bulk according to Annex II of MARPOL and the IBC Code : Not available.

Proper shipping name : Not available.
Ship type : Not available.
Pollution category : Not available.

Section 15. Regulatory information

TSCA 5(a)2 proposed significant new use rules: 5-Chloro-2-methylisothiazolinone

SARA 313

SARA 313 (40 CFR 372.45) supplier notification can be found on the Environmental Data Sheet.

California Prop. 65

WARNING: This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

Section 16. Other information

Hazardous Material Information System (U.S.A.)

Health	*	2
Flammability		0
Physical hazards		0

The customer is responsible for determining the PPE code for this material. For more information on HMIS® Personal Protective Equipment (PPE) codes, consult the HMIS® Implementation Manual.

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Section 16. Other information

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings and the associated label are not required on SDSs or products leaving a facility under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered trademark and service mark of the American Coatings Association, Inc.

Procedure used to derive the classification

Classification	Justification
CARCINOGENICITY - Category 2	Calculation method
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) - Category 2	Calculation method

History

Date of printing : 7/4/2018

Date of issue/Date of revision : 7/4/2018

Date of previous issue : 3/1/2018

Version : 7

Key to abbreviations :

- ATE = Acute Toxicity Estimate
- BCF = Bioconcentration Factor
- GHS = Globally Harmonized System of Classification and Labelling of Chemicals
- IATA = International Air Transport Association
- IBC = Intermediate Bulk Container
- IMDG = International Maritime Dangerous Goods
- LogPow = logarithm of the octanol/water partition coefficient
- MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
- UN = United Nations

Notice to reader

It is recommended that each customer or recipient of this Safety Data Sheet (SDS) study it carefully and consult resources, as necessary or appropriate, to become aware of and understand the data contained in this SDS and any hazards associated with the product. This information is provided in good faith and believed to be accurate as of the effective date herein. However, no warranty, express or implied, is given. The information presented here applies only to the product as shipped. The addition of any material can change the composition, hazards and risks of the product. Products shall not be repackaged, modified, or tinted except as specifically instructed by Sherwin-Williams, including but not limited to the incorporation of non Sherwin-Williams products or the use or addition of products in proportions not specified by Sherwin-Williams. Regulatory requirements are subject to change and may differ between various locations and jurisdictions. The customer/buyer/user is responsible to ensure that his activities comply with all country, federal, state, provincial or local laws. The conditions for use of the product are not under the control of the manufacturer; the customer/buyer/user is responsible to determine the conditions necessary for the safe use of this product. The customer/buyer/user should not use the product for any purpose other than the purpose shown in the applicable section of this SDS without first referring to the supplier and obtaining written handling instructions. Due to the proliferation of sources for information such as manufacturer-specific SDS, the manufacturer cannot be responsible for SDSs obtained from any other source.

<u>Date of issue/Date of revision</u> : 7/4/2018	<u>Date of previous issue</u> : 3/1/2018	<u>Version</u> : 7	11/11
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3M™ Polyurethane Sealant 540 (Various Colors) 10/16/18



Safety Data Sheet

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Document Group:	08-9432-9	Version Number:	20.05
Issue Date:	10/16/18	Supersedes Date:	03/14/18

SECTION 1: Identification

1.1. Product identifier

3M™ Polyurethane Sealant 540 (Various Colors)

Product Identification Numbers

62-5261-5230-1, 62-5261-5235-0, 62-5263-5230-7, 62-5263-5235-6, 62-5484-3530-4, 62-5484-3532-0, 62-5484-3930-6, 62-5484-3937-1, 62-5484-5230-9, 62-5484-5235-8, 62-5484-8530-9, 62-5485-3530-1, 62-5485-3535-0, 62-5485-3537-6, 62-5485-3930-3, 62-5485-3935-2, 62-5485-5230-6, 62-5485-5235-5, 62-5485-8530-6, 62-5485-9530-5, 62-5486-3530-9, 62-5486-3930-1, 62-5486-3937-6, 62-5486-5230-4, 62-5486-5235-3, 62-5486-8530-4, 62-5486-9530-3
7000000941, 7000000942, 7000121518, 7000148278, 7100023084, 7100001804, 7100179707, 7000121517, 7000000940, 7000121514, 7010367932

1.2. Recommended use and restrictions on use

Recommended use

Adhesive, General purpose adhesive sealant

1.3. Supplier's details

MANUFACTURER:	3M
DIVISION:	Industrial Adhesives and Tapes Division
ADDRESS:	3M Center, St. Paul, MN 55144-1000, USA
Telephone:	1-888-3M HELPS (1-888-364-3577)

1.4. Emergency telephone number

1-800-364-3577 or (651) 737-6501 (24 hours)

SECTION 2: Hazard identification

2.1. Hazard classification

Carcinogenicity: Category 2.

Specific Target Organ Toxicity (single exposure): Category 1.

Specific Target Organ Toxicity (repeated exposure): Category 1.

2.2. Label elements

Signal word

Danger

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Symbols

Health Hazard |

Pictograms



Hazard Statements

Suspected of causing cancer.

Causes damage to organs:
sensory organs |

Causes damage to organs through prolonged or repeated exposure:
nervous system |

May cause damage to organs through prolonged or repeated exposure:
sensory organs |

Precautionary Statements

General:

Keep out of reach of children.

Prevention:

Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Do not breathe dust/fume/gas/mist/vapors/spray.
Wear protective gloves.
Do not eat, drink or smoke when using this product.
Wash thoroughly after handling.

Response:

IF exposed or concerned: Get medical advice/attention.

Storage:

Store locked up.

Disposal:

Dispose of contents/container in accordance with applicable local/regional/national/international regulations.

2% of the mixture consists of ingredients of unknown acute dermal toxicity.

SECTION 3: Composition/information on ingredients

Ingredient	C.A.S. No.	% by Wt
Urethane Polymer	Trade Secret*	15 - 40 Trade Secret *
Poly(Vinyl Chloride) Polymer	9002-86-2	20 - 35 Trade Secret *
Plasticizer	Trade Secret*	10 - 30 Trade Secret *
Calcium Oxide	1305-78-8	1 - 5 Trade Secret *
Titanium Dioxide	13463-67-7	< 5 Trade Secret *
Xylene	1330-20-7	< 5 Trade Secret *

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C.I. PIGMENT BLUE 15	Trade Secret*	< 5 Trade Secret *
Iron Oxide (Fe2O3)	1309-37-1	< 5 Trade Secret *
Iron Oxide (Fe3O4)	1317-61-9	< 5 Trade Secret *
Petroleum Distillate	64742-47-8	< 5 Trade Secret *
DIISONONYL PHTHALATE	28553-12-0	< 5 Trade Secret *
Ethylbenzene	100-41-4	< 5 Trade Secret *
Chromium oxide (Cr2O3)	1308-38-9	< 1 Trade Secret *
IRON HYDROXIDE OXIDE	20344-49-4	< 5 Trade Secret *
Carbon Black	1333-86-4	< 1 Trade Secret *
C.I. PIGMENT BLUE 36	68187-11-1	< 1 Trade Secret *
P,P'-Methylenebis(phenyl isocyanate)	101-68-8	< 0.1 Trade Secret *

*The specific chemical identity and/or exact percentage (concentration) of this composition has been withheld as a trade secret.

SECTION 4: First aid measures

4.1. Description of first aid measures

Inhalation:

Remove person to fresh air. If you feel unwell, get medical attention.

Skin Contact:

Wash with soap and water. If signs/symptoms develop, get medical attention.

Eye Contact:

Immediately flush with large amounts of water for at least 15 minutes. Remove contact lenses if easy to do. Continue rinsing. Immediately get medical attention.

If Swallowed:

Rinse mouth. If you feel unwell, get medical attention.

4.2. Most important symptoms and effects, both acute and delayed

See Section 11.1. Information on toxicological effects.

4.3. Indication of any immediate medical attention and special treatment required

Not applicable

SECTION 5: Fire-fighting measures

5.1. Suitable extinguishing media

In case of fire: Use a carbon dioxide or dry chemical extinguisher to extinguish.

5.2. Special hazards arising from the substance or mixture

None inherent in this product.

Hazardous Decomposition or By-Products

Substance

Carbon monoxide
Carbon dioxide
Hydrogen Chloride
Hydrogen Cyanide
Oxides of Nitrogen
Oxides of Sulfur

Condition

During Combustion
During Combustion
During Combustion
During Combustion
During Combustion
During Combustion

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5.3. Special protective actions for fire-fighters

Wear full protective clothing, including helmet, self-contained, positive pressure or pressure demand breathing apparatus, bunker coat and pants, bands around arms, waist and legs, face mask, and protective covering for exposed areas of the head.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Evacuate area. Ventilate the area with fresh air. For large spill, or spills in confined spaces, provide mechanical ventilation to disperse or exhaust vapors, in accordance with good industrial hygiene practice. Refer to other sections of this SDS for information regarding physical and health hazards, respiratory protection, ventilation, and personal protective equipment.

6.2. Environmental precautions

Avoid release to the environment.

6.3. Methods and material for containment and cleaning up

Collect as much of the spilled material as possible. Place in a closed container approved for transportation by appropriate authorities. Clean up residue. Seal the container. Dispose of collected material as soon as possible in accordance with applicable local/regional/national/international regulations.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Keep out of reach of children. Do not handle until all safety precautions have been read and understood. Do not breathe dust/fume/gas/mist/vapors/spray. Do not get in eyes, on skin, or on clothing. Do not eat, drink or smoke when using this product. Wash thoroughly after handling. Avoid release to the environment. Use personal protective equipment (gloves, respirators, etc.) as required.

7.2. Conditions for safe storage including any incompatibilities

Keep container tightly closed to prevent contamination with water or air. If contamination is suspected, do not reseal container. Store away from heat. Store away from amines.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Occupational exposure limits

If a component is disclosed in section 3 but does not appear in the table below, an occupational exposure limit is not available for the component.

Ingredient	C.A.S. No.	Agency	Limit type	Additional Comments
Ethylbenzene	100-41-4	ACGIH	TWA:20 ppm	A3: Confirmed animal carcin.
Ethylbenzene	100-41-4	OSHA	TWA:435 mg/m ³ (100 ppm)	
P,P'-Methylenebis(phenyl isocyanate)	101-68-8	ACGIH	TWA:0.005 ppm	
P,P'-Methylenebis(phenyl isocyanate)	101-68-8	OSHA	CEIL:0.2 mg/m ³ (0.02 ppm)	
Calcium Oxide	1305-78-8	ACGIH	TWA:2 mg/m ³	
Calcium Oxide	1305-78-8	OSHA	TWA:5 mg/m ³	
CHROMIUM (III) COMPOUNDS	1308-38-9	ACGIH	TWA(as Cr(III), inhalable fraction):0.003 mg/m ³ ;TWA(as Cr):0.5	A4: Not class. as human carcin

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			mg/m3	
CHROMIUM (III) COMPOUNDS	1308-38-9	OSHA	TWA(as Cr):0.5 mg/m3	
Chromium, insoluble salts	1308-38-9	OSHA	TWA(as Cr):1 mg/m3	
DUST, INERT OR NUISANCE	1309-37-1	OSHA	TWA(as total dust):15 mg/m3;TWA(as total dust):50 millions of particles/cu. ft.(15 mg/m3);TWA(respirable fraction):15 millions of particles/cu. ft.(5 mg/m3);TWA(respirable fraction):5 mg/m3	
Iron Oxide (Fe2O3)	1309-37-1	ACGIH	TWA(respirable fraction):5 mg/m3	A4: Not class. as human carcin
Iron Oxide (Fe2O3)	1309-37-1	OSHA	TWA(as fume):10 mg/m3	
ROUGE	1309-37-1	OSHA	TWA(as total dust):15 mg/m3;TWA(respirable fraction):5 mg/m3	
Xylene	1330-20-7	ACGIH	TWA:100 ppm;STEL:150 ppm	A4: Not class. as human carcin
Xylene	1330-20-7	OSHA	TWA:435 mg/m3(100 ppm)	
Carbon Black	1333-86-4	ACGIH	TWA(inhalable fraction):3 mg/m3	A3: Confirmed animal carcin.
Carbon Black	1333-86-4	OSHA	TWA:3.5 mg/m3	
Titanium Dioxide	13463-67-7	ACGIH	TWA:10 mg/m3	A4: Not class. as human carcin
Titanium Dioxide	13463-67-7	OSHA	TWA(as total dust):15 mg/m3	
Kerosine (petroleum)	64742-47-8	ACGIH	TWA(as total hydrocarbon vapor, non-aerosol):200 mg/m3	A3: Confirmed animal carcin., SKIN
CHROMIUM (III) COMPOUNDS	68187-11-1	ACGIH	TWA(as Cr(III), inhalable fraction):0.003 mg/m3;TWA(as Cr):0.5 mg/m3	A4: Not class. as human carcin
CHROMIUM (III) COMPOUNDS	68187-11-1	OSHA	TWA(as Cr):0.5 mg/m3	
Cobalt, inorganic compounds	68187-11-1	ACGIH	TWA(as Co):0.02 mg/m3	A3: Confirmed animal carcin.
DUST, INERT OR NUISANCE	9002-86-2	OSHA	TWA(as total dust):15 mg/m3;TWA(as total dust):50 millions of particles/cu. ft.(15 mg/m3);TWA(respirable fraction):15 millions of particles/cu. ft.(5 mg/m3);TWA(respirable fraction):5 mg/m3	
Poly(Vinyl Chloride) Polymer	9002-86-2	ACGIH	TWA(respirable fraction):1 mg/m3	A4: Not class. as human carcin
C.I. PIGMENT BLUE 15	Trade Secret	ACGIH	TWA(as Cu dust or mist):1 mg/m3;TWA(as Cu, fume):0.2 mg/m3	

ACGIH : American Conference of Governmental Industrial Hygienists
 AIHA : American Industrial Hygiene Association
 CMRG : Chemical Manufacturer's Recommended Guidelines
 OSHA : United States Department of Labor - Occupational Safety and Health Administration

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TWA: Time-Weighted-Average
STEL: Short Term Exposure Limit
CEIL: Ceiling

8.2. Exposure controls

8.2.1. Engineering controls

Use general dilution ventilation and/or local exhaust ventilation to control airborne exposures to below relevant Exposure Limits and/or control dust/fume/gas/mist/vapors/spray. If ventilation is not adequate, use respiratory protection equipment.

8.2.2. Personal protective equipment (PPE)

Eye/face protection

None required.

Skin/hand protection

Select and use gloves and/or protective clothing approved to relevant local standards to prevent skin contact based on the results of an exposure assessment. Selection should be based on use factors such as exposure levels, concentration of the substance or mixture, frequency and duration, physical challenges such as temperature extremes, and other use conditions. Consult with your glove and/or protective clothing manufacturer for selection of appropriate compatible gloves/protective clothing. Note: Nitrile gloves may be worn over polymer laminate gloves to improve dexterity. Gloves made from the following material(s) are recommended: Polymer laminate

Respiratory protection

An exposure assessment may be needed to decide if a respirator is required. If a respirator is needed, use respirators as part of a full respiratory protection program. Based on the results of the exposure assessment, select from the following respirator type(s) to reduce inhalation exposure:

Half facepiece or full facepiece air-purifying respirator suitable for organic vapors and particulates

For questions about suitability for a specific application, consult with your respirator manufacturer.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

General Physical Form:	Solid
Specific Physical Form:	Paste
Odor, Color, Grade:	Mild xylene odor
Odor threshold	<i>No Data Available</i>
pH	<i>Not Applicable</i>
Melting point	<i>No Data Available</i>
Boiling Point	>=136 °C
Flash Point	No flash point
Evaporation rate	<i>No Data Available</i>
Flammability (solid, gas)	Not Classified
Flammable Limits(LEL)	<i>Not Applicable</i>
Flammable Limits(UEL)	<i>Not Applicable</i>
Vapor Pressure	<i>Not Applicable</i>
Vapor Density	<i>Not Applicable</i>
Density	1.17 g/ml
Specific Gravity	1.17 [Ref Std: WATER=1]
Solubility in Water	Nil
Solubility- non-water	<i>No Data Available</i>
Partition coefficient: n-octanol/ water	<i>No Data Available</i>
Autoignition temperature	>=200 °C
Decomposition temperature	<i>No Data Available</i>

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Viscosity	>=300,000 centipoise [@ 73.4 °F]
Hazardous Air Pollutants	<=7.1 % weight [<i>Test Method</i> :Calculated]
Molecular weight	<i>No Data Available</i>
VOC Less H2O & Exempt Solvents	54 g/l [<i>Test Method</i> :tested per EPA method 24]

SECTION 10: Stability and reactivity

10.1. Reactivity

This material may be reactive with certain agents under certain conditions - see the remaining headings in this section.

10.2. Chemical stability

Stable.

10.3. Possibility of hazardous reactions

Hazardous polymerization will not occur.

10.4. Conditions to avoid

Heat

10.5. Incompatible materials

Amines
Alcohols
Water

10.6. Hazardous decomposition products

<u>Substance</u>	<u>Condition</u>
None known.	

Refer to section 5.2 for hazardous decomposition products during combustion.

SECTION 11: Toxicological information

The information below may not be consistent with the material classification in Section 2 if specific ingredient classifications are mandated by a competent authority. In addition, toxicological data on ingredients may not be reflected in the material classification and/or the signs and symptoms of exposure, because an ingredient may be present below the threshold for labeling, an ingredient may not be available for exposure, or the data may not be relevant to the material as a whole.

11.1. Information on Toxicological effects

Signs and Symptoms of Exposure

Based on test data and/or information on the components, this material may produce the following health effects:

Inhalation:

Respiratory Tract Irritation: Signs/symptoms may include cough, sneezing, nasal discharge, headache, hoarseness, and nose and throat pain.

May cause additional health effects (see below).

Skin Contact:

Mild Skin Irritation: Signs/symptoms may include localized redness, swelling, itching, and dryness.

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Eye Contact:

Contact with the eyes during product use is not expected to result in significant irritation.

Ingestion:

Gastrointestinal Irritation: Signs/symptoms may include abdominal pain, stomach upset, nausea, vomiting and diarrhea.

May cause additional health effects (see below).

Additional Health Effects:

Single exposure may cause target organ effects:

Auditory Effects: Signs/symptoms may include hearing impairment, balance dysfunction and ringing in the ears.

Prolonged or repeated exposure may cause target organ effects:

Auditory Effects: Signs/symptoms may include hearing impairment, balance dysfunction and ringing in the ears.

Neurological Effects: Signs/symptoms may include personality changes, lack of coordination, sensory loss, tingling or numbness of the extremities, weakness, tremors, and/or changes in blood pressure and heart rate.

Carcinogenicity:

Contains a chemical or chemicals which can cause cancer.

Ingredient	CAS No.	Class Description	Regulation
Carbon Black	1333-86-4	Grp. 2B: Possible human carc.	International Agency for Research on Cancer
Ethylbenzene	100-41-4	Grp. 2B: Possible human carc.	International Agency for Research on Cancer
Titanium Dioxide	13463-67-7	Grp. 2B: Possible human carc.	International Agency for Research on Cancer

Toxicological Data

If a component is disclosed in section 3 but does not appear in a table below, either no data are available for that endpoint or the data are not sufficient for classification.

Acute Toxicity

Name	Route	Species	Value
Overall product	Dermal		No data available; calculated ATE >5,000 mg/kg
Overall product	Inhalation-Vapor(4 hr)		No data available; calculated ATE >50 mg/l
Overall product	Ingestion		No data available; calculated ATE >5,000 mg/kg
Poly(Vinyl Chloride) Polymer	Dermal		LD50 estimated to be > 5,000 mg/kg
Poly(Vinyl Chloride) Polymer	Ingestion		LD50 estimated to be > 5,000 mg/kg
Plasticizer	Dermal	Rat	LD50 > 1,000 mg/kg
Plasticizer	Ingestion	Rat	LD50 > 5,000 mg/kg
Xylene	Dermal	Rabbit	LD50 > 4,200 mg/kg
Xylene	Inhalation-Vapor (4 hours)	Rat	LC50 29 mg/l
Xylene	Ingestion	Rat	LD50 3,523 mg/kg
Iron Oxide (Fe2O3)	Dermal	Not available	LD50 3,100 mg/kg
Iron Oxide (Fe2O3)	Ingestion	Not available	LD50 3,700 mg/kg
Titanium Dioxide	Dermal	Rabbit	LD50 > 10,000 mg/kg
Titanium Dioxide	Inhalation-Dust/Mist (4 hours)	Rat	LC50 > 6.82 mg/l
Titanium Dioxide	Ingestion	Rat	LD50 > 10,000 mg/kg
C.I. PIGMENT BLUE 15	Dermal		LD50 estimated to be > 5,000 mg/kg
Iron Oxide (Fe3O4)	Dermal	Not available	LD50 3,100 mg/kg

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Iron Oxide (Fe3O4)	Ingestion	Not available	LD50 3,700 mg/kg
C.I. PIGMENT BLUE 15	Ingestion	Rat	LD50 10,000 mg/kg
Calcium Oxide	Ingestion	Rat	LD50 > 2,500 mg/kg
Petroleum Distillate	Dermal	Rabbit	LD50 > 3,160 mg/kg
Petroleum Distillate	Inhalation-Dust/Mist (4 hours)	Rat	LC50 > 3 mg/l
Petroleum Distillate	Ingestion	Rat	LD50 > 5,000 mg/kg
DIISONONYL PHTHALATE	Dermal	Rabbit	LD50 > 3,160 mg/kg
DIISONONYL PHTHALATE	Inhalation-Dust/Mist (4 hours)	Rat	LC50 > 1.7 mg/l
DIISONONYL PHTHALATE	Ingestion	Rat	LD50 > 10,000 mg/kg
Ethylbenzene	Dermal	Rabbit	LD50 15,433 mg/kg
Ethylbenzene	Inhalation-Vapor (4 hours)	Rat	LC50 17.4 mg/l
Ethylbenzene	Ingestion	Rat	LD50 4,769 mg/kg
Chromium oxide (Cr2O3)	Dermal	Professional judgement	LD50 estimated to be > 5,000 mg/kg
Chromium oxide (Cr2O3)	Inhalation-Dust/Mist (4 hours)	Rat	LC50 > 5.41 mg/l
Chromium oxide (Cr2O3)	Ingestion	Rat	LD50 > 5,000 mg/kg
IRON HYDROXIDE OXIDE	Dermal		LD50 estimated to be > 5,000 mg/kg
IRON HYDROXIDE OXIDE	Ingestion	Rat	LD50 > 10,000 mg/kg
Carbon Black	Dermal	Rabbit	LD50 > 3,000 mg/kg
Carbon Black	Ingestion	Rat	LD50 > 8,000 mg/kg
C.I. PIGMENT BLUE 36	Dermal		LD50 estimated to be > 5,000 mg/kg
C.I. PIGMENT BLUE 36	Ingestion	Rabbit	LD50 > 5,000 mg/kg
P,P'-Methylenebis(phenyl isocyanate)	Dermal	Rabbit	LD50 > 5,000 mg/kg
P,P'-Methylenebis(phenyl isocyanate)	Inhalation-Dust/Mist (4 hours)	Rat	LC50 0.368 mg/l
P,P'-Methylenebis(phenyl isocyanate)	Ingestion	Rat	LD50 31,600 mg/kg

ATE = acute toxicity estimate

Skin Corrosion/Irritation

Name	Species	Value
Poly(Vinyl Chloride) Polymer	Professional judgement	No significant irritation
Xylene	Rabbit	Mild irritant
Iron Oxide (Fe2O3)	Rabbit	No significant irritation
Titanium Dioxide	Rabbit	No significant irritation
C.I. PIGMENT BLUE 15	Rabbit	No significant irritation
Iron Oxide (Fe3O4)	Rabbit	No significant irritation
Calcium Oxide	Human	Corrosive
Petroleum Distillate	Rabbit	Mild irritant
DIISONONYL PHTHALATE	Rabbit	No significant irritation
Ethylbenzene	Rabbit	Mild irritant
Chromium oxide (Cr2O3)	Rabbit	No significant irritation
IRON HYDROXIDE OXIDE	Rabbit	No significant irritation
Carbon Black	Rabbit	No significant irritation
P,P'-Methylenebis(phenyl isocyanate)	official classification	Irritant

Serious Eye Damage/Irritation

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Name	Species	Value
Overall product	Rabbit	Mild irritant
Xylene	Rabbit	Mild irritant
Iron Oxide (Fe2O3)	Rabbit	No significant irritation
Titanium Dioxide	Rabbit	No significant irritation
C.I. PIGMENT BLUE 15	Rabbit	No significant irritation
Iron Oxide (Fe3O4)	Rabbit	No significant irritation
Calcium Oxide	Rabbit	Corrosive
Petroleum Distillate	Rabbit	Mild irritant
DIISONONYL PHTHALATE	Rabbit	Mild irritant
Ethylbenzene	Rabbit	Moderate irritant
Chromium oxide (Cr2O3)	Rabbit	No significant irritation
IRON HYDROXIDE OXIDE	Rabbit	No significant irritation
Carbon Black	Rabbit	No significant irritation
P,P'-Methylenebis(phenyl isocyanate)	official classification	Severe irritant

Skin Sensitization

Name	Species	Value
Iron Oxide (Fe2O3)	Human	Not classified
Titanium Dioxide	Human and animal	Not classified
C.I. PIGMENT BLUE 15	Human	Not classified
Iron Oxide (Fe3O4)	Human	Not classified
Petroleum Distillate	Guinea pig	Not classified
DIISONONYL PHTHALATE	Human and animal	Not classified
Ethylbenzene	Human	Not classified
Chromium oxide (Cr2O3)	similar compounds	Not classified
IRON HYDROXIDE OXIDE	Human and animal	Not classified
P,P'-Methylenebis(phenyl isocyanate)	official classification	Sensitizing

Respiratory Sensitization

Name	Species	Value
P,P'-Methylenebis(phenyl isocyanate)	Human	Sensitizing

Germ Cell Mutagenicity

Name	Route	Value
Poly(Vinyl Chloride) Polymer	In Vitro	Not mutagenic
Xylene	In Vitro	Not mutagenic
Xylene	In vivo	Not mutagenic
Iron Oxide (Fe2O3)	In Vitro	Not mutagenic
Titanium Dioxide	In Vitro	Not mutagenic
Titanium Dioxide	In vivo	Not mutagenic
C.I. PIGMENT BLUE 15	In Vitro	Not mutagenic
Iron Oxide (Fe3O4)	In Vitro	Not mutagenic
Calcium Oxide	In Vitro	Not mutagenic
Petroleum Distillate	In Vitro	Not mutagenic
DIISONONYL PHTHALATE	In Vitro	Not mutagenic
Ethylbenzene	In vivo	Not mutagenic

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Ethylbenzene	In Vitro	Some positive data exist, but the data are not sufficient for classification
Chromium oxide (Cr2O3)	In vivo	Not mutagenic
Chromium oxide (Cr2O3)	In Vitro	Some positive data exist, but the data are not sufficient for classification
Carbon Black	In Vitro	Not mutagenic
Carbon Black	In vivo	Some positive data exist, but the data are not sufficient for classification
P,P'-Methylenebis(phenyl isocyanate)	In Vitro	Some positive data exist, but the data are not sufficient for classification

Carcinogenicity

Name	Route	Species	Value
Poly(Vinyl Chloride) Polymer	Not Specified	Rat	Some positive data exist, but the data are not sufficient for classification
Xylene	Dermal	Rat	Not carcinogenic
Xylene	Ingestion	Multiple animal species	Not carcinogenic
Xylene	Inhalation	Human	Some positive data exist, but the data are not sufficient for classification
Iron Oxide (Fe2O3)	Inhalation	Human	Some positive data exist, but the data are not sufficient for classification
Titanium Dioxide	Ingestion	Multiple animal species	Not carcinogenic
Titanium Dioxide	Inhalation	Rat	Carcinogenic
C.I. PIGMENT BLUE 15	Ingestion	Mouse	Not carcinogenic
Iron Oxide (Fe3O4)	Inhalation	Human	Some positive data exist, but the data are not sufficient for classification
Petroleum Distillate	Dermal	Mouse	Some positive data exist, but the data are not sufficient for classification
DIISONONYL PHTHALATE	Ingestion	Multiple animal species	Some positive data exist, but the data are not sufficient for classification
Ethylbenzene	Inhalation	Multiple animal species	Carcinogenic
Chromium oxide (Cr2O3)	Ingestion	Rat	Not carcinogenic
IRON HYDROXIDE OXIDE	Inhalation	Rat	Not carcinogenic
Carbon Black	Dermal	Mouse	Not carcinogenic
Carbon Black	Ingestion	Mouse	Not carcinogenic
Carbon Black	Inhalation	Rat	Carcinogenic
P,P'-Methylenebis(phenyl isocyanate)	Inhalation	Rat	Some positive data exist, but the data are not sufficient for classification

Reproductive Toxicity

Reproductive and/or Developmental Effects

Name	Route	Value	Species	Test Result	Exposure Duration
Poly(Vinyl Chloride) Polymer	Not Specified	Not classified for development	Mouse	NOAEL Not available	during gestation
Xylene	Inhalation	Not classified for female reproduction	Human	NOAEL Not available	occupational exposure
Xylene	Ingestion	Not classified for development	Mouse	NOAEL Not available	during organogenesis
Xylene	Inhalation	Not classified for development	Multiple animal species	NOAEL Not available	during gestation
C.I. PIGMENT BLUE 15	Ingestion	Not classified for female reproduction	Rat	NOAEL 1,000 mg/kg/day	prematuring into lactation
C.I. PIGMENT BLUE 15	Ingestion	Not classified for male reproduction	Rat	NOAEL 1,000 mg/kg/day	42 days

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C.I. PIGMENT BLUE 15	Ingestion	Not classified for development	Rat	NOAEL 1,000 mg/kg/day	prematuring into lactation
DIISONONYL PHTHALATE	Ingestion	Not classified for female reproduction	Rat	NOAEL 500 mg/kg/day	2 generation
DIISONONYL PHTHALATE	Ingestion	Not classified for male reproduction	Rat	NOAEL 500 mg/kg/day	2 generation
DIISONONYL PHTHALATE	Ingestion	Not classified for development	Rat	NOAEL 1,000 mg/kg/day	during organogenesis
Ethylbenzene	Inhalation	Not classified for development	Rat	NOAEL 4.3 mg/l	prematuring & during gestation
Chromium oxide (Cr2O3)	Ingestion	Not classified for female reproduction	Rat	NOAEL 2,000 mg/kg/day	90 days
Chromium oxide (Cr2O3)	Ingestion	Not classified for male reproduction	Rat	NOAEL 2,000 mg/kg/day	90 days
Chromium oxide (Cr2O3)	Ingestion	Not classified for development	Rat	NOAEL 2,000 mg/kg/day	90 days
P,P'-Methylenebis(phenyl isocyanate)	Inhalation	Not classified for development	Rat	NOAEL 0.004 mg/l	during organogenesis

Lactation

Name	Route	Species	Value
Xylene	Ingestion	Mouse	Not classified for effects on or via lactation

Target Organ(s)

Specific Target Organ Toxicity - single exposure

Name	Route	Target Organ(s)	Value	Species	Test Result	Exposure Duration
Xylene	Inhalation	auditory system	Causes damage to organs	Rat	LOAEL 6.3 mg/l	8 hours
Xylene	Inhalation	central nervous system depression	May cause drowsiness or dizziness	Human	NOAEL Not available	
Xylene	Inhalation	respiratory irritation	Some positive data exist, but the data are not sufficient for classification	Human	NOAEL Not available	
Xylene	Inhalation	eyes	Not classified	Rat	NOAEL 3.5 mg/l	not available
Xylene	Inhalation	liver	Not classified	Multiple animal species	NOAEL Not available	
Xylene	Ingestion	central nervous system depression	May cause drowsiness or dizziness	Multiple animal species	NOAEL Not available	
Xylene	Ingestion	eyes	Not classified	Rat	NOAEL 250 mg/kg	not applicable
Calcium Oxide	Inhalation	respiratory irritation	May cause respiratory irritation	Not available	NOAEL Not available	occupational exposure
Petroleum Distillate	Inhalation	central nervous system depression	May cause drowsiness or dizziness	Human and animal	NOAEL Not available	
Petroleum Distillate	Inhalation	respiratory irritation	Some positive data exist, but the data are not sufficient for classification		NOAEL Not available	
Petroleum Distillate	Ingestion	central nervous system depression	May cause drowsiness or dizziness	Professional judgement	NOAEL Not available	
Ethylbenzene	Inhalation	central nervous system depression	May cause drowsiness or dizziness	Human	NOAEL Not available	
Ethylbenzene	Inhalation	respiratory irritation	Some positive data exist, but the data are not sufficient for	Human and	NOAEL Not available	

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			classification	animal		
Ethylbenzene	Ingestion	central nervous system depression	May cause drowsiness or dizziness	Professional judgement	NOAEL Not available	
Chromium oxide (Cr2O3)	Inhalation	respiratory system	Not classified	Rat	NOAEL 40 mg	
P,P'-Methylenebis(phenyl isocyanate)	Inhalation	respiratory irritation	May cause respiratory irritation	official classification	NOAEL Not available	

Specific Target Organ Toxicity - repeated exposure

Name	Route	Target Organ(s)	Value	Species	Test Result	Exposure Duration
Poly(Vinyl Chloride) Polymer	Inhalation	respiratory system	Not classified	Multiple animal species	NOAEL 0.013 mg/l	22 months
Xylene	Inhalation	nervous system	Causes damage to organs through prolonged or repeated exposure	Rat	LOAEL 0.4 mg/l	4 weeks
Xylene	Inhalation	auditory system	May cause damage to organs though prolonged or repeated exposure	Rat	LOAEL 7.8 mg/l	5 days
Xylene	Inhalation	liver	Not classified	Multiple animal species	NOAEL Not available	
Xylene	Inhalation	heart endocrine system gastrointestinal tract hematopoietic system muscles kidney and/or bladder respiratory system	Not classified	Multiple animal species	NOAEL 3.5 mg/l	13 weeks
Xylene	Ingestion	auditory system	Not classified	Rat	NOAEL 900 mg/kg/day	2 weeks
Xylene	Ingestion	kidney and/or bladder	Not classified	Rat	NOAEL 1,500 mg/kg/day	90 days
Xylene	Ingestion	liver	Not classified	Multiple animal species	NOAEL Not available	
Xylene	Ingestion	heart skin endocrine system bone, teeth, nails, and/or hair hematopoietic system immune system nervous system respiratory system	Not classified	Mouse	NOAEL 1,000 mg/kg/day	103 weeks
Iron Oxide (Fe2O3)	Inhalation	pulmonary fibrosis pneumoconiosis	Not classified	Human	NOAEL Not available	occupational exposure
Titanium Dioxide	Inhalation	respiratory system	Some positive data exist, but the data are not sufficient for classification	Rat	LOAEL 0.01 mg/l	2 years
Titanium Dioxide	Inhalation	pulmonary fibrosis	Not classified	Human	NOAEL Not available	occupational exposure
C.I. PIGMENT BLUE 15	Ingestion	endocrine system hematopoietic system respiratory system	Not classified	Rat	NOAEL 1,000 mg/kg/day	28 days
C.I. PIGMENT BLUE 15	Ingestion	kidney and/or bladder	Not classified	Multiple animal species	NOAEL Not available	not available
Iron Oxide (Fe3O4)	Inhalation	pulmonary fibrosis pneumoconiosis	Not classified	Human	NOAEL Not available	occupational exposure
DIISONONYL	Dermal	blood liver kidney	Not classified	Rabbit	NOAEL	6 weeks

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PHTHALATE		and/or bladder			2,425 mg/kg/day	
DIISONONYL PHTHALATE	Ingestion	kidney and/or bladder	Not classified	Rat	NOAEL not available	13 weeks
Ethylbenzene	Inhalation	kidney and/or bladder	Some positive data exist, but the data are not sufficient for classification	Rat	NOAEL 1.1 mg/l	2 years
Ethylbenzene	Inhalation	liver	Some positive data exist, but the data are not sufficient for classification	Mouse	NOAEL 1.1 mg/l	103 weeks
Ethylbenzene	Inhalation	hematopoietic system	Not classified	Rat	NOAEL 3.4 mg/l	28 days
Ethylbenzene	Inhalation	auditory system	Not classified	Rat	NOAEL 2.4 mg/l	5 days
Ethylbenzene	Inhalation	endocrine system	Not classified	Mouse	NOAEL 3.3 mg/l	103 weeks
Ethylbenzene	Inhalation	gastrointestinal tract	Not classified	Rat	NOAEL 3.3 mg/l	2 years
Ethylbenzene	Inhalation	bone, teeth, nails, and/or hair muscles	Not classified	Multiple animal species	NOAEL 4.2 mg/l	90 days
Ethylbenzene	Inhalation	heart immune system respiratory system	Not classified	Multiple animal species	NOAEL 3.3 mg/l	2 years
Ethylbenzene	Ingestion	liver kidney and/or bladder	Not classified	Rat	NOAEL 680 mg/kg/day	6 months
Chromium oxide (Cr2O3)	Inhalation	immune system respiratory system hematopoietic system liver kidney and/or bladder	Not classified	Rat	NOAEL 44 mg/m3	90 days
IRON HYDROXIDE OXIDE	Inhalation	respiratory system liver kidney and/or bladder	Not classified	Rat	NOAEL 0.2 mg/l	14 days
Carbon Black	Inhalation	pneumoconiosis	Not classified	Human	NOAEL Not available	occupational exposure
P,P'-Methylenebis(phenyl isocyanate)	Inhalation	respiratory system	Causes damage to organs through prolonged or repeated exposure	Rat	LOAEL 0.004 mg/l	13 weeks

Aspiration Hazard

Name	Value
Xylene	Aspiration hazard
Petroleum Distillate	Aspiration hazard
Ethylbenzene	Aspiration hazard

Please contact the address or phone number listed on the first page of the SDS for additional toxicological information on this material and/or its components.

SECTION 12: Ecological information

Ecotoxicological information

Please contact the address or phone number listed on the first page of the SDS for additional ecotoxicological information on this material and/or its components.

Chemical fate information

Please contact the address or phone number listed on the first page of the SDS for additional chemical fate information on this material and/or its components.

SECTION 13: Disposal considerations

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13.1. Disposal methods

Dispose of contents/ container in accordance with the local/regional/national/international regulations.

Dispose of completely cured (or polymerized) material in a permitted industrial waste facility. As a disposal alternative, incinerate uncured product in a permitted waste incineration facility. Proper destruction may require the use of additional fuel during incineration processes. Combustion products will include halogen acid (HCl/HF/HBr). Facility must be capable of handling halogenated materials. Empty drums/barrels/containers used for transporting and handling hazardous chemicals (chemical substances/mixtures/preparations classified as Hazardous as per applicable regulations) shall be considered, stored, treated & disposed of as hazardous wastes unless otherwise defined by applicable waste regulations. Consult with the respective regulating authorities to determine the available treatment and disposal facilities.

SECTION 14: Transport Information

For Transport Information, please visit http://3M.com/Transportinfo or call 1-800-364-3577 or 651-737-6501.

SECTION 15: Regulatory information

15.1. US Federal Regulations

Contact manufacturer for more information

EPCRA 311/312 Hazard Classifications:

Physical Hazards
Not applicable
Health Hazards
Carcinogenicity
Specific target organ toxicity (single or repeated exposure)

Section 313 Toxic Chemicals subject to the reporting requirements of that section and 40 CFR part 372 (EPCRA):

<u>Ingredient</u>	<u>C.A.S. No</u>	<u>% by Wt</u>
Xylene	1330-20-7	Trade Secret < 5
Xylene (Benzene, dimethyl-)	1330-20-7	< 5
Ethylbenzene	100-41-4	Trade Secret < 5
C.I. PIGMENT BLUE 36 (Cobalt, inorganic compounds)	68187-11-1	< 1

15.2. State Regulations

Contact manufacturer for more information

California Proposition 65

<u>Ingredient</u>	<u>C.A.S. No.</u>	<u>Listing</u>
DIISONONYL PHTHALATE; 1,2-BENZENEDICARBOXYLIC ACID, DIISONONYL ESTER (DINP)	None	Carcinogen
TOLUENE	108-88-3	Developmental Toxin
ETHYLBENZENE	100-41-4	Carcinogen
CARBON BLACK (AIRBORNE, UNBOUND PARTICLES OF RESPIRABLE SIZE [\leq 10 MICROMETERS])	1333-86-4	Carcinogen
TITANIUM DIOXIDE (AIRBORNE, UNBOUND PARTICLES OF RESPIRABLE SIZE)	13463-67-7	Carcinogen

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15.3. Chemical Inventories

The components of this product are in compliance with the new substance notification requirements of CEPA.

The components of this product are in compliance with the chemical notification requirements of TSCA.

Contact manufacturer for more information

15.4. International Regulations

Contact manufacturer for more information

This SDS has been prepared to meet the U.S. OSHA Hazard Communication Standard, 29 CFR 1910.1200.

SECTION 16: Other information

NFPA Hazard Classification

Health: 1 **Flammability:** 1 **Instability:** 0 **Special Hazards:** None

National Fire Protection Association (NFPA) hazard ratings are designed for use by emergency response personnel to address the hazards that are presented by short-term, acute exposure to a material under conditions of fire, spill, or similar emergencies. Hazard ratings are primarily based on the inherent physical and toxic properties of the material but also include the toxic properties of combustion or decomposition products that are known to be generated in significant quantities.

Document Group:	08-9432-9	Version Number:	20.05
Issue Date:	10/16/18	Supersedes Date:	03/14/18

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3M USA SDSs are available at www.3M.com

Safety Data Sheet

Sikaflex® Crack Flex Sealant



Revision Date 09/18/2017

Print Date 01/31/2018

1. Identification

Product name : Sikaflex® Crack Flex Sealant

Supplier : Sika Corporation
201 Polito Avenue
Lyndhurst, NJ 07071
USA
www.sikausa.com

Telephone : (201) 933-8800

Telefax : (201) 804-1076

E-mail address : ehs@sika-corp.com

Emergency telephone : CHEMTREC: 800-424-9300
INTERNATIONAL: 703-527-3887


Recommended use of the chemical and restrictions on use : For further information, refer to product data sheet.

2. Hazards identification

GHS Classification

Flammable liquids, Category 4	H227: Combustible liquid.
Respiratory sensitization, Category 1	H334: May cause allergy or asthma symptoms or breathing difficulties if inhaled.
Skin sensitization, Category 1	H317: May cause an allergic skin reaction.
Carcinogenicity, Category 1A (Inhalation)	H350i: May cause cancer by inhalation.
Specific target organ systemic toxicity - repeated exposure, Category 2, hearing organs (Inhalation)	H373: May cause damage to organs through prolonged or repeated exposure if inhaled.

GHS label elements

Hazard pictograms : 

Signal Word : Danger

Hazard Statements : H227 Combustible liquid.
H317 May cause an allergic skin reaction.
H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled.
H350i May cause cancer by inhalation.
H373 May cause damage to organs (hearing organs) through prolonged or repeated exposure if inhaled.

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Precautionary Statements : **Prevention:**
 P201 Obtain special instructions before use.
 P202 Do not handle until all safety precautions have been read and understood.
 P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.
 P260 Do not breathe dust/ fume/ gas/ mist/ vapors/ spray.
 P272 Contaminated work clothing must not be allowed out of the workplace.
 P280 Wear protective gloves.
 P281 Use personal protective equipment as required.
 P285 In case of inadequate ventilation wear respiratory protection.
Response:
 P302 + P352 IF ON SKIN: Wash with plenty of soap and water.
 P304 + P341 IF INHALED: If breathing is difficult, remove person to fresh air and keep comfortable for breathing.
 P308 + P313 IF exposed or concerned: Get medical advice/ attention.
 P333 + P313 If skin irritation or rash occurs: Get medical advice/ attention.
 P363 Wash contaminated clothing before reuse.
 P370 + P378 In case of fire: Use extinguishing measures that are appropriate to local circumstances and the surrounding environment for extinction.
Storage:
 P403 + P235 Store in a well-ventilated place. Keep cool.
 P405 Store locked up.
Disposal:
 P501 Dispose of contents/ container to an approved waste disposal plant.

Warning : Reports have associated repeated and prolonged exposure to some of the chemicals in this product with permanent brain,liver, kidney and nervous system damage. Intentional misuse by deliberate concentration and inhalation of vapors may be harmful or fatal.

See Section 11 for more detailed information on health effects and symptoms.
 There are no hazards not otherwise classified that have been identified during the classification process.
 There are no ingredients with unknown acute toxicity used in a mixture at a concentration >= 1%.

3. Composition/information on ingredients

Hazardous ingredients

Chemical name	CAS-No.	Concentration (%)
Calcium oxide	1305-78-8	>= 3 - < 5 %
xylene	1330-20-7	>= 2 - < 5 %
Isophoronedialdimine	932742-30-8	>= 1 - < 2 %
ethylbenzene	100-41-4	>= 0.1 - < 1 %
3-isocyanatomethyl-3,5,5-trimethylcyclohexyl isocyanate	4098-71-9	>= 0.1 - < 1 %

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4,4'-methylenediphenyl diisocyanate	101-68-8	>= 0.1 - < 1 %
Aliphatic polyisocyanate	28182-81-2	>= 0.1 - < 1 %
Quartz (SiO2) <5µm	14808-60-7	>= 0.1 - < 1 %
4,4'-Methylenediphenyl diisocyanate, oligomers	25686-28-6	>= 0.1 - < 1 %

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

4. First aid measures

- If inhaled : Move to fresh air.
Consult a physician after significant exposure.
- In case of skin contact : Take off contaminated clothing and shoes immediately.
Wash off with soap and plenty of water.
If symptoms persist, call a physician.
- In case of eye contact : Remove contact lenses.
Keep eye wide open while rinsing.
If eye irritation persists, consult a specialist.
- If swallowed : Clean mouth with water and drink afterwards plenty of water.
Do not induce vomiting without medical advice.
Do not give milk or alcoholic beverages.
Never give anything by mouth to an unconscious person.
Obtain medical attention.
- Most important symptoms and effects, both acute and delayed : sensitizing effects
carcinogenic effects

Asthmatic appearance
Allergic reactions
See Section 11 for more detailed information on health effects and symptoms.

May cause an allergic skin reaction.
May cause allergy or asthma symptoms or breathing difficulties if inhaled.
May cause cancer by inhalation.
May cause damage to organs through prolonged or repeated exposure if inhaled.
- Protection of first-aiders : Move out of dangerous area.
Consult a physician.
Show this material safety data sheet to the doctor in attendance.
- Notes to physician : Treat symptomatically.

5. Fire-fighting measures

- Suitable extinguishing media : Carbon dioxide (CO2)

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| Unsuitable extinguishing media | : Water |
| Specific extinguishing methods | : Collect contaminated fire extinguishing water separately. This must not be discharged into drains. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations. |
| Special protective equipment for fire-fighters | : In the event of fire, wear self-contained breathing apparatus. |

6. Accidental release measures

- | | |
|---|---|
| Personal precautions, protective equipment and emergency procedures | : Use personal protective equipment. Deny access to unprotected persons. |
| Environmental precautions | : Do not flush into surface water or sanitary sewer system. If the product contaminates rivers and lakes or drains inform respective authorities. Local authorities should be advised if significant spillages cannot be contained. |
| Methods and materials for containment and cleaning up | : Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Keep in suitable, closed containers for disposal. |

7. Handling and storage

- | | |
|-----------------------------|---|
| Advice on safe handling | : Avoid formation of aerosol. Do not breathe vapors or spray mist. Avoid exceeding the given occupational exposure limits (see section 8). Do not get in eyes, on skin, or on clothing. For personal protection see section 8. Persons with a history of skin sensitization problems or asthma, allergies, chronic or recurrent respiratory disease should not be employed in any process in which this mixture is being used. Smoking, eating and drinking should be prohibited in the application area. Follow standard hygiene measures when handling chemical products. |
| Conditions for safe storage | : Prevent unauthorized access. Store in original container. Keep in a well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Observe label precautions. Store in accordance with local regulations. |
| Materials to avoid | : No data available |

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8. Exposure controls/personal protection

Component	CAS-No.	Basis **	Value	Exposure limit(s)* / Form of exposure		
Calcium oxide	1305-78-8	ACGIH	TWA	2 mg/m3		
		OSHA Z-1	TWA	5 mg/m3		
		OSHA P0	TWA	5 mg/m3		
xylene	1330-20-7	OSHA Z-1	TWA	100 ppm 435 mg/m3		
		OSHA P0	STEL	150 ppm 655 mg/m3		
		OSHA P0	TWA	100 ppm 435 mg/m3		
		ACGIH	TWA	100 ppm		
		ACGIH	STEL	150 ppm		
		ethylbenzene	100-41-4	ACGIH	TWA	20 ppm
		ACGIH	STEL	125 ppm		
		OSHA Z-1	TWA	100 ppm 435 mg/m3		
		OSHA P0	TWA	100 ppm 435 mg/m3		
		OSHA P0	STEL	125 ppm 545 mg/m3		
		3-isocyanatomethyl-3,5,5-trimethylcyclohexyl isocyanate	4098-71-9	ACGIH	TWA	0.005 ppm
		OSHA P0	TWA	0.005 ppm		
		OSHA P0	STEL	0.02 ppm		
		4,4'-methylenediphenyl diisocyanate	101-68-8	ACGIH	TWA	0.005 ppm
		OSHA Z-1	C	0.02 ppm 0.2 mg/m3		
		OSHA P0	C	0.02 ppm		

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				0.2 mg/m3
Quartz (SiO ₂) <5µm	14808-60-7	OSHA Z-3	TWA	10 mg/m ³ / %SiO ₂ +2 respirable
		OSHA Z-3	TWA	250 mppcf / %SiO ₂ +5 respirable
		OSHA P0	TWA	0.1 mg/m ³ Respirable fraction
		ACGIH	TWA	0.025 mg/m ³ Respirable fraction
		OSHA Z-1	TWA	0.05 mg/m ³ Respirable dust

*The above mentioned values are in accordance with the legislation in effect at the date of the release of this safety data sheet.

****Basis**

ACGIH. Threshold Limit Values (TLV)

OSHA P0. Table Z-1, Limit for Air Contaminant (1989 Vacated Values)

OSHA P1. Permissible Exposure Limits (PEL), Table Z-1, Limit for Air Contaminant

OSHA P2. Permissible Exposure Limits (PEL), Table Z-2

OSHA Z3. Table Z-3, Mineral Dust

Engineering measures : Use of adequate ventilation should be sufficient to control worker exposure to airborne contaminants. If the use of this product generates dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure below any recommended or statutory limits.
The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits.

Personal protective equipment

Respiratory protection : Use a properly fitted NIOSH approved air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary.

The filter class for the respirator must be suitable for the maximum expected contaminant concentration (gas/vapor/aerosol/particulates) that may arise when handling the product. If this concentration is exceeded, self-contained breathing apparatus must be used.

Hand protection
Remarks : Chemical-resistant, impervious gloves complying with an

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approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

- Eye protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary.
- Skin and body protection : Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place.
- Hygiene measures : Avoid contact with skin, eyes and clothing.
Wash hands before breaks and immediately after handling the product.
Remove respiratory and skin/eye protection only after vapors have been cleared from the area.
Remove contaminated clothing and protective equipment before entering eating areas.
Wash thoroughly after handling.

9. Physical and chemical properties

- Appearance : viscous
- Color : light gray
- Odor : aromatic
- Odor Threshold : No data available
- Flash point : 185 °F (85 °C)
- Ignition temperature : No data available
- Decomposition temperature : No data available
- Lower explosion limit (Vol%) : No data available
- Upper explosion limit (Vol%) : No data available
- Flammability (solid, gas) : No data available
- Oxidizing properties : No data available
- pH : No data available
- Melting point/range / Freezing point : No data available
- Boiling point/boiling range : No data available
- Vapor pressure : 0.01 mmHg (0.01 hpa)
- Density : 1.25 g/cm³
at 73 °F (23 °C)

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Water solubility	:	Note: insoluble
Partition coefficient: n-octanol/water	:	No data available
Viscosity, dynamic	:	No data available
Viscosity, kinematic	:	> 20.5 mm ² /s at 104 °F (40 °C)
Relative vapor density	:	No data available
Evaporation rate	:	No data available
Burning rate	:	No data available
Volatile organic compounds (VOC) content	:	30 g/l

10. Stability and reactivity

Reactivity	:	No dangerous reaction known under conditions of normal use.
Chemical stability	:	The product is chemically stable.
Possibility of hazardous reactions	:	Stable under recommended storage conditions.
Conditions to avoid	:	Extremes of temperature and direct sunlight.
Incompatible materials	:	No data available

11. Toxicological information

Acute toxicity

Not classified based on available information.

Ingredients:

xylene:

Acute oral toxicity	:	LD50 Oral (Rat): 3,523 mg/kg
Acute dermal toxicity	:	LD50 Dermal (Rabbit): 1,700 mg/kg

Isophoronedialdimine:

Acute oral toxicity	:	LD50 Oral (Rat): > 2,000 mg/kg
Acute dermal toxicity	:	LD50 Dermal (Rabbit): > 2,000 mg/kg

ethylbenzene:

Acute oral toxicity	:	LD50 Oral (Rat): 3,500 mg/kg
Acute dermal toxicity	:	LD50 Dermal (Rabbit): 5,510 mg/kg

3-isocyanatomethyl-3,5,5-trimethylcyclohexyl isocyanate:

Acute oral toxicity	:	LD50 Oral (Rat): 4,814 mg/kg
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Acute inhalation toxicity : LC50 (Rat): 0.031 mg/l
Exposure time: 4 h
Test atmosphere: dust/mist

Acute dermal toxicity : LD50 Dermal (Rat): > 7,000 mg/kg

4,4'-methylenediphenyl diisocyanate:

Acute inhalation toxicity : Acute toxicity estimate: 1.5 mg/l
Test atmosphere: dust/mist
Method: Expert judgment

Aliphatic polyisocyanate:

Acute oral toxicity : LD50 Oral (Rat): > 2,500 mg/kg

Acute inhalation toxicity : Acute toxicity estimate: 1.5 mg/l
Test atmosphere: dust/mist
Method: Expert judgment

Acute dermal toxicity : LD50 Dermal (Rat): > 2,000 mg/kg

4,4'-Methylenediphenyl diisocyanate, oligomers:

Acute oral toxicity : LD50 Oral (Rat): > 5,000 mg/kg

Acute inhalation toxicity : Acute toxicity estimate: 1.5 mg/l
Test atmosphere: dust/mist
Method: Expert judgment

Acute dermal toxicity : LD50 Dermal (Rabbit): > 9,400 mg/kg

Skin corrosion/irritation

Not classified based on available information.

Serious eye damage/eye irritation

Not classified based on available information.

Product:

Method: OECD Test Guideline 438

Result: No eye irritation

Method: OECD Test Guideline 405

Respiratory or skin sensitization

Skin sensitization: May cause an allergic skin reaction.

Respiratory sensitization: May cause allergy or asthma symptoms or breathing difficulties if inhaled.

Germ cell mutagenicity

Not classified based on available information.

Reproductive toxicity

Not classified based on available information.

STOT-single exposure

Not classified based on available information.

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STOT-repeated exposure

May cause damage to organs (hearing organs) through prolonged or repeated exposure if inhaled.

Reports have associated repeated and prolonged exposure to some of the chemicals in this product with permanent brain, liver, kidney and nervous system damage. Intentional misuse by deliberate concentration and inhalation of vapors may be harmful or fatal.

Once sensitized, a severe allergic reaction may occur when subsequently exposed to very low levels.

Aspiration toxicity

Not classified based on available information.

Carcinogenicity

May cause cancer by inhalation.

IARC	Group 1: Carcinogenic to humans
	Quartz (SiO ₂) <5µm 14808-60-7
	Group 2B: Possibly carcinogenic to humans
	titanium dioxide 13463-67-7
	Carbon black 1333-86-4
	ethylbenzene 100-41-4
NTP	Known to be human carcinogen
	Quartz (SiO ₂) <5µm 14808-60-7
Carbon black (1333-86-4)	

Animal Toxicity:

Rat, oral, duration 2 year
Effect: no tumors

Mouse, oral, duration 2 years
Effect: no tumors

Mouse, dermal, duration 18 months
Effect: no skin tumors

Rat, inhalation, duration 2 years
Target organ: lungs
Effect: inflammation, fibrosis, tumors

Note: Tumors in the rat lung are considered to be related to the "particle overload phenomenon" rather than to a specific chemical effect of carbon black itself in the lung. These effects in rats have been reported in many studies on other poorly soluble inorganic particles and appear to be rat specific. Tumors have not been observed in other species (i.e., mouse and hamster) for carbon black or other poorly soluble particles under similar circumstances and study conditions.

Mortality studies (human data): A study on carbon black production workers in the UK (Sorohan, 2001) found an increased risk of lung cancer in two of the five plants studied; however, the increase was not related to the dose of carbon black. Thus, the authors did not consider the increased risk in lung cancer to be due to carbon black exposure. A German study of carbon black workers at one plant (Morfeld, 2006; Buechte, 2006) found a similar increase in lung cancer risk but, like the Sorohan, 2001 (UK study) found no association with carbon black exposure. A large US study of 18 plants showed a reduction in lung cancer risk in carbon black production workers (DEll, 2006). Based upon these studies, the February 2006 Working Group at the International Agency for Research on Cancer (IARC) concluded that the human evidence

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for carcinogenicity was inadequate (IARC, 2010).

Since the IARC evaluation of carbon black, Sorahan and Harrington (2007) have re-analyzed the UK study data using an alternative exposure hypothesis and found a positive association with carbon black exposure in two of the five plants. The same exposure hypothesis was applied by Morfeld and McCunney (2009) to the German cohort; in contrast, they found no association between carbon black exposure and lung cancer risk and, thus, no support for the alternative exposure hypothesis used by Sorahan and Harrington.

Overall, as a result of these detailed investigations, no causative link between carbon black exposure and cancer risk in humans has been demonstrated.

IARC CANCER CLASSIFICATION: In 2006 IARC re-affirmed its 1995 finding that there is "inadequate evidence" from human health studies to assess whether carbon black causes cancer in humans. IARC concluded that there is "sufficient evidence" in experimental animal studies for the carcinogenicity of carbon black. IARC's overall evaluation is that carbon black is "possibly carcinogenic to humans" (Group 2B)". This conclusion was based on IARC's guidelines, which generally require such a classification if one species exhibits carcinogenicity in two or more animal studies (IARC, 2010).

Solvent extracts of carbon black were used in one study of rats in which skin tumors were found after dermal application and several studies of mice in which sarcomas were found following subcutaneous injection. IARC concluded that there was "sufficient evidence" that carbon black extracts can cause cancer in animals (Group 2B).

ICGIH CANCER CLASSIFICATION: Confirmed Animal Carcinogen with Unknown Relevance to Humans (Category A3 Carcinogen).

ASSESSMENT: Applying the guidelines of self-classification under the Globally Harmonized System of Classification and Labeling of Chemicals, carbon black is not classified as a carcinogen. Lung tumors are induced in rats as a result of repeated exposure to inert, poorly soluble particles like carbon black and other poorly soluble particles. Rats tumors are a result of a secondary non-genotoxic mechanism that has questionable relevance for classification in humans. In support of this opinion, the CLP Guidance for Specific Target Organ Toxicity - Repeated Exposure (STOT-RE), cites lung overload under mechanisms not relevant to humans. Human health studies show that exposure to carbon black does not increase the risk to carcinogenicity.

Titanium dioxide (13463-67-7)

In lifetime inhalation studies of rats, airborne respirable-size titanium dioxide particles have been shown to cause an increase in lung tumors at concentrations associated with substantial particle lung burdens and consequential pulmonary overload and inflammation. The potential for these adverse health effects appears to be closely related to the particle size and the amount of the exposed surface area that comes into contact with the lung. However, tests with other laboratory animals such as mice and hamsters, indicate that rats are significantly more susceptible to the pulmonary overload and inflammation that cause lung cancer. Epidemiology studies do not suggest an increased risk of cancer in humans from occupational exposure to titanium dioxide. Titanium dioxide has been characterized by IARC as possibly carcinogenic to humans (Group 2B) through inhalation (not ingestion). It has not been characterized as a potential carcinogen by either NTP or OSHA.

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12. Ecological information

Other information Do not empty into drains; dispose of this material and its container in a safe way.
Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Component:

xylene	1330-20-7	<u>Toxicity to fish:</u> Species: Oncorhynchus mykiss (rainbow trout) Dose: 3.3 mg/l Exposure time: 96 h
Isophoronedialdimine	932742-30-8	<u>Toxicity to fish:</u> LC50 Species: Fish Dose: 87.2 mg/l Exposure time: 96 h <u>Toxicity to daphnia and other aquatic invertebrates:</u> EC50 Species: Daphnia Dose: > 100 mg/l Exposure time: 48 h <u>Toxicity to algae:</u> EC50 Species: Desmodesmus subspicatus (green algae) Dose: 180.4 mg/l Exposure time: 72 h

13. Disposal considerations

Disposal methods

Waste from residues : Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements.

Contaminated packaging : Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport information

DOT
Not dangerous goods
IATA
Not dangerous goods
IMDG
Not dangerous goods

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Special precautions for user

No data available

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable

15. Regulatory information

TSCA list : All chemical substances in this product are either listed on the TSCA Inventory or are in compliance with a TSCA Inventory exemption.

EPCRA - Emergency Planning and Community Right-to-Know

CERCLA Reportable Quantity

This material does not contain any components with a CERCLA RQ.

SARA304 Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 311/312 Hazards : Flammable (gases, aerosols, liquids, or solids)
Chronic Health Hazard
Respiratory or skin sensitization
Carcinogenicity
Specific target organ toxicity (single or repeated exposure)

SARA 302 : This material does not contain any components with a section 302 EHS TPQ.

SARA 313 : The following components are subject to reporting levels established by SARA Title III, Section 313:

xylene	1330-20-7	2.06 %
ethylbenzene	100-41-4	0.51 %

Clean Air Act

Ozone-Depletion Potential


This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).

The following chemical(s) are listed as HAP under the U.S. Clean Air Act, Section 12 (40 CFR 61):

xylene	1330-20-7	2.06 %
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This product does not contain any chemicals listed under the U.S. Clean Air Act Section 112(r) for Accidental Release Prevention (40 CFR 68.130, Subpart F).

California Prop 65

 **WARNING:** Cancer and Reproductive Harm - www.P65Warnings.ca.gov

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16. Other information

HMIS Classification

Health	*	3
Flammability		2
Physical Hazard		0
Personal Protection		X

Caution: HMIS® rating is based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® rating is not required on SDSs under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® rating is to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). Please note HMIS® attempts to convey full health warning information to all employees.

Notes to Reader

The information contained in this Safety Data Sheet applies only to the actual Sika Corporation ("Sika") product identified and described herein. This information is not intended to address, nor does it address the use or application of the identified Sika product in combination with any other material, product or process. All of the information set forth herein is based on technical data regarding the identified product that Sika believes to be reliable as of the date hereof. Prior to each use of any Sika product, the user must always read and follow the warnings and instructions on the product's current Product Data Sheet, product label and Safety Data Sheet for each Sika product, which are available at web site and/or telephone number listed in Section 1 of this SDS.

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All sales of Sika products are subject to its current terms and conditions of sale available at www.sikausa.com or 201-933-8800.

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Material number: 427706



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SAFETY DATA SHEET

1. Identification

Material name: TREMFIX A.F. 5 US GL
Material: 350715 805

Recommended use and restriction on use

Recommended use: Coatings
Restrictions on use: Not known.

Manufacturer/Importer/Supplier/Distributor Information

Tremco U.S. Roofing
3735 Green Road
Beachwood OH 44122
US

Contact person: EH&S Department
Telephone: 216-292-5000
Emergency telephone number: 1-800-424-9300 (US); 1-613-996-6666 (Canada)

2. Hazard(s) identification

Hazard Classification

Health Hazards

Skin sensitizer	Category 1
Germ Cell Mutagenicity	Category 1B
Carcinogenicity	Category 1A
Toxic to reproduction	Category 1B

Unknown toxicity - Health

Acute toxicity, oral	18.96 %
Acute toxicity, dermal	18.97 %
Acute toxicity, inhalation, vapor	100 %
Acute toxicity, inhalation, dust or mist	100 %

Environmental Hazards

Acute hazards to the aquatic environment	Category 1
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Unknown toxicity - Environment

Acute hazards to the aquatic environment	94.5 %
Chronic hazards to the aquatic environment	100 %

Label Elements

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Hazard Symbol:



Signal Word: Danger

Hazard Statement: May cause an allergic skin reaction.
May cause genetic defects.
May cause cancer.
May damage fertility or the unborn child.
Very toxic to aquatic life.

Precautionary Statements

Prevention: Avoid breathing dust/fume/gas/mist/vapors/spray. Contaminated work clothing should not be allowed out of the workplace. Wear protective gloves/protective clothing/eye protection/face protection. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Use personal protective equipment as required. Avoid release to the environment.

Response: IF ON SKIN: Wash with plenty of water/... If skin irritation or rash occurs: Get medical advice/attention. IF exposed or concerned: Get medical advice/attention. Specific treatment (see on this label). Wash contaminated clothing before reuse. Collect spillage.

Storage: Store locked up.

Disposal: Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal.

Hazard(s) not otherwise classified (HNOC): None.

3. Composition/information on ingredients

Mixtures

Chemical Identity	CAS number	Content in percent (%)*
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Coal tar pitch	65996-93-2	50 - <100%
Calcium Carbonate (Limestone)	1317-65-3	5 - <10%
Cellulose	9004-34-6	1 - <5%
Creosote	8001-58-9	1 - <5%
Phenanthrene	85-01-8	1 - <5%
Fluorathene	206-44-0	1 - <5%
Clay	1332-58-7	0.1 - <1%
Naphthalene	91-20-3	0.1 - <1%
Anthracene	120-12-7	0.001 - <1%
Indeno[1,2,3-cd]pyrene	193-39-5	0.1 - <1%
Benzo(a)anthracene	56-55-3	0.1 - <1%
Chrysene	218-01-9	0.1 - <1%
Benzo(a)pyrene	50-32-8	0.3 - <1%
Acenaphthene	83-32-9	0.1 - <1%
Dibenzofuran	132-64-9	0.1 - <1%
Benzo(b)fluoranthene/benzo[e]acefenantrileno	205-99-2	0.1 - <1%
Crystalline Silica (Quartz)/ Silica Sand	14808-60-7	0.1 - <1%

* All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

4. First-aid measures

- Ingestion:** Call a POISON CENTER/doctor if you feel unwell. Rinse mouth.
- Inhalation:** Move to fresh air.
- Skin Contact:** Get medical attention if symptoms occur. Destroy or thoroughly clean contaminated shoes. Immediately remove contaminated clothing and shoes and wash skin with soap and plenty of water. If skin irritation or an allergic skin reaction develops, get medical attention.
- Eye contact:** Any material that contacts the eye should be washed out immediately with water. If easy to do, remove contact lenses. If eye irritation persists: Get medical advice/attention.

Most important symptoms/effects, acute and delayed

Symptoms: May cause skin and eye irritation.

Indication of immediate medical attention and special treatment needed

Treatment: Symptoms may be delayed.

5. Fire-fighting measures

General Fire Hazards: No unusual fire or explosion hazards noted.



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Suitable (and unsuitable) extinguishing media

Suitable extinguishing media:	Use fire-extinguishing media appropriate for surrounding materials.
Unsuitable extinguishing media:	Do not use water jet as an extinguisher, as this will spread the fire.
Specific hazards arising from the chemical:	During fire, gases hazardous to health may be formed.
Special protective equipment and precautions for firefighters	
Special fire fighting procedures:	No data available.
Special protective equipment for fire-fighters:	Self-contained breathing apparatus and full protective clothing must be worn in case of fire.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures:	See Section 8 of the SDS for Personal Protective Equipment. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Keep unauthorized personnel away.
Methods and material for containment and cleaning up:	Dam and absorb spillages with sand, earth or other non-combustible material. Collect spillage in containers, seal securely and deliver for disposal according to local regulations.
Notification Procedures:	In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations.
Environmental Precautions:	Do not contaminate water sources or sewer. Prevent further leakage or spillage if safe to do so. Avoid release to the environment.

7. Handling and storage

Precautions for safe handling:	Do not handle until all safety precautions have been read and understood. Obtain special instructions before use. Use personal protective equipment as required. Avoid contact with eyes, skin, and clothing. Wash hands thoroughly after handling. Provide adequate ventilation. Wear appropriate personal protective equipment. Observe good industrial hygiene practices.
Conditions for safe storage, including any incompatibilities:	Store locked up.

8. Exposure controls/personal protection

Control Parameters
Occupational Exposure Limits

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Chemical Identity	Type	Exposure Limit Values	Source
Coal tar pitch - Aerosol. - as benzene solubles	TWA	0.2 mg/m ³	US. ACGIH Threshold Limit Values (2011)
Coal tar pitch	PEL	0.2 mg/m ³	US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) (02 2006)
Calcium Carbonate (Limestone) - Total dust.	PEL	15 mg/m ³	US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) (02 2006)
Calcium Carbonate (Limestone) - Respirable fraction.	PEL	5 mg/m ³	US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) (02 2006)
Cellulose	TWA	10 mg/m ³	US. ACGIH Threshold Limit Values (2011)
Cellulose - Total dust.	PEL	15 mg/m ³	US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) (02 2006)
Cellulose - Respirable fraction.	PEL	5 mg/m ³	US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) (02 2006)
Clay - Respirable fraction.	TWA	2 mg/m ³	US. ACGIH Threshold Limit Values (2011)
	PEL	5 mg/m ³	US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) (02 2006)
Clay - Total dust.	PEL	15 mg/m ³	US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) (02 2006)
	TWA	50 millions of particles per cubic foot of air	US. OSHA Table Z-3 (29 CFR 1910.1000) (03 2016)
Clay - Respirable fraction.	TWA	15 millions of particles per cubic foot of air	US. OSHA Table Z-3 (29 CFR 1910.1000) (03 2016)
	TWA	5 mg/m ³	US. OSHA Table Z-3 (29 CFR 1910.1000) (03 2016)
Clay - Total dust.	TWA	15 mg/m ³	US. OSHA Table Z-3 (29 CFR 1910.1000) (03 2016)
Naphthalene	TWA	10 ppm	US. ACGIH Threshold Limit Values (2011)
	PEL	10 ppm 50 mg/m ³	US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) (02 2006)
Crystalline Silica (Quartz)/ Silica Sand - Respirable fraction.	TWA	0.025 mg/m ³	US. ACGIH Threshold Limit Values (2011)
Crystalline Silica (Quartz)/ Silica Sand - Respirable dust.	TWA	0.05 mg/m ³	US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1053) (03 2016)
	OSHA_AC T	0.025 mg/m ³	US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1053) (03 2016)
Crystalline Silica (Quartz)/ Silica Sand - Respirable dust.	PEL	0.05 mg/m ³	US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) (03 2016)
Crystalline Silica (Quartz)/ Silica Sand - Respirable.	TWA	2.4 millions of particles per cubic foot of air	US. OSHA Table Z-3 (29 CFR 1910.1000) (2000)
	TWA	0.1 mg/m ³	US. OSHA Table Z-3 (29 CFR 1910.1000) (2000)



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Chemical name	Type	Exposure Limit Values	Source
Coal tar pitch - Aerosol. - as benzene solubles	TWA	0.2 mg/m3	Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended) (07 2007)
Coal tar pitch - Aerosol. - as benzene solubles	TWA	0.2 mg/m3	Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents) (11 2010)
Coal tar pitch - as benzene solubles	TWA	0.2 mg/m3	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment) (09 2017)
Calcium Carbonate (Limestone) - Total dust.	STEL	20 mg/m3	Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended) (07 2007)
	TWA	10 mg/m3	Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended) (07 2007)
Calcium Carbonate (Limestone) - Respirable fraction.	TWA	3 mg/m3	Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended) (07 2007)
Calcium Carbonate (Limestone) - Total dust.	TWA	10 mg/m3	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment) (09 2017)
Cellulose - Respirable fraction.	TWA	3 mg/m3	Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended) (07 2007)
Cellulose - Total dust.	TWA	10 mg/m3	Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended) (07 2007)
Cellulose	TWA	10 mg/m3	Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents) (11 2010)
Cellulose - Total dust.	TWA	10 mg/m3	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment) (09 2017)
Naphthalene	STEL	15 ppm	Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended) (07 2007)
	TWA	10 ppm	Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended) (07 2007)
Naphthalene	TWA	10 ppm	Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents) (11 2010)
	STEL	15 ppm	Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents) (11 2010)
Naphthalene	TWA	10 ppm 52 mg/m3	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment) (09 2017)
	STEL	15 ppm 79 mg/m3	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment) (09 2017)



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Benzo(a)pyrene	TWA	0.005 mg/m3	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment) (09 2017)
Crystalline Silica (Quartz)/ Silica Sand - Respirable fraction.	TWA	0.025 mg/m3	Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended) (07 2007)
Crystalline Silica (Quartz)/ Silica Sand - Respirable fraction.	TWA	0.10 mg/m3	Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents) (06 2015)
Crystalline Silica (Quartz)/ Silica Sand - Respirable dust.	TWA	0.1 mg/m3	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment) (09 2017)

Biological Limit Values

Chemical Identity	Exposure Limit Values	Source
Benzo(a)anthracene (1-Hydroxypyrene, with hydrolysis (1-HP): Sampling time: End of shift at end of work week.)	2.5 µg/l (Urine)	ACGIH BEI (03 2017)
Chrysene (1-Hydroxypyrene, with hydrolysis (1-HP): Sampling time: End of shift at end of work week.)	2.5 µg/l (Urine)	ACGIH BEI (03 2017)
Benzo(a)pyrene (1-Hydroxypyrene, with hydrolysis (1-HP): Sampling time: End of shift at end of work week.)	2.5 µg/l (Urine)	ACGIH BEI (03 2017)
Benzo(b)fluoranthene/benzo[e]acefenantriene (1-Hydroxypyrene, with hydrolysis (1-HP): Sampling time: End of shift at end of work week.)	2.5 µg/l (Urine)	ACGIH BEI (03 2017)

Appropriate Engineering Controls

Observe good industrial hygiene practices. Observe occupational exposure limits and minimize the risk of inhalation of vapors and mist. Mechanical ventilation or local exhaust ventilation may be required.

Individual protection measures, such as personal protective equipment

General information:

Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. Supplementary local exhaust ventilation, closed systems, or respiratory and eye protection may be needed in special circumstances, such as poorly ventilated spaces, heating, evaporation of liquids from large surfaces, spraying of mists, mechanical generation of dusts, drying of solids, etc.

Eye/face protection:

Wear safety glasses with side shields (or goggles).

Skin Protection

Hand Protection:

Use suitable protective gloves if risk of skin contact.

Other:

Wear suitable protective clothing. Wear chemical-resistant gloves, footwear, and protective clothing appropriate for the risk of exposure. Contact health and safety professional or manufacturer for specific information.



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Respiratory Protection:	In case of inadequate ventilation use suitable respirator. Seek advice from local supervisor.
Hygiene measures:	Observe good industrial hygiene practices. Wash hands before breaks and immediately after handling the product. Do not handle until all safety precautions have been read and understood. Obtain special instructions before use. Contaminated work clothing should not be allowed out of the workplace. Avoid contact with skin.

9. Physical and chemical properties

Appearance

Physical state:	liquid
Form:	liquid
Color:	Black
Odor:	Aromatic
Odor threshold:	No data available.
pH:	No data available.
Melting point/freezing point:	No data available.
Initial boiling point and boiling range:	150 °C 302 °F
Flash Point:	> 93 °C > 199 °F
Evaporation rate:	Slower than Ether
Flammability (solid, gas):	No
Upper/lower limit on flammability or explosive limits	
Flammability limit - upper (%):	No data available.
Flammability limit - lower (%):	No data available.
Explosive limit - upper (%):	No data available.
Explosive limit - lower (%):	No data available.
Vapor pressure:	No data available.
Vapor density:	Vapors are heavier than air and may travel along the floor and in the bottom of containers.
Relative density:	1.26
Solubility(ies)	
Solubility in water:	Practically Insoluble
Solubility (other):	No data available.
Partition coefficient (n-octanol/water):	No data available.
Auto-ignition temperature:	No data available.
Decomposition temperature:	No data available.
Viscosity:	No data available.

10. Stability and reactivity

Reactivity:	No data available.
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Chemical Stability:	Material is stable under normal conditions.
Possibility of hazardous reactions:	No data available.
Conditions to avoid:	Avoid heat or contamination.
Incompatible Materials:	Avoid contact with oxidizing agents (e.g. nitric acid, peroxides and chromates).
Hazardous Decomposition Products:	Thermal decomposition or combustion may liberate carbon oxides and other toxic gases or vapors.

11. Toxicological information

Information on likely routes of exposure

Inhalation:	In high concentrations, vapors, fumes or mists may irritate nose, throat and mucus membranes.
Skin Contact:	May be harmful in contact with skin. May cause an allergic skin reaction.
Eye contact:	Eye contact is possible and should be avoided.
Ingestion:	May be ingested by accident. Ingestion may cause irritation and malaise.

Symptoms related to the physical, chemical and toxicological characteristics

Inhalation:	No data available.
Skin Contact:	No data available.
Eye contact:	No data available.
Ingestion:	No data available.

Information on toxicological effects

Acute toxicity (list all possible routes of exposure)

Oral Product:	725.00 mg/kg ATEmix : 16,695.42 mg/kg
Dermal Product:	ATEmix: 2,186.07 mg/kg
Inhalation Product:	
Specified substance(s): Cellulose	LC 50 (Rabbit): 20.1 mg/l

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Repeated dose toxicity

Product: No data available.

Skin Corrosion/Irritation

Product: No data available.

Specified substance(s):

Coal tar pitch in vivo (Rabbit): Not irritant Experimental result, Key study

Naphthalene in vivo (Rabbit): Not irritant Experimental result, Key study

Anthracene in vivo (Rabbit): Not irritant Experimental result, Key study

Serious Eye Damage/Eye Irritation

Product: No data available.

Specified substance(s):

Coal tar pitch Rabbit, 1 hrs: Not irritating

Anthracene Rabbit, 24 hrs: Not irritating

Respiratory or Skin Sensitization

Product: No data available.

Carcinogenicity

Product: No data available.



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IARC Monographs on the Evaluation of Carcinogenic Risks to Humans:

Coal tar pitch	Overall evaluation: Carcinogenic to humans.
Creosote	Overall evaluation: Probably carcinogenic to humans.
Naphthalene	Overall evaluation: Possibly carcinogenic to humans.
Indeno[1,2,3-cd]pyrene	Overall evaluation: Possibly carcinogenic to humans.
Benzo(a)anthracene	Overall evaluation: Possibly carcinogenic to humans.
Chrysene	Overall evaluation: Possibly carcinogenic to humans.
Benzo(a)pyrene	Overall evaluation: Carcinogenic to humans.
Benzo(b)fluoranthene/benzo[e]acefenanthrene	Overall evaluation: Possibly carcinogenic to humans.
Crystalline Silica (Quartz)/ Silica Sand	Overall evaluation: Carcinogenic to humans.

US. National Toxicology Program (NTP) Report on Carcinogens:

Coal tar pitch	Known To Be Human Carcinogen.
Naphthalene	Reasonably Anticipated to be a Human Carcinogen.
Indeno[1,2,3-cd]pyrene	Reasonably Anticipated to be a Human Carcinogen.
Benzo(a)anthracene	Reasonably Anticipated to be a Human Carcinogen.
Benzo(a)pyrene	Reasonably Anticipated to be a Human Carcinogen.
Benzo(b)fluoranthene/benzo[e]acefenanthrene	Reasonably Anticipated to be a Human Carcinogen.
Crystalline Silica (Quartz)/ Silica Sand	Known To Be Human Carcinogen.

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050):

Crystalline Silica (Quartz)/ Silica Sand	Cancer
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Germ Cell Mutagenicity

In vitro
Product: No data available.

In vivo
Product: No data available.

Reproductive toxicity

Product: May damage fertility or the unborn child.

Specific Target Organ Toxicity - Single Exposure

Product: No data available.

Specific Target Organ Toxicity - Repeated Exposure

Product: No data available.

Aspiration Hazard

Product: No data available.

Other effects: No data available.

12. Ecological information

Ecotoxicity:

Acute hazards to the aquatic environment:

Fish

Product: No data available.

Specified substance(s):

Phenanthrene	LC 50 (Rainbow trout, donaldson trout (<i>Oncorhynchus mykiss</i>), 96 h): 3.2 mg/l Mortality
Fluorathene	LC 50 (Fathead minnow (<i>Pimephales promelas</i>), 96 h): 0.074 - 0.113 mg/l Mortality
Naphthalene	LC 50 (Fathead minnow (<i>Pimephales promelas</i>), 96 h): 4.9 mg/l Mortality
Anthracene	LC 50 (Bluegill (<i>Lepomis macrochirus</i>), 96 h): 0.00594 - 0.00781 mg/l Mortality
Acenaphthene	LC 50 (Fathead minnow (<i>Pimephales promelas</i>), 96 h): 0.52 - 0.71 mg/l Mortality

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Dibenzofuran
LC 50 (Sheepshead minnow (Cyprinodon variegatus), 48 h): > 3.2 mg/l Mortality
LC 50 (Sheepshead minnow (Cyprinodon variegatus), 72 h): 2.6 - 4.2 mg/l Mortality
LC 50 (Fathead minnow (Pimephales promelas), 96 h): 0.84 - 1.31 mg/l Mortality
LC 50 (Fathead minnow (Pimephales promelas), 96 h): 1.04 - 1.25 mg/l Mortality
LC 50 (Fathead minnow (Pimephales promelas), 96 h): 1.62 - 1.95 mg/l Mortality

Aquatic Invertebrates

Product: No data available.

Specified substance(s):

Phenanthrene
LC 50 (Water flea (Daphnia magna), 48 h): 0.59 - 0.84 mg/l Mortality

Fluorathene
LC 50 (Water flea (Daphnia magna), 24 h): 1,000 - 1,600 mg/l Mortality
EC 50 (Water flea (Daphnia magna), 7 d): > 0.01 - 0.012 mg/l Intoxication
LC 50 (Purple-spined sea urchin (Arbacia punctulata), 48 h): > 0.127 mg/l Mortality
EC 50 (Water flea (Daphnia magna), 7 d): > 0.01 - 0.015 mg/l Intoxication
LC 50 (Purple-spined sea urchin (Arbacia punctulata), 96 h): > 0.033 mg/l Mortality

Naphthalene
LC 50 (Water flea (Daphnia magna), 48 h): 3.4 mg/l Mortality

Anthracene
EC 50 (Water flea (Daphnia magna), 24 h): 0.189 - 0.236 mg/l Intoxication
LC 50 (Pacific oyster (Crassostrea gigas), 48 h): > 5 mg/l Mortality
LC 50 (Clam (Mulinia lateralis), 96 h): > 13.3 mg/l Mortality

Benzo(a)anthracene
LC 50 (Water flea (Daphnia pulex), 96 h): 0.01 mg/l Mortality

Chrysene
LC 50 (Polychaete worm (Nereis arenaceodentata), 96 h): < 1 mg/l Mortality

Benzo(a)pyrene
EC 50 (Water flea (Daphnia magna), 24 h): 0.032 - 0.049 mg/l Intoxication
LC 50 (Scud (Gammarus duebeni), 48 h): < 150 mg/l Mortality
LC 50 (Polychaete worm (Nereis arenaceodentata), 96 h): < 1 mg/l Mortality

Acenaphthene
LC 50 (Water flea (Daphnia magna), 24 h): > 280 mg/l Mortality
LC 50 (Snail (Aplexa hypnorum), 96 h): > 2.04 mg/l Mortality

Dibenzofuran
LC 50 (Water flea (Daphnia magna), 24 h): 4.4 - 13 mg/l Mortality

Benzo(b)fluoranthene/benzo[e]acefenantrileno
EC 50 (Water flea (Daphnia magna), 24 h): > 1.024 mg/l Intoxication

Chronic hazards to the aquatic environment:

Fish

Product: No data available.

Specified substance(s):

Coal tar pitch
LC 50 (Danio rerio, 42 d): > 4 µg/l Read-across from supporting substance (structural analogue or surrogate), Key study
NOAEL (Danio rerio, 42 d): 4 µg/l Read-across from supporting substance

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(structural analogue or surrogate), Key study

Aquatic Invertebrates

Product: No data available.

Toxicity to Aquatic Plants

Product: No data available.

Persistence and Degradability

Biodegradation

Product: No data available.

BOD/COD Ratio

Product: No data available.

Bioaccumulative potential

Bioconcentration Factor (BCF)

Product: No data available.

Specified substance(s):

Phenanthrene	Water flea (Daphnia pulex), Bioconcentration Factor (BCF): 325 (Static)
Fluorathene	Water flea (Daphnia magna), Bioconcentration Factor (BCF): 1,741.8 (Static)
Naphthalene	Rainbow trout,donaldson trout (Oncorhynchus mykiss), Bioconcentration Factor (BCF): 13,000 (Flow through)
Anthracene	Green algae (Chlorella fusca vacuolata), Bioconcentration Factor (BCF): 7,800 (Static)
Benzo(a)anthracene	Water flea (Daphnia pulex), Bioconcentration Factor (BCF): 10,109 (Static)
Chrysene	Water flea (Daphnia magna), Bioconcentration Factor (BCF): 6,088.4 (Static)
Benzo(a)pyrene	Water flea (Daphnia pulex), Bioconcentration Factor (BCF): 2,720 (Static)
Acenaphthene	Bluegill (Lepomis macrochirus), Bioconcentration Factor (BCF): 387 (Flow through)
Benzo(b)fluoranthene/be nzo[e]acefenantrileno	Mussel (Mytilus edulis planulatus), Bioconcentration Factor (BCF): 5,200,000 (Lentic - static water system without measurable flow rate (e.g. lake)) Bioconcentration factor calculated using dry weight tissue conc

Partition Coefficient n-octanol / water (log Kow)

Product: No data available.

Specified substance(s):

Creosote	Log Kow: 1.0
Phenanthrene	Log Kow: 4.57

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Fluorathene	Log Kow: 5.16
Naphthalene	Log Kow: 3.30
Anthracene	Log Kow: 4.45
Benzo(a)anthracene	Log Kow: 5.79
Chrysene	Log Kow: 5.73
Benzo(a)pyrene	Log Kow: 5.97
Acenaphthene	Log Kow: 3.92
Dibenzofuran	Log Kow: 4.12
Benzo(b)fluoranthene/be nzo[e]acefenantrileno	Log Kow: 6.60

Mobility in soil: No data available.
Other adverse effects: Very toxic to aquatic organisms.

13. Disposal considerations

Disposal instructions: Dispose of waste at an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal.
Contaminated Packaging: No data available.

14. Transport information

TDG:

Not Regulated

CFR / DOT:

Not Regulated

IMDG:

UN3082, ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (Coal Tar), 9, PG III, MARINE POLLUTANT

Further Information:

The above shipping description may not be accurate for all container sizes and all modes of transportation. Please refer to Bill of Lading.

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15. Regulatory information

US Federal Regulations

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

None present or none present in regulated quantities.

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

<u>Chemical Identity</u>	<u>OSHA hazard(s)</u>
Crystalline Silica (Quartz)/ Silica Sand	kidney effects lung effects immune system effects Cancer

CERCLA Hazardous Substance List (40 CFR 302.4):

<u>Chemical Identity</u>	<u>Reportable quantity</u>
Creosote	1 lbs.
Fluorathene	100 lbs.
Phenanthrene	5000 lbs.
Naphthalene	100 lbs.
Anthracene	5000 lbs.
Indeno[1,2,3-cd]pyrene	100 lbs.
Benzo(a)anthracene	10 lbs.
Chrysene	100 lbs.
Benzo(a)pyrene	1 lbs.
Acenaphthene	100 lbs.
Dibenzofuran	100 lbs.
Benzo(b)fluoranthene/benzo[e]acefenantrileno	1 lbs.
Biphenyl	100 lbs.
Dibenz(a,h)anthracene	1 lbs.
Pyrene	5000 lbs.
Acenaphthylene	5000 lbs.
Fluorene	5000 lbs.
Quinoline	5000 lbs.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories

- Immediate (Acute) Health Hazards
- Delayed (Chronic) Health Hazard
- Skin sensitizer
- Germ Cell Mutagenicity
- Carcinogenicity
- Toxic to reproduction

SARA 302 Extremely Hazardous Substance

<u>Chemical Identity</u>	<u>Reportable quantity</u>	<u>Threshold Planning Quantity</u>
Pyrene	5000 lbs.	---

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SARA 304 Emergency Release Notification

<u>Chemical Identity</u>	<u>Reportable quantity</u>
Creosote	1 lbs.
Fluorathene	100 lbs.
Phenanthrene	5000 lbs.
Naphthalene	100 lbs.
Anthracene	5000 lbs.
Indeno[1,2,3-cd]pyrene	100 lbs.
Benzo(a)anthracene	10 lbs.
Chrysene	100 lbs.
Benzo(a)pyrene	1 lbs.
Acenaphthene	100 lbs.
Dibenzofuran	100 lbs.
Benzo(b)fluoranthene/benzo[e]acefenantrileno	1 lbs.
Biphenyl	100 lbs.
Dibenz(a,h)anthracene	1 lbs.
Pyrene	5000 lbs.
Acenaphthylene	5000 lbs.
Fluorene	5000 lbs.
Quinoline	5000 lbs.

SARA 311/312 Hazardous Chemical

<u>Chemical Identity</u>	<u>Threshold Planning Quantity</u>
Pyrene	500lbs
Coal tar pitch	10000 lbs
Calcium Carbonate (Limestone)	10000 lbs
Cellulose	10000 lbs
Creosote	10000 lbs
Phenanthrene	10000 lbs
Fluorathene	10000 lbs
Clay	10000 lbs
Naphthalene	10000 lbs
Anthracene	10000 lbs
Indeno[1,2,3-cd]pyrene	10000 lbs
Benzo(a)anthracene	10000 lbs
Chrysene	10000 lbs
Benzo(a)pyrene	10000 lbs
Acenaphthene	10000 lbs
Dibenzofuran	10000 lbs
Benzo(b)fluoranthene/benzo[e]acefenantrileno	10000 lbs
Crystalline Silica (Quartz)/ Silica Sand	10000 lbs

SARA 313 (TRI Reporting)

<u>Chemical Identity</u>
Creosote
Fluorathene
Phenanthrene
Naphthalene
Indeno[1,2,3-cd]pyrene
Benzo(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoranthene/benzo[e]acefenantrileno

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

None present or none present in regulated quantities.



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Clean Water Act Section 311 Hazardous Substances (40 CFR 117.3)
None present or none present in regulated quantities.

US State Regulations

US. California Proposition 65



WARNING
Cancer - www.P65Warnings.ca.gov

US. New Jersey Worker and Community Right-to-Know Act

Chemical Identity

Coal tar pitch
Calcium Carbonate (Limestone)
Cellulose
Creosote
Fluorathene
Phenanthrene
Naphthalene
Indeno[1,2,3-cd]pyrene
Benzo(a)anthracene
Chrysene
Benzo(a)pyrene
Benzo(b)fluoranthene/benzo[e]acefenantrileno
Crystalline Silica (Quartz)/ Silica Sand

US. Massachusetts RTK - Substance List

Chemical Identity

Coal tar pitch
Calcium Carbonate (Limestone)
Cellulose
Creosote
Fluorathene
Phenanthrene
Indeno[1,2,3-cd]pyrene
Benzo(a)anthracene
Chrysene
Benzo(a)pyrene
Benzo(b)fluoranthene/benzo[e]acefenantrileno
Crystalline Silica (Quartz)/ Silica Sand
Dibenz(a,h)anthracene
Pyrene



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US. Pennsylvania RTK - Hazardous Substances

Chemical Identity

Coal tar pitch
Calcium Carbonate (Limestone)
Cellulose
Creosote
Fluorathene
Phenanthrene
Indeno[1,2,3-cd]pyrene
Benzo(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoranthene/benzo[e]acefenantrileno

US. Rhode Island RTK

Chemical Identity

Calcium Carbonate (Limestone)
Cellulose

International regulations

Montreal protocol

Not applicable

Stockholm convention

Not applicable

Rotterdam convention

Not applicable

Kyoto protocol

Not applicable

VOC:

Regulatory VOC (less water and exempt solvent) : 299 g/l
VOC Method 310 : 24.00 % 0.01 %



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Inventory Status:

Australia AICS:	One or more components in this product are not listed on or exempt from the Inventory.
Canada DSL Inventory List:	One or more components in this product are not listed on or exempt from the Inventory.
EINECS, ELINCS or NLP:	One or more components in this product are not listed on or exempt from the Inventory.
Japan (ENCS) List:	One or more components in this product are not listed on or exempt from the Inventory.
China Inv. Existing Chemical Substances:	One or more components in this product are not listed on or exempt from the Inventory.
Korea Existing Chemicals Inv. (KECI):	One or more components in this product are not listed on or exempt from the Inventory.
Canada NDSL Inventory:	One or more components in this product are not listed on or exempt from the Inventory.
Philippines PICCS:	One or more components in this product are not listed on or exempt from the Inventory.
US TSCA Inventory:	One or more components in this product are not listed on or exempt from the Inventory.
New Zealand Inventory of Chemicals:	One or more components in this product are not listed on or exempt from the Inventory.
Japan ISHL Listing:	One or more components in this product are not listed on or exempt from the Inventory.
Japan Pharmacopoeia Listing:	One or more components in this product are not listed on or exempt from the Inventory.
Mexico INSQ:	One or more components in this product are not listed on or exempt from the Inventory.
Ontario Inventory:	One or more components in this product are not listed on or exempt from the Inventory.
Taiwan Chemical Substance Inventory:	One or more components in this product are not listed on or exempt from the Inventory.

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Revision Date: 07/21/2018**16. Other information, including date of preparation or last revision**

Revision Date:	07/21/2018
Version #:	1.1
Further Information:	No data available.
Disclaimer:	For Industrial Use Only. Keep out of Reach of Children. The hazard information herein is offered solely for the consideration of the user, subject to their own investigation of compliance with applicable regulations, including the safe use of the product under every foreseeable condition.

Answers from page 18-19 “Activity: Reviewing an SDS”

1. What health effects may be experienced when using this product?

MinWax polyurethane: Causes serious eye irritation. Can cause central nervous system (CNS) depression. May cause drowsiness or dizziness. May cause respiratory irritation. May cause an allergic skin reaction. Can cause central nervous system (CNS) depression. May be fatal if swallowed and enters airways.

Loctite adhesive: Serious irritation to eyes. Abrasion could release respirable particles of silica quartz, a cancer hazard by inhalation. May cause slight irritation to skin. Not expected to be harmful by ingestion. Ingestion of large amounts may produce gastrointestinal disturbances including irritation, nausea, and diarrhea.

Sherwin Williams paint: No known significant effects or critical hazards. Suspected of causing cancer. May cause damage to organs through prolonged or repeated exposure.

3M Fastbond sealer: Respiratory Tract Irritation; Mild Skin Irritation; Gastrointestinal Irritation.

Sikaflex sealant: May cause an allergic skin reaction. May cause allergy or asthma symptoms or breathing difficulties if inhaled. May cause cancer by inhalation. May cause damage to organs through prolonged or repeated exposure if inhaled.

Tremfix roofing pitch: May cause skin and eye irritation. May cause genetic defects. May cause cancer. May damage fertility or the unborn child.

2. Are exposures likely to be over the OELs? The PELs?

MinWax polyurethane: The ACGIH Threshold Limit Value is 100 ppm. The available data is 61 ppm, less than 1/3 rd of TLV, but it was a 15 minute sample. Samples should be taken to cover an 8 hour work-day so more should be taken.

Loctite adhesive: ACGIH TLV is 10 mg/m³ and OSHA PEL is 15 mg/m³; the exposure results were below the lowest benchmark, the TLV. The “less than” indicates that the result is below what the lab can reliably measure so these exposures are quite low for gluing. How about sanding dry glue?

Sherwin Williams paint: The TLV for 2-butoxyethanol is 20 ppm and the PEL is 50 ppm. The sampling results range from 0.04 to 367 ppm so it is clear that

different ways of applying this paint result in very different exposures and they can exceed the TLV and PEL. How can the results could be so wide?

3M Fastbond sealer: The TLV for ethylbenzene is 20 ppm and the OSHA PEL is 100 ppm. The one sampling result for ethylbenzene is 5 parts per million, which is well below the PEL and TLV. Point out that there is a formula to convert ppm to mg/m³ and vice versa.

Sikaflex sealant: Isocyanates are really powerful sensitizers; OSHA's PEL and the ACGIH TLV is 0.005 ppm as an 8-hour TWA. The measured amounts during application of a similar isocyanate were all below the limit of detection <0.001 to <0.002 ppm.

Tremfix roofing pitch: The OSHA PEL and ACGIH TLV are both 0.2 mg/m³; the measured concentrations ranged from 0.14 to 1.93 mg/m³. The lower end of this range is under the standard, but the upper end is almost twice the standard. How could we keep the concentration down?

3. Is your product flammable? If so, what flammable category?

MinWax polyurethane: Flammable Liquid (Category 3)

Loctite adhesive: Not applicable

Sherwin Williams paint: Not applicable Flash point >93.3°C (>199.9°F)

3M Fastbond sealer: Not applicable, no flash point.

Sikaflex sealant: Flammable liquid (Category 4)

Tremfix roofing pitch: Not applicable Flash point >93.3°C (>199.9°F)

4. Are there additional chemicals that you are concerned about?

MinWax polyurethane: No, just the light aliphatic hydrocarbon

Loctite adhesive: Yes, quartz which is a form of silica.

Sherwin Williams paint: Yes, titanium dioxide because it is 22% by weight and could be sprayed.

3M Fastbond sealer: Yes, there are over 10 more chemical ingredients in the product..

Sikaflex sealant: Yes, xylene has a PEL of 100 and is 1-5% of the sealant. Ethylbenzene is <1% of product.

Tremfix roofing pitch: No. Even though it is a mix of an estimated 4,500 chemicals, OSHA has a PEL for Coal Tar Pitch Volatiles.

Appendix C: OSHA Standard 1910.1200

Part Number:	1910
• Part Title:	Occupational Safety and Health Standards
• Subpart:	Z
• Subpart Title:	<u>Toxic and Hazardous Substances</u>
• Standard Number:	<u>1910.1200</u>
• Title:	Hazard Communication.
• Appendix:	<u>A, B, C, D, E</u>

1910.1200(a)

Purpose.

1910.1200(a)(1)

The purpose of this section is to ensure that the hazards of all chemicals produced or imported are classified, and that information concerning the classified hazards is transmitted to employers and employees. The requirements of this section are intended to be consistent with the provisions of the United Nations Globally Harmonized System of Classification and Labelling of Chemicals (GHS), Revision 3. The 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, safety data sheets and employee training.

1910.1200(a)(2)

This occupational safety and health standard is intended to address comprehensively the issue of classifying the potential hazards of chemicals, and communicating information concerning hazards and appropriate protective measures to employees, and to preempt any legislative or regulatory enactments of a state, or political subdivision of a state, pertaining to this subject. Classifying 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 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 any requirement relating to the issue addressed by this Federal standard, except pursuant to a Federally-approved state plan.

1910.1200(b)

Scope and application.

1910.1200(b)(1)

This section requires chemical manufacturers or importers to classify the hazards of chemicals which they produce or import, and all employers to provide information to their employees about the hazardous chemicals to which they are exposed, by means of a hazard communication program, labels and other forms of warning, safety data sheets, and information and training. In addition, this section requires distributors to transmit the required information to employers. (Employers who do not produce or import chemicals need only focus on those parts of this rule that deal with establishing a workplace program and communicating information to their workers.)

1910.1200(b)(2)

This section applies to any chemical which is known to be present in the workplace in such a manner that employees may be exposed under normal conditions of use or in a foreseeable emergency.

1910.1200(b)(3)

This section applies to laboratories only as follows:

1910.1200(b)(3)(i)

Employers shall ensure that labels on incoming containers of hazardous chemicals are not removed or defaced;

1910.1200(b)(3)(ii)

Employers shall maintain any safety data sheets that are received with incoming shipments of hazardous chemicals, and ensure that they are readily accessible during each workshift to laboratory employees when they are in their work areas;

1910.1200(b)(3)(iii)

Employers shall ensure that laboratory employees are provided information and training in accordance with paragraph (h) of this section, except for the location and availability of the written hazard communication program under paragraph (h)(2)(iii) of this section; and,

1910.1200(b)(3)(iv)

Laboratory employers that ship hazardous chemicals are considered to be either a chemical manufacturer or a distributor under this rule, and thus must ensure that any containers of hazardous chemicals leaving the laboratory are labeled in accordance with paragraph (f) of this section, and that a safety data sheet is provided to distributors and other employers in accordance with paragraphs (g)(6) and (g)(7) of this section.

1910.1200(b)(4)

In work operations where employees only handle chemicals in sealed containers which are not opened under normal conditions of use (such as are found in marine cargo handling, warehousing, or retail sales), this section applies to these operations only as follows:

1910.1200(b)(4)(i)

Employers shall ensure that labels on incoming containers of hazardous chemicals are not removed or defaced;

1910.1200(b)(4)(ii)

Employers shall maintain copies of any safety data sheets that are received with incoming shipments of the sealed containers of hazardous chemicals, shall obtain a safety data sheet as soon as possible for sealed containers of hazardous chemicals received without a safety data sheet if an employee requests the safety data sheet, and shall ensure that the safety data sheets are readily accessible during each work shift to employees when they are in their work area(s); and,

1910.1200(b)(4)(iii)

Employers shall ensure that employees are provided with information and training in accordance with paragraph (h) of this section (except for the location and availability of the written hazard communication program under paragraph (h)(2)(iii) of this section), to the extent necessary to protect them in the event of a spill or leak of a hazardous chemical from a sealed container.

1910.1200(b)(5)

This section does not require labeling of the following chemicals:

1910.1200(b)(5)(i)

Any pesticide as such term is defined in the Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. 136 et seq.), when subject to the labeling requirements of that Act and labeling regulations issued under that Act by the Environmental Protection Agency;

1910.1200(b)(5)(ii)

Any chemical substance or mixture as such terms are defined in the Toxic Substances Control Act (15 U.S.C. 2601 et seq.), when subject to the labeling requirements of that Act and labeling

regulations issued under that Act by the Environmental Protection Agency;

1910.1200(b)(5)(iii)

Any food, food additive, color additive, drug, cosmetic, or medical or veterinary device or product, including materials intended for use as ingredients in such products (e.g. flavors and fragrances), as such terms are defined in the Federal Food, Drug, and Cosmetic Act (21 U.S.C. 301 et seq.) or the Virus-Serum-Toxin Act of 1913 (21 U.S.C. 151 et seq.), and regulations issued under those Acts, when they are subject to the labeling requirements under those Acts by either the Food and Drug Administration or the Department of Agriculture;

1910.1200(b)(5)(iv)

Any distilled spirits (beverage alcohols), wine, or malt beverage intended for nonindustrial use, as such terms are defined in the Federal Alcohol Administration Act (27 U.S.C. 201 et seq.) and regulations issued under that Act, when subject to the labeling requirements of that Act and labeling regulations issued under that Act by the Bureau of Alcohol, Tobacco, Firearms and Explosives;

1910.1200(b)(5)(v)

Any consumer product or hazardous substance as those terms are defined in the Consumer Product Safety Act (15 U.S.C. 2051 et seq.) and Federal Hazardous Substances Act (15 U.S.C. 1261 et seq.) respectively, when subject to a consumer product safety standard or labeling requirement of those Acts, or regulations issued under those Acts by the Consumer Product Safety Commission; and,

1910.1200(b)(5)(vi)

Agricultural or vegetable seed treated with pesticides and labeled in accordance with the Federal Seed Act (7 U.S.C. 1551 et seq.) and the labeling regulations issued under that Act by the Department of Agriculture.

1910.1200(b)(6)

This section does not apply to:

1910.1200(b)(6)(i)

Any hazardous waste as such term is defined by the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6901 et seq.), when subject to regulations issued under that Act by the Environmental Protection Agency;

1910.1200(b)(6)(ii)

Any hazardous substance as such term is defined by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) (42 U.S.C. 9601 et seq.) when the hazardous substance is the focus of remedial or removal action being conducted under CERCLA in accordance with Environmental Protection Agency regulations.

1910.1200(b)(6)(iii)

Tobacco or tobacco products;

1910.1200(b)(6)(iv)

Wood or wood products, including lumber which will not be processed, where the chemical manufacturer or importer can establish that the only hazard they pose to employees is the potential for flammability or combustibility (wood or wood products which have been treated with a hazardous chemical covered by this standard, and wood which may be subsequently sawed or cut, generating dust, are not exempted);

1910.1200(b)(6)(v)

Articles (as that term is defined in paragraph (c) of this section);

1910.1200(b)(6)(vi)

Food or alcoholic beverages which are sold, used, or prepared in a retail establishment (such as a grocery store, restaurant, or drinking place), and foods intended for personal consumption by employees while in the workplace;

1910.1200(b)(6)(vii)

Any drug, as that term is defined in the Federal Food, Drug, and Cosmetic Act (21 U.S.C. 301 et seq.), when it is in solid, final form for direct administration to the patient (e.g., tablets or pills); drugs which are packaged by the chemical manufacturer for sale to consumers in a retail establishment (e.g., over-the-counter drugs); and drugs intended for personal consumption by employees while in the workplace (e.g., first aid supplies);

1910.1200(b)(6)(viii)

Cosmetics which are packaged for sale to consumers in a retail establishment, and cosmetics intended for personal consumption by employees while in the workplace;

1910.1200(b)(6)(ix)

Any consumer product or hazardous substance, as those terms are defined in the Consumer Product Safety Act (15 U.S.C. 2051 et seq.) and Federal Hazardous Substances Act (15 U.S.C. 1261 et seq.) respectively, where the employer can show that it is used in the workplace for the purpose intended by the chemical manufacturer or importer of the product, and the use results in a duration and frequency of exposure which is not greater than the range of exposures that could reasonably be experienced by consumers when used for the purpose intended;

1910.1200(b)(6)(x)

Nuisance particulates where the chemical manufacturer or importer can establish that they do not pose any physical or health hazard covered under this section;

1910.1200(b)(6)(xi)

Ionizing and nonionizing radiation; and,

1910.1200(b)(6)(xii)

Biological hazards.

1910.1200(c)

Definitions.

Article means a manufactured item other than a fluid or particle: (i) which is formed to a specific shape or design during manufacture; (ii) which has end use function(s) dependent in whole or in part upon its shape or design during end use; and (iii) which under normal conditions of use does not release more than very small quantities, e.g., minute or trace amounts of a hazardous chemical (as determined under paragraph (d) of this section), and does not pose a physical hazard or health risk to employees.

Assistant Secretary means the Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, or designee.

Chemical means any substance, or mixture of substances.

Chemical manufacturer means an employer with a workplace where chemical(s) are produced for use or distribution.

Chemical name means the scientific designation of a chemical in accordance with the nomenclature system developed by the International Union of Pure and Applied Chemistry (IUPAC) or the Chemical Abstracts Service (CAS) rules of nomenclature, or a name that will clearly identify the chemical for the purpose of conducting a hazard classification.

Classification means to identify the relevant data regarding the hazards of a chemical; review those data to ascertain the hazards associated with the chemical; and decide whether the chemical will be classified as hazardous according to the definition of hazardous chemical in this section. In addition, classification for health and physical hazards includes the determination of the degree of hazard, where appropriate, by comparing the data with the criteria for health and physical hazards.

Commercial account means an arrangement whereby a retail distributor sells hazardous chemicals to an employer, generally in large quantities over time and/or at costs that are below the regular retail price.

Common name means any designation or identification such as code name, code number, trade name, brand name or generic name used to identify a chemical other than by its chemical name.

Container means any bag, barrel, bottle, box, can, cylinder, drum, reaction vessel, storage tank, or the like that contains a hazardous chemical. For purposes of this section, pipes or piping systems, and engines, fuel tanks, or other operating systems in a vehicle, are not considered to be containers.

Designated representative means any individual or organization to whom an employee gives written authorization to exercise such employee's rights under this section. A recognized or certified collective bargaining agent shall be treated automatically as a designated representative without regard to written employee authorization.

Director means the Director, National Institute for Occupational Safety and Health, U.S. Department of Health and Human Services, or designee.

Distributor means a business, other than a chemical manufacturer or importer, which supplies hazardous chemicals to other distributors or to employers.

Employee means a worker who may be exposed to hazardous chemicals under normal operating conditions or in foreseeable emergencies. Workers such as office workers or bank tellers who encounter hazardous chemicals only in non-routine, isolated instances are not covered.

Employer means a person engaged in a business where chemicals are either used, distributed, or are produced for use or distribution, including a contractor or subcontractor.

Exposure or exposed means that an employee is subjected in the course of employment to a chemical that is a physical or health hazard, and includes potential (e.g. accidental or possible) exposure. "Subjected" in terms of health hazards includes any route of entry (e.g. inhalation, ingestion, skin contact or absorption.)

Foreseeable emergency means any potential occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment which could result in an uncontrolled release of a hazardous chemical into the workplace.

Hazard category means the division of criteria within each hazard class, e.g., oral acute toxicity and flammable liquids include four hazard categories. These categories compare hazard severity within a hazard class and should not be taken as a comparison of hazard categories more generally.

Hazard class means the nature of the physical or health hazards, e.g., flammable solid, carcinogen, oral acute toxicity.

Hazard not otherwise classified (HNOC) means an adverse physical or health effect identified through evaluation of scientific evidence during the classification process that does not meet the specified criteria for the physical and health hazard classes addressed in this section. This does not extend coverage to adverse physical and health effects for which there is a hazard class addressed in this section, but the effect either falls below the cut-off value/concentration limit of the hazard class or is under a GHS hazard category that has not been adopted by OSHA (e.g., acute toxicity Category 5).

Hazard statement means a statement assigned to a hazard class and category that describes the nature of the hazard(s) of a chemical, including, where appropriate, the degree of hazard.

Hazardous chemical means any chemical which is classified as a physical hazard or a health hazard, a simple asphyxiant, combustible dust, pyrophoric gas, or hazard not otherwise classified.

Health hazard means a chemical which is classified as posing one of the following hazardous

effects: acute toxicity (any route of exposure); skin corrosion or irritation; serious eye damage or eye irritation; respiratory or skin sensitization; germ cell mutagenicity; carcinogenicity; reproductive toxicity; specific target organ toxicity (single or repeated exposure); or aspiration hazard. The criteria for determining whether a chemical is classified as a health hazard are detailed in Appendix A to 1910.1200 Health Hazard Criteria.

Immediate use means that the hazardous chemical will be under the control of and used only by the person who transfers it from a labeled container and only within the work shift in which it is transferred.

Importer means the first business with employees within the Customs Territory of the United States which receives hazardous chemicals produced in other countries for the purpose of supplying them to distributors or employers within the United States.

Label means an appropriate group of written, printed or graphic information elements concerning a hazardous chemical that is affixed to, printed on, or attached to the immediate container of a hazardous chemical, or to the outside packaging.

Label elements means the specified pictogram, hazard statement, signal word and precautionary statement for each hazard class and category.

Mixture means a combination or a solution composed of two or more substances in which they do not react.

Physical hazard means a chemical that is classified as posing one of the following hazardous effects: explosive; flammable (gases, aerosols, liquids, or solids); oxidizer (liquid, solid or gas); self-reactive; pyrophoric (liquid or solid); self-heating; organic peroxide; corrosive to metal; gas under pressure; or in contact with water emits flammable gas. See Appendix B to 1910.1200 Physical Hazard Criteria.

Pictogram means a composition that may include a symbol plus other graphic elements, such as a border, background pattern, or color, that is intended to convey specific information about the hazards of a chemical. Eight pictograms are designated under this standard for application to a hazard category.

Precautionary statement means a phrase that describes recommended measures that should be taken to minimize or prevent adverse effects resulting from exposure to a hazardous chemical, or improper storage or handling.

Produce means to manufacture, process, formulate, blend, extract, generate, emit, or repackage.

Product identifier means the name or number used for a hazardous chemical on a label or in the SDS. It provides a unique means by which the user can identify the chemical. The product identifier used shall permit cross-references to be made among the list of hazardous chemicals required in the written hazard communication program, the label and the SDS.

Pyrophoric gas means a chemical in a gaseous state that will ignite spontaneously in air at a temperature of 130 degrees F (54.4 degrees C) or below.

Responsible party means someone who can provide additional information on the hazardous

chemical and appropriate emergency procedures, if necessary.

Safety data sheet (SDS) means written or printed material concerning a hazardous chemical that is prepared in accordance with paragraph (g) of this section.

Signal word means a word used to indicate the relative level of severity of hazard and alert the reader to a potential hazard on the label. The signal words used in this section are “danger” and “warning.” “Danger” is used for the more severe hazards, while “warning” is used for the less severe.

Simple asphyxiant means a substance or mixture that displaces oxygen in the ambient atmosphere, and can thus cause oxygen deprivation in those who are exposed, leading to unconsciousness and death.

Specific chemical identity means the chemical name, Chemical Abstracts Service (CAS) Registry Number, or any other information that reveals the precise chemical designation of the substance.

Substance means chemical elements and their compounds in the natural state or obtained by any production process, including any additive necessary to preserve the stability of the product and any impurities deriving from the process used, but excluding any solvent which may be separated without affecting the stability of the substance or changing its composition.

Trade secret means any confidential formula, pattern, process, device, information or compilation of information that is used in an employer’s business, and that gives the employer an opportunity to obtain an advantage over competitors who do not know or use it. Appendix E to 1910.1200 Definition of Trade Secret, sets out the criteria to be used in evaluating trade secrets.

Use means to package, handle, react, emit, extract, generate as a byproduct, or transfer.

Work area means a room or defined space in a workplace where hazardous chemicals are produced or used, and where employees are present.

Workplace means an establishment, job site, or project, at one geographical location containing one or more work areas.

1910.1200(d)

Hazard classification.

1910.1200(d)(1)

Chemical manufacturers and importers shall evaluate chemicals produced in their workplaces or imported by them to classify the chemicals in accordance with this section. For each chemical, the chemical manufacturer or importer shall determine the hazard classes, and, where appropriate, the category of each class that apply to the chemical being classified. Employers are not required to classify chemicals unless they choose not to rely on the classification performed by the chemical manufacturer or importer for the chemical to satisfy this requirement.

1910.1200(d)(2)

Chemical manufacturers, importers or employers classifying chemicals shall identify and consider the full range of available scientific literature and other evidence concerning the potential hazards. There is no requirement to test the chemical to determine how to classify its hazards. Appendix A to § 1910.1200 shall be consulted for classification of health hazards, and Appendix B to § 1910.1200 shall be consulted for the classification of physical hazards.

1910.1200(d)(3)

Mixtures.

1910.1200(d)(3)(i)

Chemical manufacturers, importers, or employers evaluating chemicals shall follow the procedures described in Appendices A and B to Sec. 1910.1200 to classify the hazards of the chemicals, including determinations regarding when mixtures of the classified chemicals are covered by this section.

1910.1200(d)(3)(ii)

When classifying mixtures they produce or import, chemical manufacturers and importers of mixtures may rely on the information provided on the current safety data sheets of the individual ingredients, except where the chemical manufacturer or importer knows, or in the exercise of reasonable diligence should know, that the safety data sheet misstates or omits information required by this section.

1910.1200(e)

Written hazard communication program.

1910.1200(e)(1)

Employers shall develop, implement, and maintain at each workplace, a written hazard communication program which at least describes how the criteria specified in paragraphs (f), (g), and (h) of this section for labels and other forms of warning, safety data sheets, and employee information and training will be met, and which also includes the following:

1910.1200(e)(1)(i)

A list of the hazardous chemicals known to be present using a product identifier that is referenced on the appropriate safety data sheet (the list may be compiled for the workplace as a whole or for individual work areas); and,

1910.1200(e)(1)(ii)

The methods the employer will use to inform employees of the hazards of non-routine tasks (for example, the cleaning of reactor vessels), and the hazards associated with chemicals contained in

unlabeled pipes in their work areas.

1910.1200(e)(2)

Multi-employer workplaces. Employers who produce, use, or store hazardous chemicals at a workplace in such a way that the employees of other employer(s) may be exposed (for example, employees of a construction contractor working on-site) shall additionally ensure that the hazard communication programs developed and implemented under this paragraph (e) include the following:

1910.1200(e)(2)(i)

The methods the employer will use to provide the other employer(s) on-site access to safety data sheets for each hazardous chemical the other employer(s)' employees may be exposed to while working;

1910.1200(e)(2)(ii)

The methods the employer will use to inform the other employer(s) of any precautionary measures that need to be taken to protect employees during the workplace's normal operating conditions and in foreseeable emergencies; and,

1910.1200(e)(2)(iii)

The methods the employer will use to inform the other employer(s) of the labeling system used in the workplace.

1910.1200(e)(3)

The employer may rely on an existing hazard communication program to comply with these requirements, provided that it meets the criteria established in this paragraph (e).

1910.1200(e)(4)

The employer shall make the written hazard communication program available, upon request, to employees, their designated representatives, the Assistant Secretary and the Director, in accordance with the requirements of 29 CFR 1910.1020 (e).

1910.1200(e)(5)

Where employees must travel between workplaces during a workshift, i.e., their work is carried out at more than one geographical location, the written hazard communication program may be kept at the primary workplace facility.

1910.1200(f)

Labels and other forms of warning—

1910.1200(f)(1)

Labels on shipped containers. The chemical manufacturer, importer, or distributor shall ensure that each container of hazardous chemicals leaving the workplace is labeled, tagged, or marked. Hazards not otherwise classified do not have to be addressed on the container. Where the chemical manufacturer or importer is required to label, tag or mark the following information shall be provided:

1910.1200(f)(1)(i)

Product identifier;

1910.1200(f)(1)(ii)

Signal word;

1910.1200(f)(1)(iii)

Hazard statement(s);

1910.1200(f)(1)(iv)

Pictogram(s);

1910.1200(f)(1)(v)

Precautionary statement(s); and,

1910.1200(f)(1)(vi)

Name, address, and telephone number of the chemical manufacturer, importer, or other responsible party.

1910.1200(f)(2)

The chemical manufacturer, importer, or distributor shall ensure that the information provided under paragraphs (f)(1)(i) through (v) of this section is in accordance with Appendix C to § 1910.1200, for each hazard class and associated hazard category for the hazardous chemical, prominently displayed, and in English (other languages may also be included if appropriate).

1910.1200(f)(3)

The chemical manufacturer, importer, or distributor shall ensure that the information provided under paragraphs (f)(1)(ii) through (iv) of this section is located together on the label, tag, or mark.

1910.1200(f)(4)

Solid materials.

1910.1200(f)(4)(i)

For solid metal (such as a steel beam or a metal casting), solid wood, or plastic items that are not exempted as articles due to their downstream use, or shipments of whole grain, the required label may be transmitted to the customer at the time of the initial shipment, and need not be included with subsequent shipments to the same employer unless the information on the label changes;

1910.1200(f)(4)(ii)

The label may be transmitted with the initial shipment itself, or with the safety data sheet that is to be provided prior to or at the time of the first shipment; and,

1910.1200(f)(4)(iii)

This exception to requiring labels on every container of hazardous chemicals is only for the solid material itself, and does not apply to hazardous chemicals used in conjunction with, or known to be present with, the material and to which employees handling the items in transit may be exposed (for example, cutting fluids or pesticides in grains).

1910.1200(f)(5)

Chemical manufacturers, importers, or distributors shall ensure that each container of hazardous chemicals leaving the workplace is labeled, tagged, or marked in accordance with this section in a manner which does not conflict with the requirements of the Hazardous Materials Transportation Act (49 U.S.C. 1801 et seq.) and regulations issued under that Act by the Department of Transportation.

1910.1200(f)(6)

Workplace labeling. Except as provided in paragraphs (f)(7) and (f)(8) of this section, the employer shall ensure that each container of hazardous chemicals in the workplace is labeled, tagged or marked with either:

1910.1200(f)(6)(i)

The information specified under paragraphs (f)(1)(i) through (v) of this section for labels on shipped containers; or,

1910.1200(f)(6)(ii)

Product identifier and words, pictures, symbols, or combination thereof, which provide at least general information regarding the hazards of the chemicals, and which, in conjunction with the other information immediately available to employees under the hazard communication program, will provide employees with the specific information regarding the physical and health hazards of the hazardous chemical.

1910.1200(f)(7)

The employer may use signs, placards, process sheets, batch tickets, operating procedures, or other such written materials in lieu of affixing labels to individual stationary process containers, as long as the alternative method identifies the containers to which it is applicable and conveys the information required by paragraph (f)(6) of this section to be on a label. The employer shall ensure the written materials are readily accessible to the employees in their work area throughout each work shift.

1910.1200(f)(8)

The employer is not required to label portable containers into which hazardous chemicals are transferred from labeled containers, and which are intended only for the immediate use of the employee who performs the transfer. For purposes of this section, drugs which are dispensed by a pharmacy to a health care provider for direct administration to a patient are exempted from labeling.

1910.1200(f)(9)

The employer shall not remove or deface existing labels on incoming containers of hazardous chemicals, unless the container is immediately marked with the required information.

1910.1200(f)(10)

The employer shall ensure that workplace labels or other forms of warning are legible, in English, and prominently displayed on the container, or readily available in the work area throughout each work shift. Employers having employees who speak other languages may add the information in their language to the material presented, as long as the information is presented in English as well.

1910.1200(f)(11)

Chemical manufacturers, importers, distributors, or employers who become newly aware of any significant information regarding the hazards of a chemical shall revise the labels for the chemical within six months of becoming aware of the new information, and shall ensure that labels on containers of hazardous chemicals shipped after that time contain the new information. If the chemical is not currently produced or imported, the chemical manufacturer, importer, distributor, or employer shall add the information to the label before the chemical is shipped or introduced into the workplace again.

1910.1200(g)

Safety data sheets.

1910.1200(g)(1)

Chemical manufacturers and importers shall obtain or develop a safety data sheet for each hazardous chemical they produce or import. Employers shall have a safety data sheet in the workplace for each hazardous chemical which they use.

1910.1200(g)(2)

The chemical manufacturer or importer preparing the safety data sheet shall ensure that it is in English (although the employer may maintain copies in other languages as well), and includes at least the following section numbers and headings, and associated information under each heading, in the order listed (See Appendix D to § 1910.1200—Safety Data Sheets, for the specific content of each section of the safety data sheet):

1910.1200(g)(2)(i)

Section 1, Identification;

1910.1200(g)(2)(ii)

Section 2, Hazard(s) identification;

1910.1200(g)(2)(iii)

Section 3, Composition/information on ingredients;

1910.1200(g)(2)(iv)

Section 4, First-aid measures;

1910.1200(g)(2)(v)

Section 5, Fire-fighting measures;

1910.1200(g)(2)(vi)

Section 6, Accidental release measures;

1910.1200(g)(2)(vii)

Section 7, Handling and storage;

1910.1200(g)(2)(viii)

Section 8, Exposure controls/personal protection;

1910.1200(g)(2)(ix)

Section 9, Physical and chemical properties;

1910.1200(g)(2)(x)

Section 10, Stability and reactivity;

1910.1200(g)(2)(xi)

Section 11, Toxicological information;

1910.1200(g)(2)(xii)

Section 12, Ecological information;

1910.1200(g)(2)(xiii)

Section 13, Disposal considerations;

1910.1200(g)(2)(xiv)

Section 14, Transport information;

1910.1200(g)(2)(xv)

Section 15, Regulatory information; and

1910.1200(g)(2)(xvi)

Section 16, Other information, including date of preparation or last revision.

Note 1 to paragraph (g)(2): To be consistent with the GHS, an SDS must also include the headings in paragraphs (g)(2)(xii) through (g)(2)(xv) in order.

Note 2 to paragraph (g)(2): OSHA will not be enforcing information requirements in sections 12 through 15, as these areas are not under its jurisdiction.

1910.1200(g)(3)

If no relevant information is found for any sub-heading within a section on the safety data sheet, the chemical manufacturer, importer or employer preparing the safety data sheet shall mark it to indicate that no applicable information was found.

1910.1200(g)(4)

Where complex mixtures have similar hazards and contents (i.e. the chemical ingredients are essentially the same, but the specific composition varies from mixture to mixture), the chemical manufacturer, importer or employer may prepare one safety data sheet to apply to all of these similar mixtures.

1910.1200(g)(5)

The chemical manufacturer, importer or employer preparing the safety data sheet shall ensure that the information provided accurately reflects the scientific evidence used in making the hazard classification. If the chemical manufacturer, importer or employer preparing the safety data sheet becomes newly aware of any significant information regarding the hazards of a chemical, or ways to protect against the hazards, this new information shall be added to the safety data sheet

within three months. If the chemical is not currently being produced or imported, the chemical manufacturer or importer shall add the information to the safety data sheet before the chemical is introduced into the workplace again.

1910.1200(g)(6)(i)

Chemical manufacturers or importers shall ensure that distributors and employers are provided an appropriate safety data sheet with their initial shipment, and with the first shipment after a safety data sheet is updated;

1910.1200(g)(6)(ii)

The chemical manufacturer or importer shall either provide safety data sheets with the shipped containers or send them to the distributor or employer prior to or at the time of the shipment;

1910.1200(g)(6)(iii)

If the safety data sheet is not provided with a shipment that has been labeled as a hazardous chemical, the distributor or employer shall obtain one from the chemical manufacturer or importer as soon as possible; and,

1910.1200(g)(6)(iv)

The chemical manufacturer or importer shall also provide distributors or employers with a safety data sheet upon request.

1910.1200(g)(7)(i)

Distributors shall ensure that safety data sheets, and updated information, are provided to other distributors and employers with their initial shipment and with the first shipment after a safety data sheet is updated;

1910.1200(g)(7)(ii)

The distributor shall either provide safety data sheets with the shipped containers, or send them to the other distributor or employer prior to or at the time of the shipment;

1910.1200(g)(7)(iii)

Retail distributors selling hazardous chemicals to employers having a commercial account shall provide a safety data sheet to such employers upon request, and shall post a sign or otherwise inform them that a safety data sheet is available;

1910.1200(g)(7)(iv)

Wholesale distributors selling hazardous chemicals to employers over-the-counter may also provide safety data sheets upon the request of the employer at the time of the over-the-counter purchase, and shall post a sign or otherwise inform such employers that a safety data sheet is available;

1910.1200(g)(7)(v)

If an employer without a commercial account purchases a hazardous chemical from a retail distributor not required to have safety data sheets on file (i.e., the retail distributor does not have commercial accounts and does not use the materials), the retail distributor shall provide the employer, upon request, with the name, address, and telephone number of the chemical manufacturer, importer, or distributor from which a safety data sheet can be obtained;

1910.1200(g)(7)(vi)

Wholesale distributors shall also provide safety data sheets to employers or other distributors upon request; and,

1910.1200(g)(7)(vii)

Chemical manufacturers, importers, and distributors need not provide safety data sheets to retail distributors that have informed them that the retail distributor does not sell the product to commercial accounts or open the sealed container to use it in their own workplaces.

1910.1200(g)(8)

The employer shall maintain in the workplace copies of the required safety data sheets for each hazardous chemical, and shall ensure that they are readily accessible during each work shift to employees when they are in their work area(s). (Electronic access and other alternatives to maintaining paper copies of the safety data sheets are permitted as long as no barriers to immediate employee access in each workplace are created by such options.)

1910.1200(g)(9)

Where employees must travel between workplaces during a workshift, i.e., their work is carried out at more than one geographical location, the material safety data sheets may be kept at the primary workplace facility. In this situation, the employer shall ensure that employees can immediately obtain the required information in an emergency.

1910.1200(g)(10)

Safety data sheets may be kept in any form, including operating procedures, and may be designed to cover groups of hazardous chemicals in a work area where it may be more appropriate to address the hazards of a process rather than individual hazardous chemicals. However, the employer shall ensure that in all cases the required information is provided for each hazardous chemical, and is readily accessible during each work shift to employees when they are in their work area(s).

1910.1200(g)(11)

Safety data sheets shall also be made readily available, upon request, to designated representatives, the Assistant Secretary, and the Director, in accordance with the requirements of § 1910.1020(e).

1910.1200(h)

Employee information and training.

1910.1200(h)(1)

Employers shall provide employees with effective information and training on hazardous chemicals in their work area at the time of their initial assignment, and whenever a new chemical hazard the employees have not previously been trained about is introduced into their work area. Information and training may be designed to cover categories of hazards (e.g., flammability, carcinogenicity) or specific chemicals. Chemical-specific information must always be available through labels and safety data sheets.

1910.1200(h)(2)

Information. Employees shall be informed of:

1910.1200(h)(2)(i)

The requirements of this section;

1910.1200(h)(2)(ii)

Any operations in their work area where hazardous chemicals are present; and,

1910.1200(h)(2)(iii)

The location and availability of the written hazard communication program, including the required list(s) of hazardous chemicals, and safety data sheets required by this section.

1910.1200(h)(3)

Training. Employee training shall include at least:

1910.1200(h)(3)(i)

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

1910.1200(h)(3)(ii)

The physical, health, simple asphyxiation, combustible dust, and pyrophoric gas hazards, as well as hazards not otherwise classified, of the chemicals in the work area;

1910.1200(h)(3)(iii)

The measures employees can take to protect themselves from these hazards, including specific procedures the employer has implemented to protect employees from exposure to hazardous

chemicals, such as appropriate work practices, emergency procedures, and personal protective equipment to be used; and,

1910.1200(h)(3)(iv)

The details of the hazard communication program developed by the employer, including an explanation of the labels received on shipped containers and the workplace labeling system used by their employer; the safety data sheet, including the order of information and how employees can obtain and use the appropriate hazard information.

1910.1200(i)

Trade secrets.

1910.1200(i)(1)

The chemical manufacturer, importer, or employer may withhold the specific chemical identity, including the chemical name, other specific identification of a hazardous chemical, or the exact percentage (concentration) of the substance in a mixture, from the safety data sheet, provided that:

1910.1200(i)(1)(i)

The claim that the information withheld is a trade secret can be supported;

1910.1200(i)(1)(ii)

Information contained in the safety data sheet concerning the properties and effects of the hazardous chemical is disclosed;

1910.1200(i)(1)(iii)

The safety data sheet indicates that the specific chemical identity and/or percentage of composition is being withheld as a trade secret; and,

1910.1200(i)(1)(iv)

The specific chemical identity and percentage is made available to health professionals, employees, and designated representatives in accordance with the applicable provisions of this paragraph (i).

1910.1200(i)(2)

Where a treating physician or nurse determines that a medical emergency exists and the specific chemical identity and/or specific percentage of composition of a hazardous chemical is necessary for emergency or first-aid treatment, the chemical manufacturer, importer, or employer shall immediately disclose the specific chemical identity or percentage composition of a trade secret chemical to that treating physician or nurse, regardless of the existence of a written statement of need or a confidentiality agreement. The chemical manufacturer, importer, or employer may require a written statement of need and confidentiality agreement, in accordance with the

provisions of paragraphs (i)(3) and (4) of this section, as soon as circumstances permit.

1910.1200(i)(3)

In non-emergency situations, a chemical manufacturer, importer, or employer shall, upon request, disclose a specific chemical identity or percentage composition, otherwise permitted to be withheld under paragraph (i)(1) of this section, to a health professional (i.e. physician, industrial hygienist, toxicologist, epidemiologist, or occupational health nurse) providing medical or other occupational health services to exposed employee(s), and to employees or designated representatives, if:

1910.1200(i)(3)(i)

The request is in writing;

1910.1200(i)(3)(ii)

The request describes with reasonable detail one or more of the following occupational health needs for the information:

1910.1200(i)(3)(ii)(A)

To assess the hazards of the chemicals to which employees will be exposed;

1910.1200(i)(3)(ii)(B)

To conduct or assess sampling of the workplace atmosphere to determine employee exposure levels;

1910.1200(i)(3)(ii)(C)

To conduct pre-assignment or periodic medical surveillance of exposed employees;

1910.1200(i)(3)(ii)(D)

To provide medical treatment to exposed employees;

1910.1200(i)(3)(ii)(E)

To select or assess appropriate personal protective equipment for exposed employees;

1910.1200(i)(3)(ii)(F)

To design or assess engineering controls or other protective measures for exposed employees; and,

1910.1200(i)(3)(ii)(G)

To conduct studies to determine the health effects of exposure.

1910.1200(i)(3)(iii)

The request explains in detail why the disclosure of the specific chemical identity or percentage composition is essential and that, in lieu thereof, the disclosure of the following information to the health professional, employee, or designated representative, would not satisfy the purposes described in paragraph (i)(3)(ii) of this section:

1910.1200(i)(3)(iii)(A)

The properties and effects of the chemical;

1910.1200(i)(3)(iii)(B)

Measures for controlling workers' exposure to the chemical;

1910.1200(i)(3)(iii)(C)

Methods of monitoring and analyzing worker exposure to the chemical; and,

1910.1200(i)(3)(iii)(D)

Methods of diagnosing and treating harmful exposures to the chemical;

1910.1200(i)(3)(iv)

The request includes a description of the procedures to be used to maintain the confidentiality of the disclosed information; and,

1910.1200(i)(3)(v)

The health professional, and the employer or contractor of the services of the health professional (i.e. downstream employer, labor organization, or individual employee), employee, or designated representative, agree in a written confidentiality agreement that the health professional, employee, or designated representative, will not use the trade secret information for any purpose other than the health need(s) asserted and agree not to release the information under any circumstances other than to OSHA, as provided in paragraph (i)(6) of this section, except as authorized by the terms of the agreement or by the chemical manufacturer, importer, or employer.

1910.1200(i)(4)

The confidentiality agreement authorized by paragraph (i)(3)(iv) of this section:

1910.1200(i)(4)(i)

May restrict the use of the information to the health purposes indicated in the written statement of need;

1910.1200(i)(4)(ii)

May provide for appropriate legal remedies in the event of a breach of the agreement, including stipulation of a reasonable pre-estimate of likely damages; and,

1910.1200(i)(4)(iii)

May not include requirements for the posting of a penalty bond.

1910.1200(i)(5)

Nothing in this standard is meant to preclude the parties from pursuing non-contractual remedies to the extent permitted by law.

1910.1200(i)(6)

If the health professional, employee, or designated representative receiving the trade secret information decides that there is a need to disclose it to OSHA, the chemical manufacturer, importer, or employer who provided the information shall be informed by the health professional, employee, or designated representative prior to, or at the same time as, such disclosure.

1910.1200(i)(7)

If the chemical manufacturer, importer, or employer denies a written request for disclosure of a specific chemical identity or percentage composition, the denial must:

1910.1200(i)(7)(i)

Be provided to the health professional, employee, or designated representative, within thirty days of the request;

1910.1200(i)(7)(ii)

Be in writing;

1910.1200(i)(7)(iii)

Include evidence to support the claim that the specific chemical identity or percent of composition is a trade secret;

1910.1200(i)(7)(iv)

State the specific reasons why the request is being denied; and,

1910.1200(i)(7)(v)

Explain in detail how alternative information may satisfy the specific medical or occupational health need without revealing the trade secret.

1910.1200(i)(8)

The health professional, employee, or designated representative whose request for information is denied under paragraph (i)(3) of this section may refer the request and the written denial of the request to OSHA for consideration.

1910.1200(i)(9)

When a health professional, employee, or designated representative refers the denial to OSHA under paragraph (i)(8) of this section, OSHA shall consider the evidence to determine if:

1910.1200(i)(9)(i)

The chemical manufacturer, importer, or employer has supported the claim that the specific chemical identity or percentage composition is a trade secret;

1910.1200(i)(9)(ii)

The health professional, employee, or designated representative has supported the claim that there is a medical or occupational health need for the information; and,

1910.1200(i)(9)(iii)

The health professional, employee or designated representative has demonstrated adequate means to protect the confidentiality.

1910.1200(i)(10)(i)

If OSHA determines that the specific chemical identity or percentage composition requested under paragraph (i)(3) of this section is not a “bona fide” trade secret, or that it is a trade secret, but the requesting health professional, employee, or designated representative has a legitimate medical or occupational health need for the information, has executed a written confidentiality agreement, and has shown adequate means to protect the confidentiality of the information, the chemical manufacturer, importer, or employer will be subject to citation by OSHA.

1910.1200(i)(10)(ii)

If a chemical manufacturer, importer, or employer demonstrates to OSHA that the execution of a confidentiality agreement would not provide sufficient protection against the potential harm from the unauthorized disclosure of a trade secret, the Assistant Secretary may issue such orders or impose such additional limitations or conditions upon the disclosure of the requested chemical information as may be appropriate to assure that the occupational health services are provided without an undue risk of harm to the chemical manufacturer, importer, or employer.

1910.1200(i)(11)

If a citation for a failure to release trade secret information is contested by the chemical manufacturer, importer, or employer, the matter will be adjudicated before the Occupational

Safety and Health Review Commission in accordance with the Act's enforcement scheme and the applicable Commission rules of procedure. In accordance with the Commission rules, when a chemical manufacturer, importer, or employer continues to withhold the information during the contest, the Administrative Law Judge may review the citation and supporting documentation "in camera" or issue appropriate orders to protect the confidentiality of such matters.

1910.1200(i)(12)

Notwithstanding the existence of a trade secret claim, a chemical manufacturer, importer, or employer shall, upon request, disclose to the Assistant Secretary any information which this section requires the chemical manufacturer, importer, or employer to make available. Where there is a trade secret claim, such claim shall be made no later than at the time the information is provided to the Assistant Secretary so that suitable determinations of trade secret status can be made and the necessary protections can be implemented.

1910.1200(i)(13)

Nothing in this paragraph shall be construed as requiring the disclosure under any circumstances of process information which is a trade secret.

1910.1200(j)

Effective dates.

1910.1200(j)(1)

Employers shall train employees regarding the new label elements and safety data sheets format by December 1, 2013.

1910.1200(j)(2)

Chemical manufacturers, importers, distributors, and employers shall be in compliance with all modified provisions of this section no later than June 1, 2015, except:

1910.1200(j)(2)(i)

After December 1, 2015, the distributor shall not ship containers labeled by the chemical manufacturer or importer unless the label has been modified to comply with paragraph (f)(1) of this section.

1910.1200(j)(2)(ii)

All employers shall, as necessary, update any alternative workplace labeling used under paragraph (f)(6) of this section, update the hazard communication program required by paragraph (h)(1), and provide any additional employee training in accordance with paragraph (h)(3) for newly identified physical or health hazards no later than June 1, 2016.

1910.1200(j)(3)

Chemical manufacturers, importers, distributors, and employers may comply with either § 1910.1200 revised as of October 1, 2011, or the current version of this standard, or both during the transition period.

[59 FR 17479, April 13, 1994; 59 FR 65947, Dec. 22, 1994; 61 FR 5507, Feb. 13, 1996; 77 FR 17785, March 26, 2012]

[78 FR 9313, Feb. 8, 2013]



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