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Office of Emergency and
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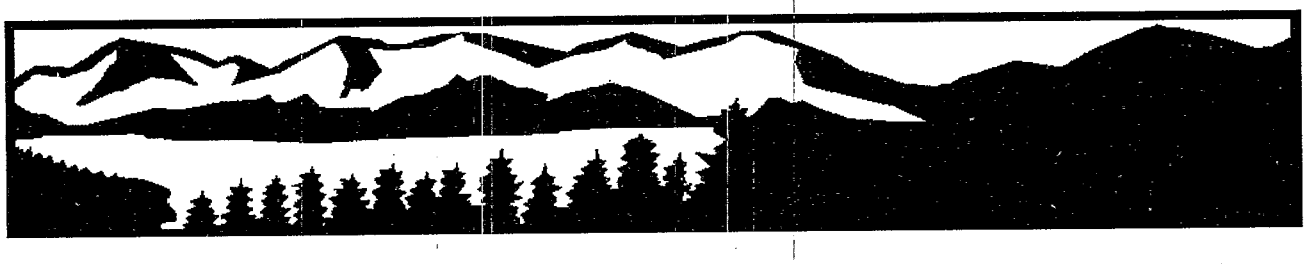
Superfund

EPA

Common Contaminants Found at Superfund Sites



• Acetone • 1,2-Dichloroethane • Cyanide • DDD • Naphthalene • Tetrachloroethylene • Boron • Cadmium • 1,1-Dichloroethene • Mercury • Aldrin/Dieldrin • DDE • Pentachlorophenol • Beryllium • 2-Hexanone • Polychlorinated Biphenyls (PCBs) • Lead • Creosols • 1,1,2-Trichloroethylene • Benzene • Chromium • Thorium • Thallium • Phenol • Toluene • Arsenic • Barium • 2-Butanone • Carbon Tetrachloride • Fluorides • Chlordane • Zinc • Nickel • Chloroform • Copper • Polycyclic Aromatic Hydrocarbons (PAHs) • DDT • Vinyl Chloride • Styrene • Xylene • Aluminum • Chrysene • Vanadium • Diethyl Phthalate • Methylene Chloride • Hexachlorocyclohexane • 1,2-Dichloroethene • Di (2-ethylhexyl) phthalate (DEHP) • 1,4-Dichlorobenzene • Cobalt • Asbestos • Chlorodibenzofurans (CDFs) • Benz(a)anthracene • Di-N-Octylphthalate (DNOP) • Bis (2-Chloroethyl) Ether • Benzo(a)pyrene • 1,1-Dichloroethane • Ethylbenzene • Antimony • N-Nitrosodiphenylamine • 1,1,1-Trichloroethane •

ATSDR

Introduction

The U.S. Environmental Protection Agency (EPA) created this booklet to help you understand more about some of the contaminants commonly found at Superfund sites.

This booklet consists of contaminant fact sheets prepared by the U.S. Department of Health and Human Services - Agency for Toxic Substances and Disease Registry (ATSDR) and are based on information in ATSDR's technical toxicological profiles. The fact sheets discuss the contaminants' known effects on human health, while acknowledging that in some instances only limited information exists about long-term health effects. The fact sheets summarize potential adverse health effects associated with exposure to hazardous substances. The fact sheets are derived from the first chapter of the ATSDR toxicological profiles–the public health statement–and are written in an easy-to-read format. Generally referred to as ATSDR ToxFAQs Fact Sheets, the descriptive components of ToxFAQs are outlined below.

ToxFAQs describe:

1. Summary of the contaminant;
2. Origin, qualities, and uses of the contaminant;
3. Fate of the contaminant in the environment;
4. Possible routes of human exposure;
5. Known adverse health effects;
6. Assessment of the contaminant's ability to cause cancer;
7. Affects of contaminant exposure on children;
8. Medical testing used to determine human exposure to the contaminant; and
9. Federal recommendations to protect human health.

Additional Information on the Web

For additional information about the contaminants highlighted in this booklet or other contaminants, visit ATSDR and EPA on the Internet. Resources on ATSDR's home page include electronic versions of ASTDR's ToxFAQs Fact Sheets, and a searchable database commonly know as the Hazardous Substance Release/Health Effects Database (HazDat). Resources on EPA's web site include the Office of Prevention, Pesticides, and Toxic Substance's home page and the Office of Emergency and Remedial Response's Superfund home page.

- **ATSDR ToxFAQs Fact Sheets**
  http://www.atsdr.cdc.gov/toxfaq.html

ToxFAQs are a series of summaries about hazardous substances developed by ATSDR's Division of Toxicology. Information for this series is excerpted from the ATSDR toxicological profiles and public health statements. Each fact sheet serves as a quick and easy-to-understand guide. Answers are provided to the most frequently asked questions (FAQs) about exposure to hazardous substances found around hazardous waste sites and about their human health effects. ToxFAQs are viewable online using any web browser.

- **ATSDR HazDat Searchable Database**
  http://www.atsdr.cdc.gov/hazdat.html

HazDat, ATSDR's Hazardous Substance Release/Health Effects Database, is the scientific and administrative database developed to provide access to information on the release of hazardous substances from Superfund sites or from emergency events, and on the effects of hazardous substances on the health of human populations. The following information is included in HazDat: site characteristics, activities and site events, contaminants found, contaminant media and maximum concentration levels, impact on population, community health concerns, ATSDR public health threat categorization, ATSDR recommendations, environmental fate of hazardous substances, exposure routes, and physical hazards at the site/event. In addition, HazDat contains substance-specific information such as the ATSDR Priority List of Hazardous Substances, health effects by route and duration of exposure, metabolites, interactions of substances, susceptible populations, and biomarkers of exposure and effects. HazDat also contains data from the U.S. Environmental Protection Agency (EPA) Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) database, including site CERCLIS ID number, site description, latitude/longitude, operable units, and additional site information.

- **Office of Prevention, Pesticides, and Toxic Substances Chemical Fact Sheets**
  http://www.epa.gov/chemfact/

EPA's Office of Prevention, Pesticides, and Toxic Substances (OPPTS) provides fact sheets and chemical summaries. The fact sheets contain general information, and the chemical summaries discuss technical topics such as the contaminant's physical/chemical properties, production, and environmental fate.

- **Office of Prevention, Pesticides, and Toxic Substances Publication List**
  http://www.epa.gov/opptintr/opptpub.htm

EPA's Office of Prevention, Pesticides, and Toxic Substance's publication list page provides links to documents, reports, fact sheets, periodicals, and newsletters on chemicals, toxins, and pollution.

- **Superfund Home Page**
  http://www.epa.gov/superfund/index.htm

EPA's Office of Emergency and Remedial Response's (OERR) Superfund web site provides information on the Superfund program. A sampling of the materials available here includes the following: background information on the Superfund program, site information, initiatives and programs, regional programs, program accomplishments, partnerships, and more.

If you do not have Internet access and you would like further information concerning EPA's Superfund hazardous waste cleanup program, call the Superfund Hotline at (800) 424-9346 or TDD (800) 553-7672. In the greater Washington, DC area, please call (703) 412-9810.

Contaminants Highlighted In This Booklet

Acetone
Aldrin/Dieldrin
Aluminum
Antimony
Arsenic
Asbestos
Barium
Benzene
Beryllium
Boron
2-Butanone
Cadmium
Carbon Tetrachloride
Chlordane
Chlorodibenzofurans (CDFs)
Chloroform
Chromium
Cobalt
Copper
Cresols
Cyanide
DDT, DDE, DDD
1,4-Dichlorobenzene
1,1-Dichloroethane
1,2-Dichloroethane
1,1-Dichloroethene
1,2-Dichloroethene
Diethyl Phthalate
Di (2-ethylhexyl) phthalate (DEHP)
Di-N-Octylphthalate (DNOP)
Ethylbenzene
Fluorides, Hydrogen Fluoride, Fluorine
Hexachlorocyclohexane
2-Hexanone
Lead
Mercury
Methylene Chloride
Naphthalene
Nickel
N-Nitrosodiphenylamine
Pentachlorophenol
Phenol
Polychlorinated Biphenyls (PCBs)
*Polycyclic Aromatic Hydrocarbons (PAHs)
Styrene
Tetrachloroethylene
Thallium
1,1,1-Trichloroethane
Trichloroethylene
Toluene
Vanadium
Vinyl Chloride
Xylene
Zinc

** Includes representative contaminants in the PAH group such as benz(a)anthracene, benzo(a)pyrene, and chrysene.*

Document Availability

To order copies of ATSDR's ToxFAQs Fact Sheets, and for information about the fact sheets currently available in Spanish, contact:

Agency for Toxic Substances and Disease Registry
Division of Toxicology–Information Center
Mailstop E-29
1600 Clifton Road, NE
Atlanta, GA 30333

Phone: (888) 42-ATSDR
Fax: (404) 639-6359
E-mail: ATSDRIC@cdc.gov

To place an order for a copy of this document or other Superfund documents, please fax your request to the Superfund Document Center at (703) 603-9240 or e-mail your request to the following address: superfund.documentcenter@epa.gov.

ACETONE

Agency for Toxic Substances and Disease Registry September 1995

This fact sheet answers the most frequently asked health questions about acetone. For more information, you may call 404-639-6000. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to acetone results mostly from breathing air, drinking water, or coming in contact with products or soil that contain acetone. Exposure to moderate-to-high amounts of acetone can irritate your eyes and respiratory system, and make you dizzy. Very high exposure may cause you to lose consciousness. This chemical has been found in at least 572 of 1,416 National Priorities List sites identified by the Environmental Protection Agency.

What is acetone?

(Pronounced ăs′ĭ-tōn′)

Acetone is a manufactured chemical that is also found naturally in the environment. It is a colorless liquid with a distinct smell and taste. It evaporates easily, is flammable, and dissolves in water. It is also called dimethyl ketone, 2-propanone, and beta-ketopropane.

Acetone is used to make plastic, fibers, drugs, and other chemicals. It is also used to dissolve other substances.

It occurs naturally in plants, trees, volcanic gases, forest fires, and as a product of the breakdown of body fat. It is present in vehicle exhaust, tobacco smoke, and landfill sites. Industrial processes contribute more acetone to the environment than natural processes.

What happens to acetone when it enters the environment?

- ❑ A large percentage (97%) of the acetone released during its manufacture or use goes into the air.
- ❑ In air, about one-half of the total amount breaks down from sunlight or other chemicals every 22 days.
- ❑ It moves from the atmosphere into the water and soil by rain and snow. It also moves quickly from soil and water back to air.
- ❑ Acetone doesn't bind to soil or build up in animals.
- ❑ It's broken down by microorganisms in soil and water.
- ❑ It can move into groundwater from spills or landfills.
- ❑ Acetone is broken down in water and soil, but the time required for this to happen varies.

How might I be exposed to acetone?

- ❑ Breathing low background levels in the environment
- ❑ Breathing higher levels of contaminated air in the workplace or from using products that contain acetone (for example, household chemicals, nail polish, and paint)
- ❑ Drinking water or eating food containing acetone
- ❑ Touching products containing acetone
- ❑ For children, eating soil at landfills or hazardous waste sites that contain acetone
- ❑ Smoking or breathing secondhand smoke.

How can acetone affect my health?

If you are exposed to acetone, it goes into your blood which then carries it to all the organs in your body. If it is a small amount, the liver breaks it down to chemicals that are not harmful and uses these chemicals to make energy for normal body functions. Breathing **moderate- to-high levels**

of acetone for short periods of time, however, can cause nose, throat, lung, and eye irritation; headaches; light-headedness; confusion; increased pulse rate; effects on blood; nausea; vomiting; unconsciousness and possibly coma; and shortening of the menstrual cycle in women.

Swallowing **very high levels** of acetone can result in unconsciousness and damage to the skin in your mouth. Skin contact can result in irritation and damage to your skin.

The smell and respiratory irritation or burning eyes that occur from moderate levels are excellent warning signs that can help you avoid breathing damaging levels of acetone.

Health effects from long-term exposures are known mostly from animal studies. Kidney, liver, and nerve damage, increased birth defects, and lowered ability to reproduce (males only) occurred in animals exposed long-term. It is not known if people would have these same effects.

How likely is acetone to cause cancer?

The **Department of Health and Human Services**, the **International Agency for Research on Cancer**, and the **Environmental Protection Agency (EPA)** have not classified acetone for carcinogenicity.

Acetone does not cause skin cancer in animals when applied to the skin. We don't know if breathing or swallowing acetone for long periods will cause cancer. Studies of workers exposed to it found no significant risk of death from cancer.

Is there a medical test to show whether I've been exposed to acetone?

Methods are available to measure the amount of acetone in your breath, blood, and urine. The test can tell you how much acetone you were exposed to, although the amount that people have naturally in their bodies varies with each person. The tests can't tell you if you will experience any health effects from the exposure.

The test must be performed within 2-3 days after exposure because acetone leaves your body within a few days. These tests are not routinely performed at your doctor's office, but your doctor can take blood or urine samples and send them to a testing laboratory.

Has the federal government made recommendations to protect human health?

The **EPA** requires that spills of 5,000 pounds or more of acetone be reported.

The **Occupational Safety and Health Administration (OSHA)** has set a maximum concentration limit in workplace air of 1,000 parts of acetone per million parts of air (1,000 ppm) for an 8-hour workday over a 40-hour week to protect workers. The **National Institute for Occupational Safety and Health (NIOSH)** recommends an exposure limit of 250 ppm in workplace air for up to a 10-hour workday over a 40-hour workweek.

Glossary

Carcinogenicity: Ability to cause cancer
CAS: Chemical Abstract Service
Evaporate: To change into a vapor or a gas
Ingesting: Taking food or drink into your body
Long-term: Lasting one year or longer

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1994. Toxicological profile for acetone. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns. For more information, contact: Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333, Phone: 404-639-6000, FAX: 404-639-6315ATSDR Internet home page via WWW is http://atsdr1.atsdr.cdc.gov.8080/atsdrhome.html

ALDRIN/ DIELDRIN

Agency for Toxic Substances and Disease Registry April 1993

This fact sheet answers the most frequently asked health questions about aldrin and dieldrin. For more information, you may call 404-639-6000. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to aldrin and dieldrin happens mostly from eating contaminated foods, such as root crops, fish, or seafood. Aldrin and dieldrin build up in the body after years of exposure and can damage the nervous system. Aldrin has been found in at least 36 of 1,300 National Priorities List sites identified by the Environmental Protection Agency. Dieldrin has been found in at least 162 of the 1,300 sites.

What are aldrin and dieldrin? (Pronounced al´ drin and di-el´ drin)

Aldrin and dieldrin are insecticides with similar structures. They are discussed together in this fact sheet because aldrin quickly breaks down to dieldrin in the body and in the environment. Pure aldrin and dieldrin are white powders with a mild chemical odor. The less pure commercial powders have a tan color. Aldrin and dieldrin do not occur naturally in the environment.

From 1950-1970, aldrin and dieldrin were popular pesticides for crops like corn and cotton. Because of concerns about damage to the environment and the potential harm to human health, EPA banned all uses of aldrin and dieldrin in 1974 except to control termites. In 1987, EPA banned all uses.

What happens to aldrin and dieldrin when they enter the environment?

- Sunlight and bacteria change aldrin to dieldrin so we mostly find dieldrin in the environment.
- They bind tightly to soil and slowly evaporate to the air.
- Dieldrin breaks down very slowly.
- Plants take in and store aldrin and dieldrin from the soil.
- Aldrin rapidly changes to dieldrin in plants and animals.
- Dieldrin is stored in the fat and leaves the body very slowly.

How might I be exposed to aldrin or dieldrin?

- Dieldrin is everywhere in the environment, but at very low levels.
- Since its use was banned, most foods contain very little, if any, dieldrin.
- Foods such as fish, seafood, dairy products, fatty meats, and root crops grown in contaminated water or soil may have higher levels of dieldrin.
- Air, surface water, or soil near waste sites may also contain higher levels.

How can aldrin and dieldrin affect my health?

Aldrin and dieldrin mainly affect the central nervous system.

Accidental or intentional ingestion of **high levels** of aldrin and dieldrin result in convulsions and death. These levels are many thousands of times higher than the average exposure.

Ingesting **moderate levels** of aldrin or dieldrin over a longer period may also cause convulsions. This occurs because aldrin and dieldrin build up in our bodies.

We don't know the effects of exposure to **low levels** of

aldrin or dieldrin over a long time. Some workers who made or applied the insecticides had nervous system effects with excitation leading to convulsions. Lesser effects in some workers included:

- headaches
- dizziness
- vomiting
- irritability
- uncontrolled muscle movements.

Workers removed from the source of exposure rapidly recovered from most of these effects.

Studies in animals indicate that aldrin or dieldrin may reduce the body's ability to resist infection.

How likely are aldrin and dieldrin to cause cancer?

The International Agency for Research on Cancer has determined that aldrin and dieldrin are not classifiable as to their carcinogenicity to humans. There is no direct evidence that aldrin or dieldrin causes cancer in humans. Studies on workers generally show no increase in cancer or deaths due to cancer. Mice given high amounts of dieldrin, however, did develop liver cancers.

Is there a medical test to show whether I've been exposed to aldrin or dieldrin?

Tests are available that measure the amount of dieldrin in blood, fat, breast milk, and body tissues. The blood test is most often used. The amount of dieldrin in the body indicates how much dieldrin you were exposed to, but not when, since dieldrin stays in the body for a long time. The blood test is simple, but not routinely performed at your doctor's office.

Some studies in people predict that levels above 0.20 milligrams of dieldrin in a liter of blood (0.20 mg/L) may result in harmful effects such as convulsions or uncontrollable muscle movements.

Has the federal government made recommendations to protect human health?

The Environmental Protection Agency (EPA) defines aldrin and dieldrin as hazardous solid waste. In 1974, EPA banned all uses of aldrin or dieldrin except as a termite killer. By 1987, EPA banned all uses. EPA concludes that the maximum amount of aldrin and dieldrin that can be present in our water and seafood should not exceed 74 picograms per liter (pg/L) of aldrin or 71 pg/L of dieldrin.

The Food and Drug Administration (FDA) regulates the residues of aldrin and dieldrin in raw foods. The allowable range for residues is from 0 to 0.1 parts of dieldrin to one million parts of food (0-0.1 ppm) depending on the type of food product. This limits the intake of aldrin and dieldrin in food to safe levels.

Glossary

Carcinogenicity: Ability to cause cancer.
Ingestion: Taking food or drink into you body.
PPM: Parts per million.
Picogram (pg): One billionth of a gram.
Milligram (mg): One millionth of a gram.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1993. Toxicological profile for aldrin/dieldrin. Atlanta: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information?

ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns. For more information, contact: Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333, Phone: 404-639-6000.

ALUMINUM
CAS # 7429-90-5

Agency for Toxic Substances and Disease Registry ToxFAQs June 1999

This fact sheet answers the most frequently asked health questions (FAQs) about aluminum. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Everyone is exposed to low levels of aluminum from food, air, and water. Exposure to high levels of aluminum may result in respiratory problems. Aluminum has been found in at least 427 of the 1,467 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is aluminum?

(Pronounced ə-lōō′mə-nəm)

Aluminum occurs naturally and makes up about 8% of the surface of the earth. It is always found combined with other elements such as oxygen, silicon, and fluorine.

Aluminum metal is silver-white and flexible. It is often used in cooking utensils, containers, appliances, and building materials. It is also used in paints and fireworks; to produce glass, rubber, and ceramics; and in consumer products such as antacids, astringents, buffered aspirin, food additives, and antiperspirants.

What happens to aluminum when it enters the environment?

- It binds to particles in the air.
- It can dissolve in lakes, streams, and rivers depending on the quality of the water.
- Acid rain may dissolve aluminum from soil and rocks.
- It can be taken up into some plants from soil.
- It is not known to bioconcentrate up the food chain.

How might I be exposed to aluminum?

- Eating small amounts of aluminum in food
- Breathing higher levels of aluminum dust in workplace air
- Drinking water with high levels of aluminum near waste sites, manufacturing plants, or areas naturally high in aluminum
- Eating substances containing high levels of aluminum (such as antacids) especially when eating or drinking citrus products at the same time
- Very little enters your body from aluminum cooking utensils.

How can aluminum affect my health?

Low-level exposure to aluminum from food, air, water, or contact with skin is not thought to harm your health. Aluminum, however, is not a necessary substance for our bodies and too much may be harmful.

People who are exposed to high levels of aluminum in air may have respiratory problems including coughing and asthma from breathing dust.

Some studies show that people with Alzheimer's disease have more aluminum than usual in their brains. We do not know whether aluminum causes the disease or whether the buildup of aluminum happens to people who already have the disease. Infants and adults who received large doses of aluminum as a treatment for another problem developed bone

diseases, which suggests that aluminum may cause skeletal problems. Some sensitive people develop skin rashes from using aluminum chlorohydrate deodorants.

How likely is aluminum to cause cancer?

The Department of Health and Human Services, the International Agency for Research on Cancer, and the EPA have not classified aluminum for carcinogenicity. Aluminum has not been shown to cause cancer in animals.

How can aluminum affect children?

Children with kidney problems who were given aluminum in their medical treatments developed bone diseases. Other health effects of aluminum on children have not been studied. It is not known whether aluminum affects children differently than adults, or what the long-term effects might be in adults exposed as children. Large amounts of aluminum have been shown to be harmful to unborn and developing animals because it can cause delays in skeletal and neurological development. Aluminum has been shown to cause lower birthweights in some animals.

How can families reduce the risk of exposure to aluminum?

The most important way families can lower exposure to aluminum is to know about the sources of aluminum and lessen exposure to these sources. Since aluminum is so common and widespread in the environment, families cannot avoid exposure to aluminum. Exposure to the low levels of aluminum that are naturally present in food and water and the forms of aluminum present in dirt and aluminum cookware is generally not harmful. The best way to reduce exposure to aluminum is to avoid taking large quantities of soluble forms of aluminum such as aluminum-containing antacids and buffered aspirin. Make sure these products have child-proof caps so children will not accidentally eat them. Some soy-based formulas may contain high levels of aluminum, so parents may want to consult with their physician when choosing an infant formula.

Is there a medical test to show whether I've been exposed to aluminum?

There are tests to measure aluminum in blood, urine, and feces. The amount in your urine can tell you whether you have been exposed to higher than normal levels of aluminum. Tests can also detect aluminum in your hair and fingernails. Not all of these tests are routinely performed at your doctor's office, but your doctor can take samples and send them to a testing laboratory.

Has the federal government made recommendations to protect human health?

EPA requires that spills or accidental releases of 5,000 pounds or more of aluminum sulfate be reported. Special regulations are set for aluminum phosphide because it is a pesticide.

EPA recommends that the concentration of aluminum in drinking water not exceed 0.2 parts of aluminum per million parts of water (0.2 ppm) because of aesthetic effects, such as taste and odor problems.

The Food and Drug Administration (FDA) has determined that aluminum cooking utensils, aluminum foil, antiperspirants, antacids, and other aluminum products are generally safe.

Source of information

Agency for Toxic Substances and Disease Registry (ATSDR). 1999. Toxicological Profile for Aluminum. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-639-6359. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

ATSDR

ANTIMONY

Agency for Toxic Substances and Disease Registry September 1995

This fact sheet answers the most frequently asked health questions about antimony. For more information, you may call 404-639-6000. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to antimony occurs in the workplace or from skin contact with soil at hazardous waste sites. Breathing high levels of antimony for a long time can irritate the eyes and lungs, and can cause problems with the lungs, heart, and stomach. This chemical has been found in at least 403 of 1,416 National Priorities List sites identified by the Environmental Protection Agency.

What is antimony?

(Pronounced ăn′tə-mō′nē)

Antimony is a silvery-white metal that is found in the earth's crust. Antimony ores are mined and then mixed with other metals to form antimony alloys or combined with oxygen to form antimony oxide.

Little antimony is currently mined in the United States. It is brought into this country from other countries for processing. However, there are companies in the United States that produce antimony as a by-product of smelting lead and other metals.

Antimony isn't used alone because it breaks easily, but when mixed into alloys, it is used in lead storage batteries, solder, sheet and pipe metal, bearings, castings, and pewter. Antimony oxide is added to textiles and plastics to prevent them from catching fire. It is also used in paints, ceramics, and fireworks, and as enamels for plastics, metal, and glass.

What happens to antimony when it enters the environment?

- Antimony is released to the environment from natural sources and from industry.
- In the air, antimony is attached to very small particles that may stay in the air for many days.
- Most antimony ends up in soil, where it attaches strongly to particles that contain iron, manganese, or aluminum.
- Antimony is found at **low levels** in some rivers, lakes, and streams.

How might I be exposed to antimony?

- Because antimony is found naturally in the environment, the general population is exposed to **low levels** of it every day, primarily in food, drinking water, and air.
- It may be found in air near industries that process or release it, such as smelters, coal-fired plants, and refuse incinerators.
- In polluted areas containing **high levels** of antimony, it may be found in the air, water, and soil.
- Workers in industries that process it or use antimony ore may be exposed to higher levels.

How can antimony affect my health?

Exposure to antimony at **high levels** can result in a variety of adverse health effects.

Breathing **high levels** for a long time can irritate your eyes and lungs and can cause heart and lung problems, stomach pain, diarrhea, vomiting, and stomach ulcers.

In short-term studies, animals that breathed **very high levels** of antimony died. Animals that breathed **high levels**

had lung, heart, liver, and kidney damage. In long-term studies, animals that breathed **very low levels** of antimony had eye irritation, hair loss, lung damage, and heart problems. Problems with fertility were also noted. In animal studies, problems with fertility have been seen when rats breathed **very high** levels of antimony for a few months.

Ingesting large doses of antimony can cause vomiting. We don't know what other effects may be caused by ingesting it. Long-term animal studies have reported liver damage and blood changes when animals ingested antimony. Antimony can irritate the skin if it is left on it.

Antimony can have beneficial effects when used for medical reasons. It has been used as a medicine to treat people infected with parasites.

How likely is antimony to cause cancer?

The **Department of Health and Human Services,** the **International Agency for Research on Cancer,** and the **Environmental Protection Agency (EPA)** have not classified antimony as to its human carcinogenicity.

Lung cancer has been observed in some studies of rats that breathed high levels of antimony. No human studies are available. We don't know whether antimony will cause cancer in people.

Is there a medical test to show whether I've been exposed to antimony?

Tests are available to measure antimony levels in the body. Antimony can be measured in the urine, feces, and blood for several days after exposure. However, these tests cannot tell you how much antimony you have been exposed to or whether you will experience any health effects. Some tests are not usually performed in most doctors' offices and may require special equipment to conduct them.

Has the federal government made recommendations to protect human health?

The **EPA** allows 0.006 parts of antimony per million parts of drinking water (0.006 ppm). The **EPA** requires that discharges or spills into the environment of 5,000 pounds or more of antimony be reported.

The **Occupational Safety and Health Administration (OSHA)** has set an occupational exposure limit of 0.5 milligrams of antimony per cubic meter of air (0.5 mg/m^3) for an 8-hour workday, 40-hour workweek.

The **American Conference of Governmental Industrial Hygienists (ACGIH)** and the **National Institute for Occupational Safety and Health (NIOSH)** currently recommend the same guidelines for the workplace as OSHA.

Glossary

Carcinogenicity: Ability to cause cancer
CAS: Chemical Abstract Service
Ingesting: Taking food or drink into your body
Long-term: Lasting one year or more
Milligram (mg): One thousandth of a gram
Parasite: An organism living in or on another organism
PPM: Parts per million
Short-term: Lasting 14 days or less

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1992. Toxicological profile for antimony. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns. For more information, contact: Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333, Phone: 404-639-6000, FAX: 404-639-6315ATSDR Internet home page via WWW is http://atsdr1.atsdr.cdc.gov.8080/atsdrhome.html

ATSDR

ARSENIC

Agency for Toxic Substances and Disease Registry April 1993

This fact sheet answers the most frequently asked health questions about arsenic. For more information, you may call 404-639-6000. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to higher than average levels of arsenic happens mostly in the workplace, near hazardous waste sites, or in areas with high natural levels. Arsenic is a powerful poison. At high levels, it can cause death or illness. This chemical has been found in at least 781 of 1,300 National Priorities List sites identified by the Environmental Protection Agency.

What is arsenic? (Pronounced ar′ sə̀ - nik)

Arsenic is found in nature at low levels. It's mostly in compounds with oxygen, chlorine, and sulfur. These are called inorganic arsenic compounds. Arsenic in plants and animals combines with carbon and hydrogen. This is called organic arsenic. Organic arsenic is usually less harmful than inorganic arsenic.

Most arsenic compounds have no smell or special taste.

Inorganic arsenic compounds are mainly used to preserve wood. They are also used to make insecticides and weed killers. You can check the labels of treated wood and insecticides to see if they contain arsenic.

Copper and lead ores contain small amounts of arsenic.

What happens to arsenic when it enters the environment?

- It doesn't evaporate.
- Most arsenic compounds can dissolve in water.
- It gets into air when contaminated materials are burned.
- It settles from the air to the ground.
- It doesn't break down, but can change from one form to another.
- Fish and shellfish build up organic arsenic in their tissues, but most of the arsenic in fish isn't toxic.

How might I be exposed to arsenic?

- Breathing sawdust or burning smoke from wood containing arsenic
- Breathing workplace air
- Ingesting contaminated water, soil, or air at waste sites
- Ingesting contaminated water, soil, or air near areas naturally high in arsenic.

How can arsenic affect my health?

Inorganic arsenic is a human poison. Organic arsenic is less harmful.

High levels of inorganic arsenic in food or water can be fatal. A high level is 60 parts of arsenic per million parts of food or water (60 ppm). Arsenic damages many tissues including nerves, stomach and intestines, and skin. Breathing high levels can give you a sore throat and irritated lungs.

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Lower levels of exposure to inorganic arsenic may cause:

- Nausea, vomiting, and diarrhea
- Decreased production of red and white blood cells
- Abnormal heart rhythm
- Blood vessel damage
- A "pins and needles" sensation in hands and feet.

Long term exposure to inorganic arsenic may lead to a darkening of the skin and the appearance of small "corns" or "warts" on the palms, soles, and torso.

Direct skin contact may cause redness and swelling.

How likely is arsenic to cause cancer?

The Department of Health and Human Services (DHHS) has determined that arsenic is a known carcinogen. Breathing inorganic arsenic increases the risk of lung cancer. Ingesting inorganic arsenic increases the risk of skin cancer and tumors of the bladder, kidney, liver, and lung.

Is there a medical test to show whether I've been exposed to arsenic?

Tests can measure your exposure to high levels of arsenic. These tests are not routinely performed in a doctor's office.

Arsenic can be measured in your urine. This is the most reliable test for arsenic exposure. Since arsenic stays in the body only a short time, you must have the test soon after exposure.

Tests on hair or fingernails can measure your exposure to high levels of arsenic over the past 6-12 months. These tests are not very useful for low level exposures.

These tests do not predict whether you will have any harmful health effects.

Has the federal government made recommendations to protect human health?

The Environmental Protection Agency (EPA) sets limits on the amount of arsenic that industrial sources can release. It restricted or canceled many uses of arsenic in pesticides and may restrict more. EPA set a limit of 0.05 parts per million (ppm) for arsenic in drinking water. EPA may lower this further.

The Occupational Safety and Health Administration (OSHA) established a maximum permissible exposure limit for workplace airborne arsenic of 10 micrograms per cubic meter ($\mu g/m^3$).

Glossary

Carcinogen: Substance that can cause cancer.
Ingesting: Taking food or drink into your body.
PPM: Parts per million.
Microgram (μg): One millionth of a gram.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1993. Toxicological profile for arsenic. Atlanta: U.S. Department of Health and Human Services, Public Health Service.

Agency for Toxic Substances and Disease Registry (ATSDR). 1993. Case studies in environmental medicine: Arsenic toxicity. Atlanta: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information?

ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns. For more information, contact: Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333, Phone: 404-639-6000.

ASBESTOS
CAS # 1332-21-4

Agency for Toxic Substances and Disease Registry September 1996

This fact sheet answers the most frequently asked health questions about asbestos. For more information, you may call 404-639-6000. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to asbestos usually occurs by breathing contaminated air in workplaces that make or use asbestos. Asbestos is also found in the air of buildings containing asbestos that are being torn down or renovated. Asbestos exposure can cause cancer and other serious lung problems. This substance has been found in at least 58 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is asbestos?
(Pronounced ăs-bĕs′təs)

Asbestos is the name that's used for a group of six different fibrous minerals (amosite, chrysotile, crocidolite, and the fibrous varieties of tremolite, actinolite, and anthophyllite) that occur naturally in soil and rocks in some areas. Asbestos fibers vary in length and may be straight or curled.

Asbestos fibers are resistant to heat and most chemicals. Because of this, asbestos fibers are used for a wide range of manufactured goods, mostly roofing shingles, ceiling and floor tiles, paper products, asbestos cement products, friction products (automobile clutch, brake, and transmission parts), textiles, packaging, gaskets, and coatings.

What happens to asbestos when it enters the environment?

- Asbestos can enter the air and water from the weathering of natural deposits and the wearing down of manufactured asbestos products, such as brake pads.
- Small fibers may remain suspended in the air for a long time before settling. Larger fibers tend to settle more quickly.
- Asbestos fibers aren't able to move through soil and they aren't broken down to other compounds in the environment. Therefore, they can remain in the environment for decades or longer.
- Asbestos fibers may build up in animals.

How might I be exposed to asbestos?

- Breathing low levels in air.
- Breathing higher levels in air while working in industries that make or use asbestos products or near a building that contains asbestos products and is being torn down or renovated.
- Breathing higher levels in air near an asbestos-related industry or near an asbestos-containing waste site.
- Drinking water containing asbestos from natural sources or from asbestos-containing cement pipes in drinking water distribution systems.

How can asbestos affect my health?

Asbestos mainly affects the lungs. Changes in the membrane surrounding the lung are quite common in workers exposed to asbestos. These are also sometimes found in people living in areas with **high levels** of asbestos in the air, but effects on breathing usually aren't serious.

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Breathing **very high levels** of asbestos may result in a slow buildup of scar-like tissue in the lungs and in the membrane that surrounds the lungs. This disease is called asbestosis, and is usually found in asbestos workers and not in the general public. People with asbestosis have shortness of breath, often along with a cough and sometimes heart enlargement. This is a serious disease and can eventually lead to disability or death.

How likely is asbestos to cause cancer?

The **Department of Health and Human Services (DHHS)** has determined that asbestos is a known carcinogen.

It is known that asbestos causes cancer in people. There are two types of cancer caused by exposure to **high levels** of asbestos: cancer of the lung tissue itself and mesothelioma, a cancer of the membrane that surrounds the lung and other internal organs. Both of these are usually fatal. These diseases don't develop immediately, but show up only after many years.

Interactions between cigarette smoke and asbestos increase your chances of getting lung cancer. Studies of workers suggest that breathing asbestos can increase the chances of getting cancer in other parts of the body (stomach, intestines, esophagus, pancreas, kidneys), but this is not certain.

People who are exposed to **lower levels** of asbestos may also have an increased risk of developing cancer, but the risks are usually small and are difficult to measure.

It is not known whether ingesting asbestos causes cancer. Some people who had been exposed to asbestos fibers in their drinking water had higher-than-average death rates from cancer of the esophagus, stomach, and intestines. However, it isn't known whether this was caused by asbestos or by something else.

Is there a medical test to show whether I've been exposed to asbestos?

Chest X-rays cannot detect asbestos fibers, but can detect early signs of lung disease caused by asbestos. Other tests (lung and CAT scans), are also useful in detecting changes in the lungs.

Tests exist to measure asbestos fibers in urine, feces, mucus, or material rinsed out of the lung. However, low levels of asbestos fibers are found in these body fluids in nearly all people, so higher-than-average levels can only show that you have been exposed to asbestos, not whether you will experience any health effects.

Has the federal government made recommendations to protect human health?

In 1989, the **EPA** banned all new uses of asbestos; uses established before this date are still allowed. The **EPA** has established regulations that require school systems to inspect for damaged asbestos and to eliminate or reduce the exposure by removing the asbestos or by covering it up. The **EPA** has set a limit of 7 million fibers per liter (MFL) as the concentration of long asbestos fibers that may be present in drinking water.

Glossary

Carcinogen: A substance that can cause cancer.

CAS: Chemical Abstract Service.

MFL: Million fibers per liter.

CAT scan: A medical test in which a computer makes a 3-dimensional image of a body organ.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1995. Toxicological profile for asbestos. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns. For more information, contact: Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333, Phone: 404-639-6000, FAX: 404-639-6315. ATSDR Internet home page via WWW is http://atsdr1.atsdr.cdc.gov:8080/atsdrhome.html

BARIUM

Agency for Toxic Substances and Disease Registry September 1995

This fact sheet answers the most frequently asked health questions about barium. For more information, you may call 404-639-6000. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to barium occurs mostly in the workplace or from drinking contaminated water. Ingesting high levels of barium can cause problems with the heart, stomach, liver, kidneys, and other organs. This chemical has been found in at least 649 of 1,416 National Priorities List sites identified by the Environmental Protection Agency.

What is barium?

(Pronounced bär′ē-əm)

Barium is a silvery-white metal found in nature. It occurs combined with other chemicals such as sulfur or carbon and oxygen. These combinations are called compounds. Barium compounds can also be produced by industry.

Barium compounds are used by the oil and gas industries to make drilling muds. Drilling muds make it easier to drill through rock by keeping the drill bit lubricated. They are also used to make paint, bricks, tiles, glass, and rubber.

A barium compound (barium sulfate) is sometimes used by doctors to perform medical tests and to take x-rays of the stomach.

What happens to barium when it enters the environment?

- Barium gets into the air during the mining, refining, and production of barium compounds, and from the burning of coal and oil.
- Some barium compounds dissolve easily in water and are found in lakes, rivers, and streams.
- Barium is found in most soils and foods at low levels.
- Fish and aquatic organisms accumulate barium.

How might I be exposed to barium?

- Breathing very low levels in air, drinking water, and eating food
- Breathing higher levels in air while working in industries that make or use barium compounds
- Drinking water containing high levels of barium from natural sources
- Breathing air near barium mining or processing plants.

How can barium affect my health?

The health effects of the different barium compounds depend on how well the compound dissolves in water. Barium compounds that do not dissolve well in water are not generally harmful and are often used by doctors for medical purposes.

Those barium compounds that dissolve well in water may cause harmful health effects in people. Ingesting **high levels** of barium compounds that dissolve well in water over the short term has resulted in

- Difficulties in breathing
- Increased blood pressure
- Changes in heart rhythm
- Stomach irritation

- Brain swelling
- Muscle weakness
- Damage to the liver, kidney, heart, and spleen.

We don't know the effects in people of ingesting **low levels** of barium over the long term. Animal studies have found increased blood pressure and changes in the heart from ingesting barium over a long time. We don't know the effects of barium from breathing it or from touching it.

How likely is barium to cause cancer?

The **Department of Health and Human Services,** the **International Agency for Research on Cancer,** and the **Environmental Protection Agency (EPA)** have not classified barium as to its human carcinogenicity.

Barium has not been classified because there are no studies in people and the two available animal studies were inadequate to determine whether or not barium causes cancer.

Is there a medical test to show whether I've been exposed to barium?

There is no routine medical test to show whether you have been exposed to barium. However, doctors can measure barium in the blood, bones, urine, and feces, using very complex instruments. Due to the complexity of the tests, these tests are usually done only for cases of severe barium poisoning and for medical research.

Has the federal government made recommendations to protect human health?

EPA allows 2 parts of barium per million parts of drinking water (2 ppm). **EPA** requires that discharges or spills into the environment of 10 pounds or more of barium cyanide be reported.

The **Occupational Safety and Health Administration (OSHA),** the **National Institute for Occupational Safety and Health (NIOSH),** and the **American Conference of Governmental Industrial Hygienists (ACGIH)** have set an occupational exposure limit of 0.5 milligrams of soluble barium compounds per cubic meter of air (0.5 mg/m^3) for an 8-hour workday, 40-hour workweek.

The **OSHA** exposure limit for barium sulfate dust in air is 5 to 15 milligrams of barium per cubic meter of air (5–15 mg/m^3).

NIOSH currently recommends that a level of 50 mg/m^3 be considered immediately dangerous to life and health. This is the exposure level of barium that is likely to cause permanent health problems or death.

Glossary

Carcinogenicity: Ability to cause cancer

CAS: Chemical Abstract Service

Ingesting: Taking food or drink into your body

Long-term: Lasting one year or longer

Milligram (mg): One thousandth of a gram

PPM: Parts per million

Short-term: Lasting 14 days or less

Soluble: Dissolves well in liquid

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1992. Toxicological profile for barium. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns. For more information, contact: Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333, Phone: 404-639-6000, FAX: 404-639-6315ATSDR Internet home page via WWW is http://atsdr1.atsdr.cdc.gov.8080/atsdrhome.html

BENZENE
CAS # 71-43-2

Agency for Toxic Substances and Disease Registry ToxFAQs September 1997

This fact sheet answers the most frequently asked health questions (FAQs) about benzene. For more information, call the ATSDR Information Center at 1-800-447-1544. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Benzene is a widely used chemical formed from both natural processes and human activities. Breathing benzene can cause drowsiness, dizziness, and unconsciousness; long-term benzene exposure causes effects on the bone marrow and can cause anemia and leukemia. Benzene has been found in at least 813 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is benzene?

(Pronounced bĕn′zēn′)

Benzene is a colorless liquid with a sweet odor. It evaporates into the air very quickly and dissolves slightly in water. It is highly flammable and is formed from both natural processes and human activities.

Benzene is widely used in the United States; it ranks in the top 20 chemicals for production volume. Some industries use benzene to make other chemicals which are used to make plastics, resins, and nylon and synthetic fibers. Benzene is also used to make some types of rubbers, lubricants, dyes, detergents, drugs, and pesticides. Natural sources of benzene include volcanoes and forest fires. Benzene is also a natural part of crude oil, gasoline, and cigarette smoke.

What happens to benzene when it enters the environment?

- Industrial processes are the main source of benzene in the environment.
- Benzene can pass into the air from water and soil.
- It reacts with other chemicals in the air and breaks down within a few days.
- Benzene in the air can attach to rain or snow and be carried back down to the ground.
- It breaks down more slowly in water and soil, and can pass through the soil into underground water.
- Benzene does not build up in plants or animals.

How might I be exposed to benzene?

- Outdoor air contains low levels of benzene from tobacco smoke, automobile service stations, exhaust from motor vehicles, and industrial emissions.
- Indoor air generally contains higher levels of benzene from products that contain it such as glues, paints, furniture wax, and detergents.
- Air around hazardous waste sites or gas stations will contain higher levels of benzene.
- Leakage from underground storage tanks or from hazardous waste sites containing benzene can result in benzene contamination of well water.
- People working in industries that make or use benzene may be exposed to the highest levels of it.
- A major source of benzene exposure is tobacco smoke.

How can benzene affect my health?

Breathing very high levels of benzene can result in death, while high levels can cause drowsiness, dizziness, rapid heart rate, headaches, tremors, confusion, and unconsciousness. Eating or drinking foods containing high levels of benzene

can cause vomiting, irritation of the stomach, dizziness, sleepiness, convulsions, rapid heart rate, and death.

The major effect of benzene from long-term (365 days or longer) exposure is on the blood. Benzene causes harmful effects on the bone marrow and can cause a decrease in red blood cells leading to anemia. It can also cause excessive bleeding and can affect the immune system, increasing the chance for infection.

Some women who breathed high levels of benzene for many months had irregular menstrual periods and a decrease in the size of their ovaries. It is not known whether benzene exposure affects the developing fetus in pregnant women or fertility in men.

Animal studies have shown low birth weights, delayed bone formation, and bone marrow damage when pregnant animals breathed benzene.

How likely is benzene to cause cancer?

The **Department of Health and Human Services (DHHS)** has determined that benzene is a known human carcinogen. Long-term exposure to high levels of benzene in the air can cause leukemia, cancer of the blood-forming organs.

Is there a medical test to show whether I've been exposed to benzene?

Several test can show if you have been exposed to benzene. There is test for measuring benzene in the breath; this test must be done shortly after exposure. Benzene can also be measured in the blood, however, since benzene disappears rapidly from the blood, measurements are accurate only for recent exposures.

In the body, benzene is converted to products called metabolites. Certain metabolites can be measured in the urine. However, this test must be done shortly after exposure and is not a reliable indicator of how much benzene you have been exposed to, since the metabolites may be present in urine from other sources.

Has the federal government made recommendations to protect human health?

The **EPA** has set the maximum permissible level of benzene in drinking water at 0.005 milligrams per liter (0.005 mg/L). The **EPA** requires that spills or accidental releases into the environment of 10 pounds or more of benzene be reported to the **EPA**.

The **Occupational Safety and Health Administration (OSHA)** has set a permissible exposure limit of 1 part of benzene per million parts of air (1 ppm) in the workplace during an 8-hour workday, 40-hour workweek.

Glossary

Anemia: A decreased ability of the blood to transport oxygen

Carcinogen: A substance with the ability to cause cancer

CAS: Chemical Abstracts Service

Metabolites: Breakdown products of chemicals

Milligram (mg): One thousandth of a gram

Pesticide: A substance that kills pests

Source of Information

This ToxFAQs information is taken from the 1997 Toxicological Profile for Benzene (update) produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

Animal testing is sometimes necessary to find out how toxic substances might harm people and how to treat people who have been exposed. Laws today protect the welfare of research animals and scientists must follow strict guidelines.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-800-447-1544, FAX: 404-639-6359. ToxFAQs Internet address via WWW is http://atsdr1.atsdr.cdc.gov:8080/ToxFAQ.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

BERYLLIUM

Agency for Toxic Substances and Disease Registry

April 1993

This fact sheet answers the most frequently asked health questions about beryllium. For more information, you may call 404-639-6000. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to beryllium happens mostly in the workplace, near some hazardous waste sites, and from breathing tobacco smoke. Lung damage has been observed in some people who have breathed contaminated air. Some people become highly sensitive to beryllium exposure. Beryllium has been found in at least 349 of 1,300 National Priorities List sites identified by the Environmental Protection Agency.

What is beryllium? (Pronounced ber-il´ le-um)

Pure beryllium is a hard, grayish metal. In nature, beryllium can be found in compounds in mineral rocks, coal, soil, and volcanic dust. Beryllium compounds are commercially mined, and the beryllium purified for use in electrical parts, machine parts, ceramics, aircraft parts, nuclear weapons, and mirrors.

Beryllium compounds have no particular smell.

What happens to beryllium when it enters the environment?

- Beryllium dust gets into air from burning coal and oil.
- Beryllium dusts settles from air to the soil and water.
- It enters water from rocks and soil, and from industrial waste.
- Some beryllium compounds dissolve in water, but most settle to the bottom as particles.
- Beryllium particles in ocean water may take a few hundred years to settle to the bottom.
- Most beryllium in soil doesn't move up to the surface or into the groundwater.
- Fish do not build up beryllium in their bodies from the surrounding water to any great extent.

How might I be exposed to beryllium?

- Background levels in air, food, and water are low.
- Breathing contaminated workplace air (e.g., mining or processing ores, alloy and chemical manufacturing with beryllium, machining or recycling metals containing beryllium)
- Beathing tobacco smoke from leaf high in beryllium
- Breathing contaminated air or ingesting water or food near industry or hazardous waste sites.

How can beryllium affect my health?

Beryllium can be harmful if you breathe it. The effects depend on how much you are exposed to and for how long.

High levels of beryllium in air cause lung damage and a disease that resembles pneumonia. If you stop breathing beryllium dust, the lung damage may heal.

Some people become sensitive to beryllium. This is called a hypersensitivity or allergy. These individuals develop an inflammatory reaction to **low levels** of beryllium. This condition is called chronic beryllium

disease, and can occur long after exposure to small amounts of beryllium. This disease can make you feel weak and tired, and can cause difficulty in breathing.

Both the short-term, pneumonia-like disease and the chronic beryllium disease can cause death.

Swallowing beryllium has not been reported to cause effects in humans because very little beryllium can move from the stomach and intestines into the bloodstream.

Beryllium contact with scraped or cut skin can cause rashes or ulcers.

How likely is beryllium to cause cancer?

The Department of Health and Human Services (DHHS) has determined that beryllium and certain beryllium compounds may reasonably be anticipated to be carcinogens. This determination is based on animal studies and studies in workers. None of the studies provide conclusive evidence, but when taken as a whole, they indicate that long-term exposure to beryllium in the air results in an increase in lung cancer.

Is there a medical test to show whether I've been exposed to beryllium?

Tests can measure beryllium in the urine and blood. The amount of beryllium in blood or urine may not indicate how much or how recently you were exposed. Small amounts of human lung and skin can also be removed from the body and examined for beryllium. These tests can be done in a doctor's office or in a hospital.

One test uses blood cells washed out of the lung. If these cells start growing in the presence of beryllium, you are probably sensitive to beryllium and may have chronic beryllium disease.

Has the federal government made recommendations to protect human health?

The Environmental Protection Agency (EPA) restricts the amount of beryllium that industries may emit into the environment to 10 grams (g) in a 24-hour period, or to an amount that would result in atmospheric levels of 0.01 micrograms (μg) beryllium per cubic meter (m^3)of air, averaged over a 30-day period.

The National Institute for Occupational Safety and Health (NIOSH) recommends a standard for occupational exposure of 0.5 μg beryllium/m^3 of workroom air during an 8-hour shift to protect workers from potential cancer.

The Occupational Safety and Health Administration (OSHA) sets a limit of 2 μg beryllium/m^3 of workroom air for an 8-hour work shift.

Glossary

Carcinogen: Substance that can cause cancer.
Ingesting: Taking food or drink into your body.
Hypersensitivity: A greater than normal bodily response to a foreign agent.
Microgram (μg): One millionth of a gram.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1993. Toxicological profile for beryllium Atlanta: U.S. Department of Health and Human Services, Public Health Service.

Agency for Toxic Substances and Disease Registry (ATSDR). 1993. Case studies in environmental medicine: Beryllium toxicity. Atlanta: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information?

ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns. For more information, contact: Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333, Phone: 404-639-6000.

BORON

Agency for Toxic Substances and Disease Registry September 1995

This fact sheet answers the most frequently asked health questions about boron. For more information, you may call 404-639-6000. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to boron occurs in the workplace or from using certain consumer products. Breathing moderate levels of boron irritates the nose, throat, and eyes. This chemical has been found in at least 142 of 1,416 National Priorities List sites identified by the Environmental Protection Agency.

What is boron?

(Pronounced bôr′ŏn′)

Boron is a compound that occurs in nature. It is often found combined with other substances to form compounds called borates. Common borate compounds include boric acid, salts of borates, and boron oxide.

Several companies in the United States produce most of the world's borates by processing boron compounds. Borates are used mostly to produce glass. They are also used in fire retardants, leather tanning industries, cosmetics, photographic materials, soaps and cleaners, and for high-energy fuel. Some pesticides used for cockroach control and some wood preservatives also contain borates.

What happens to boron when it enters the environment?

- Boron is released to the environment from natural sources such as oceans, volcanoes, and geothermal steam.
- Boron is also released from industries that use it.
- No information is available on how long boron remains in air, water, or soil.
- Boron does not appear to accumulate in fish or other organisms in water.
- Boron accumulates in plants and is found in foods, mainly fruits and vegetables.

How might I be exposed to boron?

- In air, water, and food at **low levels**
- Drinking water that contains it from areas where boron is found naturally at high levels in the earth
- Eating foods containing **high levels**
- Working in borax mining and refining plants and at sites where boric acid is manufactured
- Using consumer products that contain it, such as cosmetics and laundry products.

How can boron affect my health?

There is little information on the health effects of long-term exposure to boron. Most of the studies are on short-term exposures.

Breathing **moderate levels** of boron can result in irritation of the nose, throat, and eyes. Reproductive effects, such as low sperm count, were seen in men exposed to boron over the long-term. Animal studies have shown effects on the lungs from breathing **high levels** of boron.

Ingesting **large amounts** of boron over short periods of time can harm the stomach, intestines, liver, kidney, and

brain. Animal studies of ingestion of boron found effects on the testes in male animals. Birth defects were also seen in the offspring of female animals exposed during pregnancy.

We don't know what the effects are in people from skin contact with boron. Animal studies have found skin irritation when boron was applied directly to the skin.

How likely is boron to cause cancer?

The **Department of Health and Human Services**, the **International Agency for Research on Cancer**, and the **Environmental Protection Agency (EPA)** have not classified boron as to its human carcinogenicity.

One animal study found no evidence of cancer after lifetime exposure to boric acid in food. No human studies are available.

Is there a medical test to show whether I've been exposed to boron?

Tests are available to measure boron levels in blood and urine. These tests must be done shortly after exposure, because most excess boron leaves the body through the urine within a few days of exposure.

These tests are not usually performed in doctors' offices because special equipment is needed to conduct them. It is not known whether boron levels measured in the body can be used to predict whether health problems will occur.

Has the federal government made recommendations to protect human health?

The **EPA** allows no more than 30 parts of boron per million parts of cottonseed oil (30 ppm) and 8 ppm of boron in or on citrus fruits.

The **EPA** requires that discharges or spills into the environment of 100 pounds of more of boron trichloride and boron trifluoride be reported.

The **Occupational Safety and Health Administration (OSHA)** has set an occupational exposure limit of 15 milligrams per cubic meter (15 mg/m^3) for boron oxide dust in workplace air for an 8-hour workday, 40-hour workweek.

The **National Institute for Occupational Safety and Health (NIOSH)** currently recommends an occupational exposure limit of 10 mg/m^3 for boron oxide dust.

NIOSH also recommends that 25 ppm boron trifluoride be considered immediately dangerous to life and health. This is the exposure level of a chemical that is likely to cause permanent health problems or death.

The **Food and Drug Administration (FDA)** allows no more than 310 ppm of boron as a food additive.

Glossary

Carcinogenicity: Ability to cause cancer

CAS: Chemical Abstract Service

Ingesting: Taking food or drink into your body

Long-term: Lasting one year or longer

Milligram (mg): One thousandth of a gram

Pesticides: Chemicals used to kill pests

PPM: Parts per million

Short-term: Lasting 14 days or less

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1992. Toxicological profile for boron. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns. For more information, contact: Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333, Phone: 404-639-6000, FAX: 404-639-6315ATSDR Internet home page via WWW is http://atsdr1.atsdr.cdc.gov.8080/atsdrhome.html

2-BUTANONE

Agency for Toxic Substances and Disease Registry September 1995

This fact sheet answers the most frequently asked health questions about 2-butanone. For more information, you may call 404-639-6000. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to 2-butanone occurs in the workplace or from using consumer products containing it. Mild irritations of the eyes, nose, and throat were seen in people who breathed 2-butanone. This chemical has been found in at least 472 of 1,416 National Priorities List sites identified by the Environmental Protection Agency.

What is 2-butanone?

(Pronounced 2-byōō′tə-nōn)

2-Butanone is a manufactured chemical but it is also present in the environment from natural sources. It is a colorless liquid with a sharp, sweet odor. It is also known as methyl ethyl ketone (MEK).

2-Butanone is produced in large quantities. Nearly half of its use is in paints and other coatings because it will quickly evaporate into the air and it dissolves many substances. It is also used in glues and as a cleaning agent.

2-Butanone occurs as a natural product. It is made by some trees and found in some fruits and vegetables in small amounts. It is also released to the air from car and truck exhausts.

What happens to 2-butanone when it enters the environment?

- ❑ 2-Butanone enters the air during production, use and transport, and from hazardous waste sites.
- ❑ In air, one-half of it will break down from sunlight in 1 day or less.
- ❑ It dissolves in water and is broken down more slowly to a simpler chemical form in about 2 weeks.
- ❑ It does not stick to soil and will travel through the soil to the groundwater.
- ❑ Some of the 2-butanone in soil or water will evaporate into the air.
- ❑ It does not deposit in the bottom of rivers or lakes.
- ❑ It is not expected to concentrate in fish or increase in the tissues of animals further up the food chain.

How might I be exposed to 2-butanone?

- ❑ Breathing contaminated air from the production or use of paints, glues, coatings, or cleaning agents containing it
- ❑ Breathing contaminated air near hazardous waste sites
- ❑ Breathing cigarette smoke
- ❑ Sniffing glues
- ❑ Drinking contaminated water from wells near manufacturing or hazardous waste sites
- ❑ Skin contact with the liquid during production or use.

How can 2-butanone affect my health?

The known health effects to people from exposure to 2-butanone are irritation of the nose, throat, skin, and eyes. No one has died from breathing 2-butanone alone. If 2-butanone is breathed along with other chemicals that damage health, it can increase the amount of damage that occurs.

Serious health effects in animals have been seen only at **very high levels.** When breathed, these effects included birth defects, loss of consciousness, and death.

When swallowed, rats had nervous system effects including drooping eyelids and uncoordinated muscle movements. There was no damage to the ability to reproduce.

Mice who breathed low levels for a short time showed temporary behavioral effects. Mild kidney damage was seen in animals that drank water with **lower levels** of 2-butanone for a short time.

There are no long-term studies with animals either breathing or drinking 2-butanone.

How likely is 2-butanone to cause cancer?

The **Department of Health and Human Services** has not classified 2-butanone as to its human carcinogenicity.

The **International Agency for Research on Cancer** and the **Environmental Protection Agency (EPA)** have also not classified 2-butanone as to its human carcinogenicity.

Two studies of workers exposed to 2-butanone and other chemicals did not find an increase in cancer. No animal studies are available that examine the potential for 2-butanone to cause cancer.

Is there a medical test to show whether I've been exposed to 2-butanone?

Tests are available to measure 2-butanone or its breakdown products in blood, breath, and urine. These tests are useful only to measure recent exposures because 2-butanone and its breakdown products leave the body rapidly. These tests are not usually performed at your doctor's office, but your doctor can take blood or urine samples and send them to a testing laboratory.

Has the federal government made recommendations to protect human health?

The **EPA** requires that discharges or spills into the environment of 5,000 pounds of more of 2-butanone be reported.

The **Occupational Safety and Health Administration (OSHA)** set an occupational exposure limit of 200 parts of 2-butanone per million parts of workplace air (200 ppm) for an 8-hour workday, 40-hour workweek.

The **American Conference of Governmental Industrial Hygienists (ACGIH)** and the **National Institute for Occupational Safety and Health (NIOSH)** have established the same guidelines as **OSHA** for the workplace.

Glossary

Carcinogenicity: Ability to cause cancer

CAS: Chemical Abstract Services

Evaporate: To change into a vapor or a gas

PPM: Parts per million

Long-term: Lasting one year or longer

Short time: Lasting 14 days or less

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1992. Toxicological profile for 2-butanone. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns. For more information, contact: Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333, Phone: 404-639-6000, FAX: 404-639-6315ATSDR Internet home page via WWW is http://atsdr1.atsdr.cdc.gov.8080/atsdrhome.html

CADMIUM
CAS # 7440-43-9

Agency for Toxic Substances and Disease Registry ToxFAQs June 1999

This fact sheet answers the most frequently asked health questions (FAQs) about cadmium. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to cadmium happens mostly in the workplace where cadmium products are made. The general population is exposed from breathing cigarette smoke or eating cadmium contaminated foods. Cadmium damages the lungs, can cause kidney disease, and may irritate the digestive tract. This substance has been found in at least 776 of the 1,467 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is cadmium?

(Pronounced cad' me um)

Cadmium is a natural element in the earth's crust. It is usually found as a mineral combined with other elements such as oxygen (cadmium oxide), chlorine (cadmium chloride), or sulfur (cadmium sulfate, cadmium sulfide).

All soils and rocks, including coal and mineral fertilizers, contain some cadmium. Most cadmium used in the United States is extracted during the production of other metals like zinc, lead, and copper. Cadmium does not corrode easily and has many uses, including batteries, pigments, metal coatings, and plastics.

What happens to cadmium when it enters the environment?

- Cadmium enters air from mining, industry, and burning coal and household wastes.
- Cadmium particles in air can travel long distances before falling to the ground or water.
- It enters water and soil from waste disposal and spills or leaks at hazardous waste sites.
- It binds strongly to soil particles.
- Some cadmium dissolves in water.
- It doesn't break down in the environment, but can change forms.
- Fish, plants, and animals take up cadmium from the environment.
- Cadmium stays in the body a very long time and can build up from many years of exposure to low levels.

How might I be exposed to cadmium?

- Breathing contaminated workplace air (battery manufacturing, metal soldering or welding)
- Eating foods containing it; low levels in all foods (highest in shellfish, liver, and kidney meats)
- Breathing cadmium in cigarette smoke (doubles the average daily intake)
- Drinking contaminated water
- Breathing contaminated air near the burning of fossil fuels or municipal waste

How can cadmium affect my health?

Breathing high levels of cadmium severely damages the lungs and can cause death. Eating food or drinking water with very high levels severely irritates the stomach, leading to vomiting and diarrhea. Long-term exposure to lower levels of cadmium in air, food, or water leads to a buildup of cadmium in the kidneys and possible kidney disease.

Other long-term effects are lung damage and fragile bones. Animals given cadmium in food or water had high blood pressure, iron-poor blood, liver disease, and nerve or brain damage.

We don't know if humans get any of these diseases from eating or drinking cadmium. Skin contact with cadmium is not known to cause health effects in humans or animals.

How likely is cadmium to cause cancer?

The Department of Health and Human Services (DHHS) has determined that cadmium and cadmium compounds may reasonably be anticipated to be carcinogens.

How can cadmium affect children?

The health effects in children are expected to be similar to those in adults (kidney, lung and intestinal damage).

We don't know if cadmium causes birth defects in people. Cadmium does not readily go from a pregnant woman's body into the developing child, but some portion can cross the placenta. It can also be found in breast milk. The babies of animals exposed to high levels of cadmium during pregnancy had changes in behavior and learning ability. Cadmium may also affect birth weight and the skeleton in developing animals.

Animal studies also indicate that more cadmium is absorbed into the body if the diet is low in calcium, protein, or iron, or is high in fat. A few studies show that younger animals absorb more cadmium and are more likely to lose bone and bone strength than adults.

How can families reduce the risk of exposure to cadmium?

In the home, store substances that contain cadmium safely, and keep nickel-cadmium batteries out of reach of young children. If you work with cadmium, use all safety precautions to avoid carrying cadmium-containing dust home from work on your clothing, skin, hair, or tools.

A balanced diet can reduce the amount of cadmium taken into the body from food and drink.

Is there a medical test to show whether I've been exposed to cadmium?

Tests are available in some medical laboratories that measure cadmium in blood, urine, hair, or nails. Blood levels show recent exposure to cadmium, and urine levels show both recent and earlier exposure. The reliability of tests for cadmium levels in hair or nails is unknown.

Has the federal government made recommendations to protect human health?

The EPA has set a limit of 5 parts of cadmium per billion parts of drinking water (5 ppb). EPA doesn't allow cadmium in pesticides.

The Food and Drug Administration (FDA) limits the amount of cadmium in food colors to 15 parts per million (15 ppm).

The Occupational Safety and Health Administration (OSHA) limits workplace air to 100 micrograms cadmium per cubic meter (100 $\mu g/m^3$) as cadmium fumes and 200 μg cadmium/m^3 as cadmium dust.

Source of information

Agency for Toxic Substances and Disease Registry (ATSDR). 1999. Toxicological Profile for Cadmium. Atlanta: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-639-6359. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

CARBON TETRACHLORIDE

Agency for Toxic Substances and Disease Registry September 1995

This fact sheet answers the most frequently asked health questions about carbon tetrachloride. For more information, you may call 404-639-6000. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to carbon tetrachloride results mostly from breathing air, drinking water, or coming in contact with soil that is contaminated with it. This is most likely to occur around hazardous waste sites or in the workplace. In people, exposure to very high amounts of carbon tetrachloride can damage the liver, kidneys, and nervous system. This chemical has been found in at least 326 of 1,416 National Priorities List sites identified by the Environmental Protection Agency.

What is carbon tetrachloride?

(Pronounced kär′bən tĕt′rə klôr′īd′)

Carbon tetrachloride is a manufactured compound that does not occur naturally. It's a clear liquid with a sweet smell that can be detected at low levels. It's also called carbon chloride, methane tetrachloride, perchloromethane, tetrachloroethane, or benziform. Trade names include Benzinoform, Freon 10, Halon 104, Tetraform, or Tetrasol.

Carbon tetrachloride is most often found as a colorless gas. It's not flammable and doesn't dissolve in water very easily. It was used in the production of refrigeration fluid and propellants for aerosol cans, as a pesticide, as a cleaning fluid and degreasing agent, in fire extinguishers, and in spot removers. Because of its harmful effects, these uses are now banned and it is only used in some industrial applications.

What happens to carbon tetrachloride when it enters the environment?

- It moves very quickly into the air upon release, so most of it is in the air.
- It evaporates very quickly from soil and surface water.
- Only a small amount sticks to soil particles; the rest evaporates or moves into the groundwater.
- It is very stable in air (lifetime of 30-100 years).
- It can be broken down or transformed in soil and water within several days.
- When it does break down, it forms chemicals that can destroy ozone in the upper atmosphere.
- It doesn't build up in animals. We do not know if it builds up in plants.

How might I be exposed to carbon tetrachloride?

- Breathing contaminated air near manufacturing plants or waste sites
- Breathing workplace air when it is used
- Drinking contaminated water near manufacturing plants and waste sites
- Breathing contaminated air and skin contact with water while showering or cooking with contaminated water
- Swimming or bathing in contaminated water
- Contact with or eating contaminated soil at waste sites.

How can carbon tetrachloride affect my health?

High exposure to carbon tetrachloride can cause liver, kidney, and central nervous system damage. These effects result from either eating, drinking, or breathing it, and possibly from exposure to the skin. The liver is especially sensitive to carbon tetrachloride because it swells and cells

are damaged or destroyed. Kidneys are also damaged, causing a buildup of wastes in the blood. If exposure is **low** and then stops, the liver and kidneys can repair the damaged cells and function normally again.

If exposure is **very high**, the nervous system, including the brain, is affected. People may feel intoxicated and experience headaches, dizziness, sleepiness, and nausea and vomiting. These effects may subside if exposure is stopped, but in severe cases, coma and even death can occur.

There have been no studies in people on carbon tetrachloride's effects on reproduction or development, but studies in rats showed no adverse effects.

How likely is carbon tetrachloride to cause cancer?

The **Department of Health and Human Services** has determined that carbon tetrachloride may reasonably be anticipated to be a carcinogen.

Animals that ingested carbon tetrachloride over a long time developed liver cancer. We do not know if breathing carbon tetrachloride causes cancer in animals. We also do not know if breathing or ingesting it will cause cancer in people.

Is there a medical test to show whether I've been exposed to carbon tetrachloride?

Several sensitive and specific tests are available to measure the amount of carbon tetrachloride in your breath, blood, urine, and body tissues. The tests can't tell you how much carbon tetrachloride you were exposed to or whether there will be any effects on your health. The tests must be done soon after exposure because it leaves your body quickly. These tests aren't routinely performed in doctors' offices, but your doctor can tell you where to obtain such a test.

Has the federal government made recommendations to protect human health?

The **Environmental Protection Agency (EPA)** has set a limit of 0.005 parts of carbon tetrachloride per million parts of drinking water (0.005 ppm). The **EPA** recommends that drinking water exposures should not exceed 0.3 ppm for adults and 0.07 ppm for children for long periods of time (7 years).

The **EPA** has also set limits on how much carbon tetrachloride can be released from an industrial plant into wastewater and is preparing to set limits on how much can be released into outside air.

The **Occupational Safety and Health Administration (OSHA)** set a maximum concentration limit in workplace air of 10 ppm for an 8-hour workday over a 40-hour workweek.

Glossary

Carcinogen: A substance that can cause cancer

CAS: Chemical Abstract Service

Evaporate: To change into a vapor or a gas

Ingesting: Taking food or drink into your body

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1994. Toxicological profile for carbon tetrachloride. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Agency for Toxic Substances and Disease Registry (ATSDR). 1992. Case studies in environmental medicine. Carbon tetrachloride toxicity. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns. For more information, contact: Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333, Phone: 404-639-6000, FAX: 404-639-6315ATSDR Internet home page via WWW is http://atsdr1.atsdr.cdc.gov.8080/atsdrhome.html

CHLORDANE

Agency for Toxic Substances and Disease Registry September 1995

This fact sheet answers the most frequently asked health questions about chlordane. For more information, you may call 404-639-6000. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to chlordane occurs mostly from eating contaminated foods, such as root crops, meats, fish, and shellfish, or from touching contaminated soil. High levels of chlordane can cause damage to the nervous system or liver. This chemical has been found in at least 171 of 1,416 National Priorities List sites identified by the Environmental Protection Agency.

What is chlordane?

(Pronounced klôr′dān′)

Chlordane is a manufactured chemical that was used as a pesticide in the United States from 1948 to 1988. Technical chlordane is not a single chemical, but is actually a mixture of pure chlordane mixed with many related chemicals. It doesn't occur naturally in the environment. It is a thick liquid whose color ranges from colorless to amber. Chlordane has a mild, irritating smell.

Some of its trade names are Octachlor and Velsicol 1068. Until 1983, chlordane was used as a pesticide on crops like corn and citrus and on home lawns and gardens.

Because of concern about damage to the environment and harm to human health, the **Environmental Protection Agency (EPA)** banned all uses of chlordane in 1983 except to control termites. In 1988, **EPA** banned all uses.

What happens to chlordane when it enters the environment?

- ❑ Chlordane entered the environment when it was used as a pesticide on crops, on lawns and gardens, and to control termites.
- ❑ Chlordane sticks strongly to soil particles at the surface and is not likely to enter groundwater.
- ❑ It can stay in the soil for over 20 years.
- ❑ Most chlordane leaves soil by evaporation to the air.
- ❑ It breaks down very slowly.
- ❑ Chlordane doesn't dissolve easily in water.
- ❑ It builds up in the tissues of fish, birds, and mammals.

How might I be exposed to chlordane?

- ❑ By eating crops grown in soil that contains chlordane
- ❑ By eating fish or shellfish caught in water that is contaminated by chlordane
- ❑ By breathing air or touching soil near homes treated for termites with chlordane
- ❑ By breathing air or by touching soil near waste sites or landfills.

How can chlordane affect my health?

Chlordane affects the nervous system, the digestive system, and the liver in people and animals. Headaches, irritability, confusion, weakness, vision problems, vomiting, stomach cramps, diarrhea, and jaundice have occurred in people who breathed air containing **high concentrations** of chlordane or accidentally swallowed **small amounts** of chlordane. **Large amounts** of chlordane taken by mouth can cause convulsions and death in people.

A man who had long-term skin contact with soil containing **high levels** of chlordane had convulsions. Japanese workers who used chlordane over a long period of time had minor changes in liver function.

Animals given **high levels** of chlordane by mouth for short periods died or had convulsions. Long-term exposure caused harmful effects in the liver of test animals.

We do not know whether chlordane affects the ability of people to have children or whether it causes birth defects. Animals exposed before birth or while nursing developed behavioral effects later.

How likely is chlordane to cause cancer?

The **International Agency for Research on Cancer** has determined that chlordane is not classifiable as to its carcinogenicity to humans. Studies of workers who made or used chlordane do not show that exposure to chlordane is related to cancer, but the information is not sufficient to know for sure. Mice fed low levels of chlordane in food developed liver cancer.

Is there a medical test to show whether I've been exposed to chlordane?

Laboratory tests can measure chlordane and its breakdown products in blood, fat, urine, feces, and breast milk. The amount of breakdown products measured in body fat or breast milk does not tell how much or how long ago you were exposed to chlordane or if harmful effects will occur.

Has the federal government made recommendations to protect human health?

In 1988, the **EPA** banned all uses of chlordane. The **EPA** recommends that a child should not drink water with more than 60 parts of chlordane per billion parts of drinking water (60 ppb) for longer than 1 day. **EPA** has set a limit in drinking water of 2 ppb.

EPA requires spills or releases of chlordane into the environment of 1 pound or more to be reported to **EPA**.

The **Food and Drug Administration (FDA)** limits the amount of chlordane and its breakdown products in most fruits and vegetables to less than 300 ppb and in animal fat and fish to less than 100 ppb.

The **Occupational Safety and Health Administration (OSHA)**, the **National Institute for Occupational Health and Safety (NIOSH)**, and the **American Conference of Governmental Industrial Hygienists (ACGIH)** set a maximum level of 0.5 milligrams of chlordane per cubic meter (mg/m^3) in workplace air for an 8-hour workday, 40-hour workweek. These agencies have advised that eye and skin contact should be avoided because this may be a significant route of exposure.

Glossary

Carcinogenicity: Ability to cause cancer

Long-term: Lasting one year or longer

Milligram (mg): One thousandth of a gram

Pesticide: A substance that kills pests

PPB: Parts per billion

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1994. Toxicological profile for chlordane (update). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns. For more information, contact: Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333, Phone: 404-639-6000, FAX: 404-639-6315ATSDR Internet home page via WWW is http://atsdr1.atsdr.cdc.gov.8080/atsdrhome.html

ATSDR CHLORODIBENZOFURANS (CDFS)

Agency for Toxic Substances and Disease Registry September 1995

This fact sheet answers the most frequently asked health questions about chlorodibenzofurans (CDFs). For more information, you may call 404-639-6000. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to chlorodibenzofurans (CDFs) occurs mainly by eating certain contaminated foods. In people, exposure to CDFs is most likely to cause skin and eye irritation, and increased vulnerability to respiratory infection and nervous system effects. This chemical has been found in at least 51 of 1,416 National Priorities List sites identified by the Environmental Protection Agency.

What are chlorodibenzofurans (CDFs)? (Pronounced klor'o-di-ben-zo-fyoor'onz)

Chlorinated dibenzofurans, or CDFs, are a family of chemicals that contain one to eight chlorine atoms attached to the carbon atoms of the parent chemical, dibenzofuran. There are 135 different types of CDFs with varying harmful health and environmental effects. The compounds that contain chlorine atoms at the 2,3,7,8-positions of the dibenzofuran molecule are known to be especially harmful.

Not all of the different types have been found in large enough quantities to study the physical properties. However, of those that have been studied, they do not dissolve in water easily and appear to be in the form of colorless solids.

There is no known use for these chemicals. Other than for research purposes, they are not deliberately produced by industry. Most CDFs are produced in small amounts as undesirable by-products of certain processes, such as manufacturing other chemicals or bleaching at paper and pulp mills. CDFs can also be released from incinerators.

What happens to CDFs when they enter the environment?

- CDFs exist in the air as solid particles and sometimes vapors.
- They can enter the environment from car exhausts or from burning coal, wood, or oil for home heating, and the production of electricity.
- Vaporized CDFs are broken down by other chemicals in the atmosphere.
- They can be removed from the air in snow and rain.
- They attach to soil and sediment in lakes and rivers.
- They are not likely to move into groundwater from soil.
- They accumulate in fish to tens of thousands times higher levels than in the water or sediment.
- They also build up in other animals, birds, and people that are exposed to CDFs in their food.

How might I be exposed to CDFs?

- Eating contaminated foods, such as meat, fish, and milk (90% of daily exposure, which is only a few picograms [pg], results from eating contaminated food)
- Breathing air or drinking water that is contaminated, or coming in contact with contaminated soil
- Using products such as milk cartons, coffee filters, and tampons could result in very low exposures
- Breathing contaminated workplace air.

How can CDFs affect my health?

Very little is known about the health effects in people or animals from breathing or touching CDFs. A study in mice showed that skin exposure to low levels over several weeks produced effects similar to those from ingesting CDFs.

Most of the information on the adverse health effects comes from studies in people who were accidentally exposed to food contaminated with CDFs. The amounts that these people were exposed to were much higher than are likely from environmental exposures or from a normal diet.

CDFs caused skin and eye irritations, including severe acne, darkened skin color, and swollen eyelids with discharge from the eyes. CDF poisoning also caused vomiting and diarrhea, anemia, more frequent lung infections, numbness, effects on the nervous system, and mild changes in the liver. Children born to exposed mothers had skin irritation and more difficulty learning.

Many of the same effects that occurred in people also occurred in laboratory animals that ate CDFs. Animals also had severe weight loss, and their stomachs, livers, kidneys, and immune systems were seriously injured. Some animals had birth defects and testicular damage, and in severe cases, some animals died. These effects in animals were seen when they were fed large amounts of CDFs over a short time, or small amounts over several weeks or months.

How likely are CDFs to cause cancer?

The Department of Health and Human Services, the International Agency for Research on Cancer, and the Environmental Protection Agency (EPA) have not classified CDFs for carcinogenicity.

It is not definitely known if CDFs cause cancer in people. There are no cancer studies in animals that ate or breathed CDFs. One study found that when CDFs were applied to the skin of animals, they did not cause cancer, but when they were applied with another compound called MNNG, which is known to initiate tumors, cancer did develop.

Is there a medical test to show whether I've been exposed to CDFs?

There are tests available to measure CDFs in your blood, body fat, and breast milk. The tests can tell you if you have been exposed, but they can't tell you the exact amount of CDFs or for how long you were exposed. The tests also cannot predict whether you will experience harmful health effects. Nearly everyone in the United States and other industrialized countries has been exposed to low levels of CDFs because they are in the environment.

Has the federal government made recommendations to protect human health?

There are no federal guidelines or recommendations for protecting human health or the environment from exposure to CDFs.

Glossary

Anemia: A decreased ability of the blood to transport oxygen.
Carcinogenicity: Ability to cause cancer.
Picogram (pg): One trillionth of a gram.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1994. Toxicological profile for chlorodibenzofurans. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns. For more information, contact: Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333, Phone: 404-639-6000, FAX: 404-639-6315, ATSDR Internet home page via WWW is http://atsdr1.atsdr.cdc.gov.8080/atsdrhome.html

CHLOROFORM

CAS # 67-66-3

Agency for Toxic Substances and Disease Registry ToxFAQs September 1997

This fact sheet answers the most frequently asked health questions (FAQs) about chloroform. For more information, call the ATSDR Information Center at 1-800-447-1544. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to chloroform can occur when breathing contaminated air or when drinking or touching the substance or water containing it. Breathing chloroform can cause dizziness, fatigue, and headaches. Breathing chloroform or ingesting chloroform over long periods of time may damage your liver and kidneys. It can cause sores if large amounts touch your skin. This substance has been found in at least 717 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is chloroform?

(Pronounced klôr′ə-fôrm′)

Chloroform is a colorless liquid with a pleasant, nonirritating odor and a slightly sweet taste. It will burn only when it reaches very high temperatures.

In the past, chloroform was used as an inhaled anesthetic during surgery, but it isn't used that way today. Today, chloroform is used to make other chemicals and can also be formed in small amounts when chlorine is added to water.

Other names for chloroform are trichloromethane and methyl trichloride.

What happens to chloroform when it enters the environment?

- Chloroform evaporates easily into the air.
- Most of the chloroform in air breaks down eventually, but it is a slow process.
- The breakdown products in air include phosgene and hydrogen chloride, which are both toxic.
- It doesn't stick to soil very well and can travel through soil to groundwater.
- Chloroform dissolves easily in water and some of it may break down to other chemicals.
- Chloroform lasts a long time in groundwater.
- Chloroform doesn't appear to build up in great amounts in plants and animals.

How might I be exposed to chloroform?

- Drinking water or beverages made using water containing chloroform
- Breathing indoor or outdoor air containing it, especially in the workplace
- Eating food that contains it
- Skin contact with chloroform or water that contains it, such as in swimming pools

How can chloroform affect my health?

Breathing about 900 parts of chloroform per million parts air (900 ppm) for a short time can cause dizziness, fatigue, and headache. Breathing air, eating food, or drinking water

containing high levels of chloroform for long periods of time may damage your liver and kidneys. Large amounts of chloroform can cause sores when chloroform touches your skin.

It isn't known whether chloroform causes reproductive effects or birth defects in people.

Animal studies have shown that miscarriages occurred in rats and mice that breathed air containing 30 to 300 ppm chloroform during pregnancy and also in rats that ate chloroform during pregnancy. Offspring of rats and mice that breathed chloroform during pregnancy had birth defects. Abnormal sperm were found in mice that breathed air containing 400 ppm chloroform for a few days.

How likely is chloroform to cause cancer?

The **Department of Health and Human Services (DHHS)** has determined that chloroform may reasonably be anticipated to be a carcinogen.

Rats and mice that ate food or drank water with chloroform developed cancer of the liver and kidneys.

Is there a medical test to show whether I've been exposed to chloroform?

Although the amounts of chloroform in the air that you exhale and in blood, urine, and body tissues can be measured, there is no reliable test to determine how much chloroform you have been exposed to or whether you will experience any harmful effects.

The measurement of chloroform in body fluids and tissues may help to determine if you have come into contact with large amounts of chloroform, but these tests are useful for only a short time after you are exposed. Chloroform in your body might also indicate that you have come into contact with other chemicals.

Has the federal government made recommendations to protect human health?

The **EPA** drinking water limit for total trihalomethanes, a class of chemicals that includes chloroform, is 100 micrograms per liter of water (100 μg/L).

The **EPA** requires that spills or accidental releases of 10 pounds or more of chloroform into the environment be reported to the **EPA**.

The **Occupational Safety and Health Administration (OSHA)** has set the maximum allowable concentration of chloroform in workroom air during an 8-hour workday in a 40-hour workweek at 50 ppm.

Glossary

Carcinogenicity: A substance with the ability to cause cancer

CAS: Chemical Abstracts Service

Ingesting: Taking food or drink into your body

Microgram (μg): One millionth of a gram

Miscarriage: Pregnancy loss

PPM: Parts per million

Source of Information

This ToxFAQs information is taken from the 1997 Toxicological Profile for Chloroform (update) produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

Animal testing is sometimes necessary to find out how toxic substances might harm people and how to treat people who have been exposed. Laws today protect the welfare of research animals and scientists must follow strict guidelines.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-800-447-1544, FAX: 404-639-6359. ToxFAQs Internet address via WWW is http://atsdr1.atsdr.cdc.gov:8080/ToxFAQ.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

CHROMIUM

Agency for Toxic Substances and Disease Registry

April 1993

This fact sheet answers the most frequently asked health questions about chromium. For more information, you may call 404-639-6000. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to chromium happens mostly from breathing workplace air, or ingesting water or food from soil near waste sites. Chromium can damage the lungs and cause allergic responses in the skin. Chromium has been found in at least 115 of 1,300 National Priorities List sites identified by the Environmental Protection Agency.

What is chromium? (Pronounced kro′ mē - um)

Chromium is a naturally occurring element found in rocks, soil, plants, animals, and in volcanic dust and gases.

Chromium has three main forms—chromium(0), chromium(III), and chromium(VI). Chromium(III) compounds are stable and occur naturally, in the environment. Chromium(0) does not occur naturally and chromium (VI) occurs only rarely. Chromium compounds have no taste or odor.

Chromium(III) is an essential nutrient in our diet, but we need only a very small amount. Other forms of chromium are not needed by our bodies.

Chromium is used for making steel and other alloys, bricks in furnaces, and dyes and pigments, and for chrome plating, leather tanning, and wood preserving.

What happens to chromium when it enters the environment?

- ❑ Manufacturing, disposal of products or chemicals containing chromium, or burning of fossil fuels release chromium to the air, soil, and water.
- ❑ Chromium particles settle from air in less than 10 days.
- ❑ Chromium sticks strongly to soil particles.
- ❑ Most chromium in water sticks to dirt particles that fall to the bottom; only a small amount dissolves.
- ❑ Small amounts move from soil to groundwater.
- ❑ Fish don't take up or store chromium in their bodies.

How might I be exposed to chromium?

- ❑ Breathing contaminated workplace air (stainless steel welding, chromate or chrome pigment production, chrome plating, leather tanning)
- ❑ Handling or breathing sawdust from chromium treated wood
- ❑ Breathing contaminated air, or ingesting water, or food from soil near waste sites or industries that use chromium
- ❑ Very small amounts of chromium(III) are in everyday foods.

How can chromium affect my health?

All forms of chromium can be toxic at high levels, but chromium(VI) is more toxic than chromium(III).

Breathing **very high levels** of chromium(VI) in air can damage and irritate your nose, lungs, stomach, and intestines. People who are allergic to chromium may also have asthma attacks after breathing **high levels** of either chromium(VI) or (III).

Long term exposures to **high or moderate levels** of chromium(VI) cause damage to the nose (bleeding, itching, sores) and lungs, and can increase your risk of non-cancer lung diseases.

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, Public Health Service
Agency for Toxic Substances and Disease Registry

Agency for Toxic Substances and Disease Registry April 1993

Ingesting very large amounts of chromium can cause stomach upsets and ulcers, convulsions, kidney and liver damage, and even death.

We don't know if chromium harms the fetus or our ability to reproduce. Mice that ingested large amounts of chromium had reproductive problems and offspring with birth defects.

Skin contact with liquids or solids containing chromium(VI) may lead to skin ulcers. Some people have allergic reactions including severe redness and swelling.

How likely is chromium to cause cancer?

The Department of Health and Human Services has determined that certain chromium(VI) compounds are known carcinogens. This is based on increased lung cancer in some workers who were exposed to chromium. Animal studies also indicate chromium(VI) is a carcinogen. We do not have enough data to determine if chromium(0) or chromium(III) are carcinogens.

Is there a medical test to show whether I've been exposed to chromium?

Chromium can be measured in the hair, urine, serum, red blood cells, and whole blood.

Tests for chromium exposure are most useful for people exposed to high levels. These tests cannot determine the exact levels of chromium you were exposed to or predict how the levels in your tissues will affect your health.

Skin patch tests may indicate if you are allergic to chromium.

Has the federal government made recommendations to protect human health?

The Environmental Protection Agency (EPA) sets a maximum level for chromium(III) and chromium(VI) in drinking water of 100 micrograms of chromium per liter of water (100 μg/L).

The Occupational Safety and Health Administration (OSHA) sets limits for an 8-hour workday, 40-hour workweek of 500 micrograms chromium per cubic meter ($\mu g/m^3$) for water-soluble chromic [chromium(III)] or chromous [chromium(II)] salts and 1,000 $\mu g/m^3$ for metallic chromium [chromium(0)], and insoluble salts. Chromic acid and chromium(VI) compounds in the workplace air should not be higher than 100 $\mu g/m^3$ for any period of time.

The National Institute for Occupational Safety and Health (NIOSH) recommends an exposure limit of 500 μg /m3 for chromium(0), chromium(II), and chromium(III) for a 10-hour workday, 40-hour workweek. NIOSH considers all chromium(VI) compounds to be potential occupational carcinogens, and recommends an exposure limit of 1 $\mu g/m^3$ for a 10-hour workday, 40-hour workweek.

The National Research Council (NRC) recommends a dietary intake of chromium(III) of 50-200 μg/day. In the United States, severe chromium deficiency is rare, but marginal deficiency may be more common. Chromium(III) is believed to help insulin maintain normal glucose levels.

Glossary

Carcinogen: Substance that can cause cancer.
Ingestion: Taking food or drink into your body.
Microgram (μg): One millionth of a gram.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1993. Toxicological profile for chromium. Atlanta: U.S. Department of Health and Human Services, Public Health Service.

Agency for Toxic Substances and Disease Registry (ATSDR). 1993. Case studies in environmental medicine: Chromium toxicity. Atlanta: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information?

ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns. For more information, contact: Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333, Phone: 404-639-6000.

COBALT

Agency for Toxic Substances and Disease Registry September 1995

This fact sheet answers the most frequently asked health questions about cobalt. For more information, you may call 404-639-6000. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Everyone is exposed to low levels of cobalt in air, water, and food. Exposure to higher levels of cobalt occurs in the workplace. Cobalt has both beneficial and harmful effects on health. At low levels, it is part of Vitamin B_{12}, which is essential for good health; at high levels, it may harm the lungs. This chemical has been found in at least 336 of 1,416 National Priorities List sites identified by the Environmental Protection Agency.

What is cobalt?

(Pronounced kō′bôlt′)

Cobalt is a compound that occurs in nature. It occurs in many different chemical forms. Pure cobalt is a steel-gray, shiny, hard metal. Cobalt is not currently mined in the United States.

All cobalt used in industry is imported or obtained by recycling scrap metal that contains cobalt. It is used in industry to make alloys (mixtures of metals), colored pigments, and as a drier for paint and porcelain enamel used on steel bathroom fixtures, large appliances, and kitchen wares.

Small amounts of cobalt naturally occur in food. In addition, vitamin B_{12} is a cobalt-containing compound that is essential for good health.

Some important natural sources of cobalt in the environment are soil, dust, and seawater. Cobalt is also released to the environment from burning coal and oil, and from exhaust from cars and trucks.

What happens to cobalt when it enters the environment?

- ❑ Cobalt enters the environment from natural sources and from the burning of coal and oil.
- ❑ Cobalt stays in the air for a few days.
- ❑ Pure cobalt does not dissolve in water, but some of its compounds do.
- ❑ Cobalt can stay for years in water and soil.
- ❑ It can move from the soil to underground water.
- ❑ Cobalt is taken up by plants from the soil.

How might I be exposed to cobalt?

- ❑ Everyone is exposed to cobalt at **low** levels in air, water, and food.
- ❑ People who live near hazardous waste sites containing cobalt may be exposed to higher levels of this chemical.
- ❑ Food is another source of exposure to cobalt.
- ❑ Workers may be exposed to cobalt in industries that process it or make products containing cobalt.

How can cobalt affect my health?

Cobalt has both beneficial and harmful effects on human health. Cobalt is beneficial because it is part of Vitamin B_{12}. Cobalt has also been used as a treatment for anemia, because it causes red blood cells to be produced.

Exposure to **high levels** of cobalt can harm your health. Effects on the lungs, including asthma, pneumonia, and

wheezing, have been found in workers who breathed **high levels** of cobalt in the air.

In the 1960s, some breweries added cobalt to beer to stabilize the foam. Some people who drank **large quantities** of the beer experienced nausea, vomiting, and serious effects on the heart. However, effects on the heart were not seen in people with anemia or pregnant women treated with cobalt.

Animal studies have found problems with the development of the fetus in animals exposed to **high concentrations** of cobalt during pregnancy. However, cobalt is also essential for the growth and development of certain animals.

How likely is cobalt to cause cancer?

The **International Agency for Research on Cancer** has determined that cobalt is a possible carcinogen to humans.

Studies in animals have shown that cobalt causes cancer when placed directly into the muscle or under the skin. Cobalt did not cause cancer in animals that were exposed to it in the air, in food, or in drinking water. Studies on people are inconclusive regarding cobalt and cancer.

Is there a medical test to show whether I've been exposed to cobalt?

Tests are available to measure cobalt levels in the urine and blood. These tests are only accurate for up to a few days after exposure because cobalt leaves the body fairly quickly.

These tests are not usually performed in most doctors' offices because special equipment is needed to conduct them. These tests cannot determine if adverse health effects will occur from exposure to cobalt.

Has the federal government made recommendations to protect human health?

The **Environmental Protection Agency (EPA)** requires that discharges or accidental spills into the environment of 1,000 pounds or more of cobalt be reported.

The **Occupational Safety and Health Administration (OSHA)** has set an exposure limit of 0.1 milligrams per cubic meter (0.1 mg/m^3) for cobalt in workplace air for an 8-hour workday, 40-hour workweek.

The **American Conference of Governmental and Industrial Hygienists (ACGIH)** has recommended an occupational exposure limit of 0.02 mg/m^3 for cobalt for an 8-hour workday, 40-hour workweek.

The **National Institute for Occupational Safety and Health (NIOSH)** has recommended an occupational exposure limit of 0.05 mg/m^3 for cobalt for a 10-hour workday, 40-hour workweek.

Glossary

Alloy: A mixture of metals

Anemia: A decreased ability of the blood to transport oxygen

Carcinogen: A substance that can cause cancer

Milligram (mg): One thousandth of a gram

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1992. Toxicological profile for cobalt. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information?

ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns. For more information, contact: Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333, Phone: 404-639-6000, FAX: 404-639-6315.

COPPER
CAS # 7440-50-8

Agency for Toxic Substances and Disease Registry ToxFAQs July 1999

This fact sheet answers the most frequently asked health questions (FAQs) about copper. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Copper is an element that is found naturally in the environment. Small amounts of copper are necessary for good health; however, very large amounts can cause dizziness, headaches, diarrhea, and liver and kidney damage. Copper has been found in at least 210 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is copper?

(Pronounced kŏp′ər)

Copper is a reddish metal that occurs naturally in the environment. It also occurs naturally in plants and animals. Copper is an essential element for all living things including people.

Copper is extensively mined in the United States and is used to make wire, sheet metal, pipes, and pennies. It is also used in farming to treat some plant diseases; in water treatment; and to preserve wood, leather, and fabrics.

What happens to copper when it enters the environment?

- Copper is emitted to the air through natural processes such as windblown dust and volcanic eruptions.
- Human activities such as copper smelting and ore processing also result in copper being released to the air.
- Copper may enter the air when it is applied as a fungicide to plants, wood, fabric, and leather.
- Copper is released to water as a result of natural weathering of soil.
- It may also be released to water from discharges from industries and sewage treatment plants.
- Copper may also be added to lakes and ponds to control algae.

How might I be exposed to copper?

- By breathing air and eating food containing copper
- By drinking water containing copper, particularly if you have copper pipes
- By swimming in lakes or ponds where copper was added to the water
- By handling coins and touching other metals containing copper
- By touching soil near industries where copper is mined or disposed of

How can copper affect my health?

Copper is necessary for good health. However, very large doses can be harmful. Long-term exposure to copper in the air can irritate your nose, mouth, and eyes, and cause dizziness, headaches, and diarrhea.

Eating or drinking very high amounts of copper can cause liver and kidney damage and effects on the blood. Drinking water with higher than normal levels of copper can cause vomiting, diarrhea, stomach cramps, and nausea.

Skin contact with copper can result in an allergic reaction in some people. This reaction is usually skin irritation or a skin rash.

Animal testing is sometimes necessary to find out how toxic substances might harm people or to treat those who have been exposed. Laws today protect the welfare of research animals and scientists must follow strict guidelines. Animal studies have shown effects on the stomach and abnormalities in development when animals were fed a diet high in copper.

How likely is copper to cause cancer?

Copper has not been shown to cause cancer in people or animals. The International Agency for Research on Cancer (IARC) has determined that copper is not classifiable as to human carcinogenicity.

Is there a medical test to show whether I've been exposed to copper?

Copper can be measured in the urine and blood. High levels of copper in these fluids can show that you have been exposed to high levels of copper. Samples can be collected in a doctor's office and sent to a laboratory that has special equipment to measure copper levels.

These tests aren't available at most doctors' offices, but can be done at special laboratories that have the right equipment. However, these tests cannot tell you when you were exposed or to how much, or whether health effects will occur.

Has the federal government made recommendations to protect human health?

The EPA has set a treatment technique for copper in drinking water that includes an action level of 1.3 milligrams of copper per liter of water (1.3 mg/L).

The EPA has also set a secondary maximum contaminant level (SMCL) of 1 mg/L of copper in drinking water. An SMCL is a nonenforceable drinking water standard based on taste, odor, or other aesthetic considerations.

The EPA requires that spills or accidental releases into the environment of 5,000 pounds or more of copper be reported to the EPA.

The Occupational Safety and Health Administration (OSHA) has set occupational exposure limits of 0.1 milligram of copper per cubic meter of air (0.1 mg/m^3) as fumes and 1 mg/m^3 of copper as dust and mists for an 8-hour workday, 40-hour workweek.

Glossary

Aesthetic: Relating to the senses (smell, taste, etc.)

Carcinogenicity: Ability to cause cancer

CAS: Chemical Abstracts Service

Fungicide: A substance that kills fungi, a group of plants that include molds, mildews, mushrooms, and yeast

Long-term: 365 days or longer

Milligram (mg): One thousandth of a gram

Source of information

Agency for Toxic Substances and Disease Registry. 1990. Toxicological profile for copper. Atlanta, GA; U.S. Department of Health and Human Services, Public Health Service.

Values in the federal recommendations section updated as of June 1999.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-639-6359. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

CRESOLS

Agency for Toxic Substances and Disease Registry September 1995

This fact sheet answers the most frequently asked health questions about cresols. For more information, you may call 404-639-6000. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to cresols occurs mainly from breathing air containing car exhaust, breathing air from homes heated with coal or wood, and smoking cigarettes. Cresols, when breathed at very high levels, may cause irritation of the nose and throat. These chemicals have been found in at least 314 of 1,416 National Priorities List sites identified by the Environmental Protection Agency.

What are cresols?

(Pronounced krē′-sōlz′)

Cresols are a widely occurring natural and manufactured group of chemicals. In their pure form, they are colorless solids and may be liquids if they are mixtures. Cresols smell like medicine.

There are three forms of cresols that are only slightly different in their chemical structure: ortho-cresol (o-cresol), meta-cresol (m-cresol), and para-cresol (p-cresol). These forms occur separately or as a mixture. They are used to dissolve other chemicals, as disinfectants and deodorizers, and to make certain chemicals that kill insect pests.

Cresols are found in many foods and in wood and tobacco smoke, crude oil, coal tar, and in brown mixtures such as creosote and cresylic acids, which are wood preservatives. Small organisms in soil and water produce cresols when they break down materials in the environment.

What happens to cresols when they enter the environment?

- ❑ Cresols enter the environment from natural sources, car exhaust, combustion, manufacturing use, and waste sites.
- ❑ Cresols appear everywhere in our environment, but usually at low levels, because they quickly break down.
- ❑ In air, cresols quickly break down into other chemicals.
- ❑ Cresols do not evaporate quickly from water, but they can be removed by bacteria.
- ❑ Cresols may last longer in deep groundwater or water that does not have bacteria.
- ❑ In soil, half the total amount of cresols will break down in about a week.
- ❑ Cresols do not appear to accumulate in fish or meat.

How might I be exposed to cresols?

- ❑ Breathing contaminated air from car exhaust, coal or wood combustion, oil refineries, or cigarette smoke
- ❑ Breathing workplace air or skin contact in the workplace
- ❑ Eating foods, including ketchup, tomatoes, cheese, butter, and bacon, but generally the levels are not harmful
- ❑ Drinking contaminated water near manufacturing sites, waste sites, or landfills.

How can cresols affect my health?

Most exposures to cresols are at very **low levels** that are not harmful. When cresols are breathed, ingested, or applied to the skin at **very high levels,** they can be very harmful. Effects observed in people include irritation and burning of

skin, eyes, mouth, and throat; abdominal pain and vomiting; heart damage; anemia; liver and kidney damage; facial paralysis; coma; and death.

Breathing **high levels** of cresols for a short time results in irritation of the nose and throat. Aside from these effects, very little is known about the effects of breathing cresols, for example, at **lower levels** over longer times.

Ingesting **high levels** results in kidney problems, mouth and throat burns, abdominal pain, vomiting, and effects on the blood and nervous system.

Skin contact with **high levels** of cresols can burn the skin and damage the kidneys, liver, blood, brain, and lungs.

Short-term and long-term studies with animals have shown similar effects from exposure to cresols. No human or animal studies have shown harmful effects from cresols on the ability to have children.

It is not known what the effects are from long-term ingestion or skin contact with **low levels** of cresols.

How likely are cresols to cause cancer?

The **Environmental Protection Agency (EPA)** has determined that cresols are possible human carcinogens.

No studies are available in people on the carcinogenic effects of cresols. Animal studies show that cresols may increase the ability of some carcinogenic chemicals to cause tumors.

Is there a medical test to show whether I've been exposed to cresols?

Tests are available that measure the amount of cresols in the urine. The tests must be performed within one day of exposure since cresols break down quickly in the body.

Since cresols occur naturally in the body, results of tests for cresol exposure would have to be compared to results of tests taken from the same person both before and several days after the exposure. These tests are usually not available in your doctor's office.

Has the federal government made recommendations to protect human health?

The **EPA** requires that discharges or accidental spills of 1,000 pounds or more of cresols be reported.

The **Occupational Safety and Health Administration (OSHA)** has set an exposure limit of 22 milligrams per cubic meter (22 mg/m^3) for cresols in workplace air for an 8-hour workday, 40-hour workweek. **OSHA** advises avoiding eye and skin contact because this may be a route of significant exposure.

Glossary

Carcinogen: A substance that can cause cancer

Ingesting: Taking food or drink into your body

Long-term: Lasting one year or longer

Milligram (mg): One thousandth of a gram

Short-term: Lasting 14 days or less

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1992. Toxicological profile for cresols: o-cresol, p-cresol, & m-cresol. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information?

ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns. For more information, contact: Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333, Phone: 404-639-6000, FAX: 404-639-6315.

CYANIDE

CAS # 74-90-8, 143-33-9, 151-50-8, 592-01-8, 544-92-3, 506-61-6, 460-19-5, 506-77-4

Agency for Toxic Substances and Disease Registry ToxFAQs | September 1997

This fact sheet answers the most frequently asked health questions (FAQs) about cyanide. For more information, call the ATSDR Information Center at 1-800-447-1544. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Cyanide is a very poisonous chemical. Exposure to high levels of cyanide harms the brain and heart, and may cause coma and death. Exposure to lower levels may result in breathing difficulties, heart pains, vomiting, blood changes, headaches, and enlargement of the thyroid gland. Cyanide has been found in at least 415 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is cyanide?

(Pronounced sī′ə-nīd′)

Cyanide is usually found joined with other chemicals to form compounds. Examples of simple cyanide compounds are hydrogen cyanide, sodium cyanide and potassium cyanide. Cyanide can be produced by certain bacteria, fungi, and algae, and it is found in a number of foods and plants. In the body, cyanide combines with a chemical to form Vitamin B_{12}. Cyanide occurs naturally in cassava roots, which are potato-like tubers of cassava plants grown in tropical countries.

Hydrogen cyanide is a colorless gas with a faint, bitter, almond-like odor. Sodium cyanide and potassium cyanide are both white solids with a bitter, almond-like odor in damp air. Cyanide and hydrogen cyanide are used in electroplating, metallurgy, production of chemicals, photographic development, making plastics, fumigating ships, and some mining processes.

What happens to cyanide when it enters the environment?

- Cyanide enters the environment from both natural processes and human industrial activities.
- In air, cyanide is mainly found as gaseous hydrogen cyanide; a small amount is present as fine dust particles.
- It takes about 1–3 years for half of the hydrogen cyanide to disappear from the air.
- Most cyanide in surface water will form hydrogen cyanide and evaporate.
- Cyanide in water does not build up in the bodies of fish.
- At high concentrations, cyanide becomes toxic to soil microorganisms and can pass through soil into underground water.

How might I be exposed to cyanide?

- Breathing air, drinking water, touching soil, or eating foods containing cyanide
- Smoking cigarettes and breathing smoke-filled air during fires are major sources of cyanide exposure
- Breathing air near a hazardous waste site containing cyanide
- Eating foods containing cyanide compounds, such as cassava roots, lima beans, and almonds
- Working in an industry where cyanide is used or produced, such as electroplating, metallurgy, metal cleaning, and photography

How can cyanide affect my health?

In large amounts, cyanide is very harmful to people. Expo-

sure to high levels of cyanide in the air for a short time harms the brain and heart, and may cause coma and death.

Exposure to lower levels of cyanide for a long time may result in breathing difficulties, heart pains, vomiting, blood changes, headaches, and enlargement of the thyroid gland.

People who eat large amounts of cyanide may have symptoms including deep breathing and shortness of breath, convulsions, and loss of consciousness, and may die. Use of cassava roots as a primary food source in tropical Africa has led to high blood cyanide levels.

People with high blood cyanide levels have also shown harmful effects such as weakness of the fingers and toes, difficulty walking, dimness of vision, deafness, and decreased thyroid gland function, but chemicals other than cyanide may have contributed to these effects. Skin contact with cyanide can produce irritation and sores.

It is not known whether cyanide can directly cause birth defects in people. Birth defects were seen in rats that ate diets of cassava roots. Effects on the reproductive system were seen in rats and mice that drank water containing sodium cyanide.

How likely is cyanide to cause cancer?

The **EPA** has determined that cyanide is not classifiable as to its human carcinogenicity. There are no reports that cyanide can cause cancer in people or animals.

Is there a medical test to show whether I've been exposed to cyanide?

There are medical tests to measure blood and urine levels of cyanide; however, small amounts of cyanide are always detectable in blood and urine. Tissue levels of cyanide can be measured if cyanide poisoning is suspected, but cyanide is rapidly cleared from the body, so the tests must be done soon after the exposure. An almond-like odor in the breath may alert a doctor that a person was exposed to cyanide.

Has the federal government made recommendations to protect human health?

The **EPA** has set a maximum contaminant level of cyanide in drinking water of 0.2 milligrams cyanide per liter of water (0.2 mg/L). The **EPA** requires that spills or accidental releases into the environment of 1 pound or more of hydrogen cyanide, potassium cyanide, sodium cyanide, calcium cyanide or copper cyanide be reported to the **EPA**.

The **Occupational Safety and Health Administration (OSHA)** and **(other recommendations)** the **American Conference of Governmental Industrial Hygienists (ACGIH)** have set a permissible exposure limit of 5 milligrams of cyanide per cubic meter of air (5 mg/m^3) in the workplace during an 8-hour workday, 40-hour workweek.

Glossary

Carcinogenicity: Ability to cause cancer

CAS: Chemical Abstracts Service

Milligram (mg): One thousandth of a gram

PPM: Parts per million

Source of Information

This ToxFAQs information is taken from the 1997 Toxicological Profile for Cyanide (update) produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

Animal testing is sometimes necessary to find out how toxic substances might harm people and how to treat people who have been exposed. Laws today protect the welfare of research animals and scientists must follow strict guidelines.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-800-447-1544, FAX: 404-639-6359. ToxFAQs Internet address via WWW is http://atsdr1.atsdr.cdc.gov:8080/ToxFAQ.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

DDT, DDE, AND DDD

Agency for Toxic Substances and Disease Registry September 1995

This fact sheet answers the most frequently asked health questions about DDT, DDE, and DDD. For more information, you may call 404-639-6000. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to DDT, DDE, and DDD happens mostly from eating contaminated foods, such as root and leafy vegetables, meat, fish, and poultry. At high levels, it can damage the nervous system, causing excitability, tremors, and seizures in people. These chemicals have been found in at least 337 of 1,416 National Priorities List sites identified by the Environmental Protection Agency.

What are DDT, DDE, and DDD?

(Pronounced DDT, DDE and DDD)

DDT (1,1,1-trichloro-2,2-bis(p-chlorophenyl)ethane) was a manufactured chemical widely used to control insects on agricultural crops and insects that carry diseases like malaria and typhus. It does not occur naturally in the environment. DDT is a white, crystalline solid with no odor or taste.

Because of damage to wildlife and the potential harm to human health, the use of DDT was banned in the United States, except for public health emergencies. DDT is still used in some other countries.

Two similar chemicals that sometimes contaminate DDT products are DDE (1,1-dichloro-2,2-bis(chlorophenyl) ethylene) and DDD (1,1-dichloro-2,2-bis(p-chlorophenyl) ethane). DDD was also used to kill pests, but its use has also been banned. One form of it has been used medically to treat cancer of the adrenal gland. DDE has no commercial use.

What happens to DDT, DDE, and DDD when they enter the environment?

- DDT entered the environment when it was used as an insecticide.
- DDT in air lasts for only a short time. Half the DDT in air is gone within 2 days.
- It does not dissolve easily in water.
- DDT sticks strongly to soil particles and does not move quickly to underground water.
- DDT lasts a very long time in soil; half the DDT in soil will break down in 2–15 years.
- Some DDT will evaporate from soil and surface water into the air and some is broken down by sunlight or by microorganisms in soil or surface water.
- DDT in soil usually breaks down to form DDE or DDD.
- Levels of DDT build up in plants and in the fatty tissues of fish, birds, and animals.

How might I be exposed to DDT, DDE, and DDD?

- Eating domestic foods, such as root and leafy vegetables, fatty meat, fish, and poultry, but levels are very low
- Eating imported foods from countries that still allow the use of DDT to control pests
- Breathing contaminated air or drinking contaminated water; levels generally are low and of little concern except near waste sites and landfills that may contain higher levels of these chemicals
- Infants fed on human breast milk from mothers who have been exposed
- Breathing or swallowing soil particles near waste sites or landfills that contain these chemicals.

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, Public Health Service
Agency for Toxic Substances and Disease Registry

How can DDT, DDE, and DDD affect my health?

DDT affects the nervous system. People who accidentally swallowed **large amounts** of DDT became excitable and had tremors and seizures. These effects went away after the exposure stopped. No effects were seen in people who took **small daily doses** of DDT by capsule for 18 months.

People who worked with DDT for a long time had some reversible changes in the levels of liver enzymes.

In animals, short-term exposure to **large amounts** of DDT in food affected the nervous system. In animals, long-term exposure to DDT affected the liver. Animal studies suggest that short-term exposure to DDT in food may have a harmful effect on reproduction.

How likely are DDT, DDE, and DDD to cause cancer?

The **Department of Health and Human Services (DHHS)** has determined that DDT may reasonably be anticipated to be a human carcinogen. **DHHS** has not classified DDE and DDD, but the **Environmental Protection Agency (EPA)** has determined that they are probable human carcinogens.

Liver cancer has been seen in animals that were fed DDT. Studies in DDT-exposed workers did not show increases in cancer.

Is there a medical test to show whether I've been exposed to DDT, DDE, and DDD?

Laboratory tests can detect DDT, DDE, and DDD in fat, blood, urine, semen, and breast milk. These tests may show **low, moderate,** or **excessive** exposure to these compounds.

These tests cannot show the exact amount of DDT, DDE, or DDD to which a person was exposed or tell if harmful effects will occur. These tests are not routinely available at doctors' offices.

Has the federal government made recommendations to protect human health?

In 1972, the **EPA** banned all uses of DDT, except for public health emergencies. **EPA** requires spills or releases of DDT into the environment of 1 pound or more to be reported to **EPA**.

The **Food and Drug Administration (FDA)** has set limits on DDT levels in most foods.

The **Occupational Safety and Health Administration (OSHA)** set an exposure limit of 1 milligram of DDT per cubic meter (1 mg/m^3) in workplace air for an 8-hour workday, 40-hour workweek. The **National Institute for Occupational Safety and Health (NIOSH)** recommends an exposure limit of 0.5 mg/m^3 in workplace air over a 10-hour workday, 40-hour workweek.

Glossary

Carcinogen: A substance that can cause cancer

Evaporate: To change into a vapor or a gas

Milligram (mg): One thousandth of a gram

Short-term: Lasting 14 days or less

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1994. Toxicological profile for 4,4'-DDT, 4,4'-DDE, 4,4'-DDD (Update). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information?

ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns. For more information, contact: Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333, Phone: 404-639-6000, FAX: 404-639-6315.

1,4-DICHLOROBENZENE

CAS # 106-46-7

Agency for Toxic Substances and Disease Registry ToxFAQs June 1999

This fact sheet answers the most frequently asked health questions (FAQs) about 1,4-dichlorobenzene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to 1,4-dichlorobenzene happens mostly from breathing high levels in indoor air or workplace air. Extremely high exposures can cause dizziness, headaches, and liver problems. 1,4-Dichlorobenzene has been found in at least 281 of 1,467 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is 1,4-dichlorobenzene?

(Pronounced dī′ klôr′ ō bĕn′ zēn′)

1,4-Dichlorobenzene is a chemical used to control moths, molds, and mildew, and to deodorize restrooms and waste containers. It is also called para-DCB or p-DCB. Other names include Paramoth, Para crystals, and Paracide reflecting its widespread use to kill moths.

At room temperature, p-DCB is a white solid with a strong, pungent odor. When exposed to air, it slowly changes from a solid to a vapor. It is the vapor that acts as a deodorizer or insect killer. Most people recognize the odor as the smell of mothballs, and can smell p-DCB in the air at very low levels. Most p-DCB in our environment comes from its use in moth repellent products and in toilet deodorizer blocks.

What happens to 1,4-dichlorobenzene when it enters the environment?

- In air, it breaks down to harmless products in about a month.
- It does not dissolve easily in water.
- It is not easily broken down by soil organisms.
- It evaporates easily from water and soil, so most is found in the air.
- It is taken up and retained by plants and fish.

How might I be exposed to 1,4-dichlorobenzene?

- Breathing indoor air in public restrooms and homes that use p-DCB as a deodorizer
- Breathing air around some mothballs (check the label)
- Breathing workplace air where p-DCB is manufactured
- Drinking contaminated water around hazardous waste sites
- Eating foods such as pork, chicken, and eggs that are contaminated with p-DCB from its use as an odor control product in animal stalls
- Eating fish from contaminated waters

How can 1,4-dichlorobenzene affect my health?

There is no evidence that moderate use of common household products that contain p-DCB will result in harmful effects to your health. Harmful effects, however, may occur from high exposures. Very high usage of p-DCB products in the home can result in dizziness, headaches, and liver problems.

Some of the patients who developed these symptoms had been using the products for months or even years after they first began to feel ill.

Workers breathing high levels of p-DCB (1,000 times more than levels in deodorized rooms) have reported painful irritation of the nose and eyes. There are cases of people who have eaten p-DCB products regularly for months to years because of its sweet taste. These people had skin blotches and lower numbers of red blood cells.

How likely is 1,4-dichlorobenzene to cause cancer?

The Department of Health and Human Services (DHHS) has determined that p-DCB may reasonably be anticipated to be a carcinogen. There is no direct evidence that p-DCB can cause cancer in humans. However, animals given very high levels in water developed liver and kidney tumors.

How can 1,4-dichlorobenzene affect children?

Children are exposed to p-DCB in many of the same ways that adults are. Children may be at higher risk, due to accidental exposures such as swallowing p-DCB used in the home in mothballs or toilet bowl deoderant blocks. There is very little information on how children react to p-DCB exposure, but children would probably show the same effects as adults.

No studies in people or animals show that p-DCB crosses the placenta or can be found in fetal tissues. Based on other similar chemicals, it is possible that this could occur. There is no credible evidence that p-DCB causes birth defects. One study found dichlorobenzenes in breast milk, but p-DCB has not been specifically measured.

How can families reduce the risk of exposure to 1,4-dichlorobenzene?

You should not let children play with or drink toilet bowl water because it may contain p-DCB. Do not let children rub mothballs or cleaners containing p-DCB on their skin. Pesticides, bathroom deoderizers, and mothballs containg p-DCB should be stored out of reach of young children. Always store household chemicals in their original containers. Never store them in containers children would find attractive to eat or drink from, such as old soda bottles.

Is there a medical test to show whether I've been exposed to 1,4-dichlorobenzene?

Tests are available to measure your exposure to p-DCB. The most common test measures a breakdown product of p-DCB called 2,5-dichlorophenol in urine and blood. If there is 2,5-dichlorophenol in the urine, it indicates that the person was exposed to p-DCB within the previous day or two. The test that measures p-DCB in your blood is less common.

Has the federal government made recommendations to protect human health?

The EPA has set a maximum contaminant level of 75 micrograms of p-DCB per liter of drinking water (75 μg/L).

p-DCB is also an EPA-registered pesticide. Manufacturers must provide certain information to EPA for it to be used as a pesticide.

The Occupational Safety and Health Administration (OSHA) has set a maximum level of 75 parts of p-DCB per million parts air in the workplace (75 ppm) for an 8-hour day, 40-hour workweek.

Source of information

Agency for Toxic Substances and Disease Registry (ATSDR). 1998. Toxicological Profile for 1,4-Dichlorobenzene. Atlanta: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone:1-888-422-8737, FAX: 404-639-6359. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

1,1-DICHLOROETHANE

CAS # 75-34-3

Agency for Toxic Substances and Disease Registry ToxFAQs July 1999

This fact sheet answers the most frequently asked health questions (FAQs) about 1,1-dichloroethane. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: 1,1-Dichloroethane is used to make other chemicals and to dissolve and remove grease. Breathing very high levels can affect your heart and animal studies have seen kidney disease from long-term exposure to high levels in air. 1,1-Dichloroethane has been found in at least 248 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is 1,1-dichloroethane?

(Pronounced 1,1-dī′ klôr′ ō ĕth′ ān′)

1,1-Dichloroethane is a colorless, oily liquid with a sweet odor. It evaporates easily at room temperature and burns easily. It does not occur naturally in the environment.

In the past, 1,1-dichloroethane was used as a surgical anesthetic, but it is no longer used this way. Today it is used primarily to make other chemicals, to dissolve substances such as paint, varnish, and finish removers, and to remove grease.

What happens to 1,1-dichloroethane when it enters the environment?

- 1,1-Dichloroethane is released from industrial processes primarily to the air.
- 1,1-Dichloroethane evaporates from water rapidly into the air.
- It can also be found in the air as a breakdown product of another chemical, 1,1,1-trichloroethane.
- 1,1-Dichloroethane does not dissolve easily in water.
- Small amounts of 1,1-dichloroethane released to soil can evaporate into the air or move into groundwater.
- It is not known how long it stays in soil.
- 1,1-Dichloroethane is not expected to build up in the body tissues of animals.

How might I be exposed to 1,1-dichloroethane?

- Breathing air containing it from industrial releases or hazardous waste sites
- Drinking contaminated tap water
- Touching soil containing it
- Touching contaminated materials in the workplace

How can 1,1-dichloroethane affect my health?

Animal testing is sometimes necessary to find out how toxic substances might harm people or to treat those who have been exposed. Laws today protect the welfare of research animals and scientists must follow strict guidelines.

1,1-DICHLOROETHANE

CAS # 75-34-3

ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html

Very limited information is available on the effects of 1,1-dichloroethane on people's health. The chemical was discontinued as a surgical anesthetic when effects on the heart, such as irregular heart beats were reported.

Studies in animals have shown that 1,1-dichloroethane can cause kidney disease after long-term exposure to high levels in air. Delayed growth was seen in the offspring of animals who breathed high concentrations of the chemical during pregnancy.

How likely is 1,1-dichloroethane to cause cancer?

The Department of Health and Human Services (DHHS), the International Agency for Research on Cancer (IARC), and the EPA have not classified 1,1-dichloroethane for carcinogenicity.

1,1-Dichloroethane caused cancer in one study in which rats and mice were fed large doses of the chemical for their lifetimes.

Is there a medical test to show whether I've been exposed to 1,1-dichloroethane?

Tests are available that measure 1,1-dichloroethane in urine, blood, breath, and body tissues. These tests aren't available at most doctors' offices, but can be done at a special laboratory that has special equipment.

The tests must be done soon after exposure occurs, because most of the 1,1-dichloroethane that is taken into the body leaves within 2 days. In addition, these tests cannot tell you when you were exposed, or whether health effects will occur.

Has the federal government made recommendations to protect human health?

The EPA requires that spills or accidental releases into the environment of 1,000 pounds or more of 1,1-dichloroethane be reported to the EPA.

The Occupational Safety and Health Administration (OSHA) has set an occupational exposure limit of 400 milligrams of 1,1-dichloroethane per cubic meter of air (400 mg/m^3) for an 8-hour workday, 40-hour workweek.

The National Institute for Occupational Safety and Health (NIOSH) and the American Conference of Governmental Industrial Hygienists (ACGIH) recommend the same exposure limit in air.

NIOSH currently recommends that a level of 12,150 mg/m^3 be considered immediately dangerous to life and health. This is the exposure level of 1,1-dichloroethane that is likely to cause permanent health problems or death.

Glossary

Anesthetic: A substance used to cause numbness
Carcinogenicity: Ability to cause cancer
CAS: Chemical Abstracts Service
Evaporate: To change into a vapor or gas
Milligram (mg): One thousandth of a gram

Source of information

Agency for Toxic Substances and Disease Registry. 1990. Toxicological Profile for 1,1-Dichloroethane. Atlanta, GA; U.S. Department of Health and Human Services, Public Health Service.

Values in the federal recommendations section updated as of June 1999.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-639-6359. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

1,2-DICHLOROETHANE

Agency for Toxic Substances and Disease Registry September 1995

This fact sheet answers the most frequently asked health questions about 1,2-dichloroethane. For more information, you may call 404-639-6000. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to 1,2-dichloroethane occurs mainly in the workplace. Breathing high levels of 1,2-dichloroethane damages the central nervous system, heart, liver, kidneys, and lungs. This chemical has been found in at least 493 of 1,416 National Priorities List sites identified by the Environmental Protection Agency.

What is 1,2-dichloroethane?

(Pronounced 1,2-dī′klôr′ō ĕth′ān′)

1,2-Dichloroethane is a manufactured chemical that is not found naturally in the environment. It is clear and has a pleasant smell and a sweet taste. It is also called 1,2-ethylene dichloride, dichloroethylene, or ethylene dichloride.

Its most common use today is to make vinyl chloride and other chemicals and to dissolve grease, glue, and dirt. It is also added to leaded gasoline to remove lead.

In the past, 1,2-dichloroethane was used in home products such as cleaning solutions and paint removers. It is rarely used in these products today.

What happens to 1,2-dichloroethane when it enters the environment?

- ❑ Most of it goes into the air during manufacturing or use.
- ❑ It evaporates very quickly from water into the air.
- ❑ In air, it is readily broken down by sunlight.
- ❑ It slowly breaks down in water.
- ❑ It can stay in groundwater for many years.
- ❑ In soil, it can be broken down within several months if another compound called methane is also present.

How might I be exposed to 1,2-dichloroethane?

- ❑ Breathing contaminated air in workplaces where it is used
- ❑ Breathing contaminated air near factories where 1,2-dichloroethane is made or used
- ❑ Breathing contaminated air near hazardous waste sites that contain the chemical
- ❑ Drinking water from contaminated wells
- ❑ Breathing contaminated air when using cleaning products or other products that contain 1,2-dichloroethane.

How can 1,2-dichloroethane affect my health?

Breathing **high levels** of 1,2-dichloroethane results in many harmful effects to people. It causes damage to the heart, central nervous system, liver, kidneys, and lungs.

These same effects have been seen in people who accidentally ingested **high levels** of the chemical.

We do not know the effects in people of breathing or ingesting **lower levels** of 1,2-dichloroethane over a longer period of time.

Studies in animals have found similar nervous system damage and kidney disease from breathing and ingesting the chemical. Other effects in animals include a reduced ability to fight infection. These effects have not been adequately studied in people.

Animal studies suggest that 1,2-dichloroethane is not likely to harm the ability to reproduce or cause an increase in the number of birth defects.

Animal studies show that direct contact with 1,2-dichloroethane can cause damage to the skin and eyes.

How likely is 1,2-dichloroethane to cause cancer?

The **Department of Health and Human Services** has determined that 1,2-dichloroethane may reasonably be anticipated to be a carcinogen.

Human studies are inconclusive. Several studies have not shown an increase in tumors in workers exposed to 1,2-dichloroethane. One study found an increase in colon and rectal cancer in people who drank contaminated water, but other chemicals were also present in the water.

There is good evidence from animal studies that ingesting large amounts of 1,2-dichloroethane causes an increase in a variety of tumors. In some animal studies, it caused cancer when breathed or absorbed through the skin.

Is there a medical test to show whether I've been exposed to 1,2-dichloroethane?

Tests are available that measure levels of 1,2-dichloroethane in breath, blood, breast milk, and urine. These tests are not usually available in a doctor's office. However, a sample taken in a doctor's office can be sent to a special laboratory if needed.

1,2-Dichloroethane leaves the body fairly quickly, so these tests are only good for exposures that occurred within the previous few days. The tests can't tell if an exposure will result in harmful effects.

Has the federal government made recommendations to protect human health?

The **Environmental Protection Agency (EPA)** has set a limit in drinking water of 0.005 parts of 1,2-dichloroethane per million parts of water (0.005 ppm). **EPA** requires that discharges or spills into the environment of 100 pounds or more of 1,2-dichloroethane be reported.

The **Occupational Safety and Health Administration (OSHA)** has set an occupational exposure limit of 50 parts of 1,2-dichloroethane per million parts of air (50 ppm) for an 8-hour workday, 40-hour workweek.

The **National Institute for Occupational Safety and Health (NIOSH)** has recommended an occupational exposure limit of 1 ppm of 1,2-dichloroethane for a 10-hour workday, 40-hour workweek.

Glossary

Carcinogen: A substance that can cause cancer

CAS: Chemical Abstract Service

Ingesting: Taking food or drink into your body

PPM: Parts per million

Tumor: An abnormal mass of tissue

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1994. Toxicological profile for 1,2-dichloroethane. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns. For more information, contact: Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333, Phone: 404-639-6000, FAX: 404-639-6315ATSDR Internet home page via WWW is http://atsdr1.atsdr.cdc.gov.8080/atsdrhome.html

1,1-DICHLOROETHENE

CAS # 75-35-4

Agency for Toxic Substances and Disease Registry September 1995

This fact sheet answers the most frequently asked health questions about 1,1-dichloroethene. For more information, you may call 404-639-6000. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to 1,1-dichloroethene occurs mainly in the workplace. Breathing high levels of 1,1-dichloroethene can affect the liver, kidney, and central nervous system. This chemical has been found in at least 515 of 1,416 National Priorities List sites identified by the Environmental Protection Agency.

What is 1,1-dichloroethene?

(Pronounced 1,1-dī′klôr′ō ĕth′ēn)

1,1-Dichloroethene is an industrial chemical that is not found naturally in the environment. It is a colorless liquid with a mild, sweet smell. It is also called vinylidene chloride.

1,1-Dichloroethene is used to make certain plastics, such as flexible films like food wrap, and in packaging materials. It is also used to make flame retardant coatings for fiber and carpet backings, and in piping, coating for steel pipes, and in adhesive applications.

What happens to 1,1-dichloroethene when it enters the environment?

- 1,1-Dichloroethene enters the environment from industries that make or use it.
- 1,1-Dichloroethene evaporates very quickly from water and soil to the air.
- In the air, it takes about 4 days for it to break down.
- 1,1-Dichloroethene breaks down very slowly in water.
- It does not accumulate very much in fish or birds.
- In soil, 1,1-dichloroethene is slowly transformed to other less harmful chemicals.

How might I be exposed to 1,1-dichloroethene?

- Workers may be exposed in industries that make or use 1,1-dichloroethene (these industries are mainly in Texas and Louisiana).
- Food that is wrapped in plastic wrap may contain very low levels of 1,1-dichloroethene. The government controls these levels to prevent harm to your health.
- A small percentage (3%) of the drinking water supplies may contain very low levels of 1,1-dichloroethene.
- Air near factories that make or use 1,1-dichloroethene and air near hazardous waste sites may contain low levels of it.

How can 1,1-dichloroethene affect my health?

The main effect from breathing **high levels** of 1,1-dichloroethene is on the central nervous system. Some people lost their breath and fainted after breathing **high levels** of the chemical.

Breathing **lower levels** of 1,1-dichloroethene in air for a long time may damage your nervous system, liver, and lungs. Workers exposed to 1,1-dichloroethene have reported a loss in liver function, but other chemicals were present.

Animals that breathed **high levels** of 1,1-dichloroethene had damaged livers, kidneys, and lungs. The offspring of some of the animals had a higher number of birth defects. We do not know if birth defects occur when people are exposed to 1,1-dichloroethene.

Animals that ingested **high levels** of 1,1-dichloroethene had damaged livers, kidneys, and lungs. There were no birth defects in animals that ingested the chemical.

Spilling 1,1-dichloroethene on your skin or in your eyes can cause irritation.

How likely is 1,1-dichloroethene to cause cancer?

The **Environmental Protection Agency (EPA)** has determined that 1,1-dichloroethene is a possible human carcinogen.

Studies on workers who breathed 1,1-dichloroethene have not shown an increase in cancer. These studies, however, are not conclusive because of the small numbers of workers and the short time studied.

Animal studies have shown mixed results. Several studies reported an increase in tumors in rats and mice, and other studies reported no such effects.

Is there a medical test to show whether I've been exposed to 1,1-dichloroethene?

Tests are available to measure levels of 1,1-dichloroethene in breath, urine, and body tissues. These tests are not usually available in your doctor's office. However, a sample taken in your doctor's office can be sent to a special laboratory if necessary.

Because 1,1-dichloroethene leaves the body fairly quickly, these methods are useful only for finding exposures that have occurred within the last few days. These tests can't tell you if adverse health effects will occur from exposure to 1,1-dichloroethene.

Has the federal government made recommendations to protect human health?

The **EPA** has set a limit in drinking water of 0.007 parts of 1,1-dichloroethene per million parts of drinking water (0.007 ppm). **EPA** requires that discharges or spills into the environment of 5,000 pounds or more of 1,1-dichloroethene be reported.

The **Occupational Safety and Health Administration (OSHA)** has set an occupational exposure limit of 1 ppm of 1,1-dichloroethene in workplace air for an 8-hour workday, 40-hour workweek.

The **National Institute for Occupational Safety and Health (NIOSH)** currently recommends that workers breathe as little 1,1-dichloroethene as possible.

Glossary

Carcinogen: A substance that can cause cancer
CAS: Chemical Abstracts Service
Ingesting: Taking food or drink into your body
PPM: Parts per million
Tumor: An abnormal mass of tissue

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1994. Toxicological profile for 1,1-dichloroethene. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns. For more information, contact: Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333, Phone: 404-639-6000, FAX: 404-639-6315ATSDR Internet home page via WWW is http://atsdr1.atsdr.cdc.gov.8080/atsdrhome.html

1,2-DICHLOROETHENE

Agency for Toxic Substances and Disease Registry September 1997

This fact sheet answers the most frequently asked health questions (FAQs) about 1,2-dichloroethene. For more information, call the ATSDR Information Center at 1-800-447-1544. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to 1,2-dichloroethene occurs mainly in workplaces where it is made or used. Breathing high levels of 1,2-dichloroethene can make you feel nauseous, drowsy, and tired. cis-1,2-Dichloroethene has been found in at least 146 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA). trans-1,2-Dichloroethene was found in at least 563 NPL sites. 1,2-Dichloroethene was found at 336 sites, but the isomer (cis- or trans-) was not specified.

What is 1,2-dichloroethene?

1,2-Dichloroethene, also called 1,2-dichloroethylene, is a highly flammable, colorless liquid with a sharp, harsh odor. It is used to produce solvents and in chemical mixtures. You can smell very small amounts of 1,2-dichloroethene in air (about 17 parts of 1,2-dichloroethene per million parts of air [17 ppm]).

There are two forms of 1,2-dichloroethene; one is called cis-1,2-dichloroethene and the other is called trans-1,2-dichloroethene. Sometimes both forms are present as a mixture.

What happens to 1,2-dichloroethene when it enters the environment?

- 1,2-Dichloroethene evaporates rapidly into air.
- In the air, it takes about 5–12 days for half of it to break down.
- Most 1,2-dichloroethene in the soil surface or bodies of water will evaporate into air.
- 1,2-Dichloroethene can travel through soil or dissolve in water in the soil. It is possible that it can contaminate groundwater.
- In groundwater, it takes about 13–48 weeks to break down.
- There is a slight chance that 1,2-dichloroethene will break down into vinyl chloride, a different chemical which is believed to be more toxic than 1,2-dichloroethene.

How might I be exposed to 1,2-dichloroethene?

- Breathing 1,2-dichloroethene that has leaked from hazardous waste sites and landfills
- Drinking contaminated tap water or breathing vapors from contaminated water while cooking, bathing, or washing dishes
- Breathing 1,2-dichloroethene, touching it, or touching contaminated materials in the workplace

How can 1,2-dichloroethene affect my health?

Breathing high levels of 1,2-dichloroethene can make you feel nauseous, drowsy, and tired; breathing very high levels can kill you.

When animals breathed high levels of trans-1,2-dichloroethene for short or longer periods of time, their livers and lungs were damaged and the effects were more severe with longer exposure times. Animals that breathed very high levels of trans-1,2-dichloroethenehad damaged hearts.

Animals that ingested extremely high doses of cis- or trans-1,2-dichloroethene died.

Lower doses of cis-1,2-dichloroethene caused effects on the blood, such as decreased numbers of red blood cells, and also effects on the liver.

The long-term (365 days or longer) human health effects after exposure to low concentrations of 1,2-dichloroethene aren't known. One animal study suggested that an exposed fetus may not grow as quickly as one that hasn't been exposed.

Exposure to 1,2-dichloroethene hasn't been shown to affect fertility in people or animals.

How likely is 1,2-dichloroethene to cause cancer?

The EPA has determined that cis-1,2-dichloroethene is not classifiable as to its human carcinogenicity. No EPA cancer classification is available for trans-1,2-dichloroethene.

Is there a medical test to show whether I've been exposed to 1,2-dichloroethene?

Tests are available to measure concentrations of the breakdown products of 1,2-dichloroethene in blood, urine, and tissues. However, these tests aren't used routinely to determine whether a person has been exposed to this compound. This is because after you are exposed to 1,2-dichloroethene, the breakdown products in your body that are detected with these tests may be the same as those that come from exposure to other chemicals. These tests aren't available in most doctors' offices, but can be done at special laboratories that have the right equipment.

Has the federal government made recommendations to protect human health?

The EPA has set the maximum allowable level of cis-1,2-dichloroethene in drinking water at 0.07 milligrams per liter of water (0.07 mg/L) and trans-1,2-dichloroethene at 0.1 mg/L.

The EPA requires that any spills or accidental release of 1,000 pounds or more of 1,2-dichloroethene must be reported to the EPA.

The Occupational Health Safety and Health Administration (OSHA) has set the maximum allowable amount of 1,2-dichloroethene in workroom air during an 8-hour workday in a 40-hour workweek at 200 parts of 1,2-dichloroethene per million parts of air (200 ppm).

Glossary

Carcinogenicity: Ability of a substance to cause cancer
CAS: Chemical Abstracts Service
Fertility: Ability to reproduce
Ingest: To eat or drink something
Milligram (mg): One thousandth of a gram
PPM: Parts per million
Solvent: A chemical that can dissolve other substances

Source of Information

This ToxFAQs information is taken from the 1996 Toxicological Profile for 1,2-Dichloroethene produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

Animal testing is sometimes necessary to find out how toxic substances might harm people and how to treat people who have been exposed. Laws today protect the welfare of research animals and scientists must follow strict guidelines.

Where can I get more information? ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns. For more information, contact: Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333, Phone: 1-800-447-1544, FAX: 404-639-6315, ATSDR Internet home page via WWW is http://atsdr1.atsdr.cdc.gov.8080/atsdrhome.html

DIETHYL PHTHALATE

CAS # 84-66-2

Agency for Toxic Substances and Disease Registry September 1996

This fact sheet answers the most frequently asked health questions about diethyl phthalate. For more information, you may call 404-639-6000. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to diethyl phthalate occurs when you use plastics that contain it, and when you eat food from plastic containers made with it. Health effects have not been reported in people exposed to diethyl phthalate. This substance has been found in at least 248 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is diethyl phthalate?

(Pronounced dī ĕth′əl thăl′āt)

Diethyl phthalate is a colorless liquid that has a bitter, disagreeable taste. This synthetic substance is commonly used to make plastics more flexible. Products in which it is found include toothbrushes, automobile parts, tools, toys, and food packaging.

Diethyl phthalate can be released fairly easily from these products, as it is not part of the chain of chemicals (polymers) that makes up the plastic. Diethyl phthalate is also used in cosmetics, insecticides, and aspirin.

What happens to diethyl phthalate when it enters the environment?

- Diethyl phthalate has been found in waste sites and landfills from discarded plastics.
- It may break down in the air.
- It can become attached to particles of dust in the air, and can settle out.
- It is broken down to harmless products by microorganisms in soil and water.
- Small amounts of it can build up in fish and shellfish living in water containing it.

How might I be exposed to diethyl phthalate?

- Eating food that was contained in plastic packaging.
- Eating contaminated fish and shellfish.
- Drinking contaminated water near waste sites and landfills that contain diethyl phthalate.
- Using consumer products that contain it.

How can diethyl phthalate affect my health?

No information is available regarding possible effects caused by diethyl phthalate if you breathe, eat, or drink it, or if it touches your skin. **Very high** oral doses of diethyl phthalate have caused death in animals, but brief oral exposures to lower doses caused no harmful effects.

Weight gain was decreased in animals that ate **high doses** of diethyl phthalate for a long time. The liver and kidneys of these animals were larger than normal, but not from any harmful effects of diethyl phthalate.

It is not known if diethyl phthalate causes birth defects in humans. Fewer live babies were born to female animals that were exposed to diethyl phthalate throughout their lives.

The presence of an extra rib has been noted in newborn rats whose mothers were given **very high** dietary doses of diethyl phthalate, but this effect is not considered harmful by all scientists. Some birth defects occurred in rats whose mothers received **high doses** of diethyl phthalate by injection during pregnancy. Humans are not exposed to diethyl phthalate by this route.

Diethyl phthalate can be mildly irritating when applied to the skin of animals. It can also be slightly irritating when put directly into the eyes of animals.

How likely is diethyl phthalate to cause cancer?

The **Environmental Protection Agency (EPA)** has determined that diethyl phthalate is not classifiable as to its carcinogenicity in humans.

Diethyl phthalate placed directly on the skin of rats daily for 2 years was not carcinogenic. Liver tumors were seen in mice that had diethyl phthalate placed directly on their skin daily for 2 years. This type of tumor is common in mice, and the smallest dose resulted in a similar number of tumors as the largest dose.

It is not clear if diethyl phthalate will cause a similar effect in humans. Other studies of cancer in humans or animals exposed to diethyl phthalate were not located.

Is there a medical test to show whether I've been exposed to diethyl phthalate?

There is no routine medical test to show if you have been exposed to diethyl phthalate. However, it has been measured in semen, fat, and kidney tissue in laboratory studies.

Has the federal government made recommendations to protect human health?

The **EPA** requires that spills or accidental releases into the environment of 1,000 pounds or more of diethyl phthalate be reported to the **EPA**.

The **National Institute for Occupational Safety and Health (NIOSH)** and the **American Conference of Governmental Industrial Hygienists (ACGIH)** recommend a maximum concentration of 5 milligrams of diethyl phthalate per cubic meter of air (5 mg/m^3) in workplace air for an 8- to 10-hour workday, 40-hour workweek.

Glossary

Carcinogenicity: Ability to cause cancer.

CAS: Chemical Abstract Service.

Insecticide: Substance that kills insects.

Milligram (mg): One thousandth of a gram.

Oral: Taken by mouth.

Synthetic: Made by humans.

Tumor: An abnormal mass of tissue.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1995. Toxicological profile for diethyl phthalate (update). Atlanta, GA.: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns. For more information, contact: Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333, Phone: 404-639-6000, FAX: 404-639-6315. ATSDR Internet home page via WWW is http://atsdr1.atsdr.cdc.gov:8080/atsdrhome.html

DEHP

Di (2-ethylhexyl) phthalate

Agency for Toxic Substances and Disease Registry April 1993

This fact sheet answers the most frequently asked health questions about DEHP. For more information, you may call 404-639-6000. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to di(2-ethylhexyl)phthalate or DEHP is generally very low. Increased exposures may come from intravenous fluids delivered through plastic tubing, and from ingesting contaminated foods or water. DEHP is not toxic at the low levels usually present. In animals, high levels of DEHP damaged the liver and kidney and affected the ability to reproduce. DEHP has been found in at least 587 of 1,300 National Priorities List sites identified by the Environmental Protection Agency.

What is DEHP or di(2-ethylhexyl)phthalate? (Pronounced di 2 - eth″il - hex″sil - thal″ate)

Di(2-ethylhexyl)phthalate is a manufactured chemical that makes plastic more flexible. It is also called DEHP. DEHP is a colorless liquid with almost no odor.

DEHP is in polyvinyl chloride (PVC) plastic products like toys, vinyl upholstery, shower curtains, adhesives, and coatings. Vinyl plastic may contain up to 40% DEHP.

DEHP is also used in inks, pesticides, cosmetics, and vacuum pump oil. It is used to detect leaks in protective face gear, and as a test material for filtration systems.

Trade names for DEHP are Platinol DOP, Octoil, Silicol 150, Bisoflex 81, and Eviplast 80.

What happens to DEHP when it enters the environment?

- DEHP is everywhere in the environment because of its use in plastics, but it evaporates into air and dissolves into water at very low rates.
- DEHP from plastic materials, coatings, and flooring can increase indoor air levels.
- It dissolves faster in water if gas, oil, or paint removers are present.
- It attaches strongly to soil particles.
- Small organisms in surface water or soil break it down into harmless compounds.
- It doesn't break down easily in deep soil, or in lake or river bottoms.
- It is in plants, fish, and other animals, but animals high on the food chain are able to breakdown DEHP, so tissue levels are usually low.

How might I be exposed to DEHP?

DEHP is usually present at very low levels even in the sources of potentially higher exposures listed below.

- Use of medical products packaged in plastic such as blood products
- Eating some foods packaged in plastics, especially fatty foods like milk products, fish and seafood, oils, but levels still usually quite low
- Drinking well water near waste sites, but levels usually are low
- Breathing workplace air or indoor air where DEHP is released, but usually not at levels of concern
- Fluids from plastic intravenous tubing if used extensively as for kidney dialysis.

How can DEHP affect my health?

There is no evidence that DEHP causes serious health effects in humans. Most of what we know about the health effects of DEHP comes from high exposures to rats and mice.

Adverse effects in animals were generally seen only at **high doses** or with long term exposures. You are not likely to be exposed to these very high levels. Moreover, absorption and breakdown of DEHP in humans is different than in rats and mice, so the effects seen in rats and mice may not occur in humans.

The studies in rats and mice with DEHP in the air produced no serious harmful effects. There was no effect on lifespan or the ability to reproduce.

Brief exposure to **very high levels** of DEHP in food or water damaged sperm, but the effect reversed when DEHP was removed from the diet. Longer exposures to high doses affected the ability of both males and females to reproduce and caused birth defects.

High levels of DEHP damaged the livers of rats and mice. Long exposures of rats to DEHP caused kidney damage similar to the damage seen in the kidneys of long-term dialysis patients. Whether or not DEHP contributes to human kidney damage, is unclear at present.

You should have no health effects from skin contact with products containing DEHP because it cannot be taken up easily through the skin.

How likely is DEHP to cause cancer?

The Department of Health and Human Services (DHHS) has determined that DEHP may reasonably be anticipated to be a carcinogen. There is no evidence that DEHP causes cancer in humans, but high exposures in rats and mice increased liver cancer. Based on these studies, DEHP has been classified as a potential carcinogen.

Is there a medical test to show whether I've been exposed to DEHP?

A test is available that measures a breakdown product of DEHP called mono(2-ethylhexyl)phthalate (MEHP). MEHP is measured in your urine or blood. This test is good only for recent exposures because DEHP remains in your body for only a short time.

These tests require special equipment that is not routinely available in a doctor's office.

Has the federal government made recommendations to protect human health?

The Environmental Protection Agency proposed a limit of 6 parts DEHP per billion parts of drinking water (6 ppb).

The Food and Drug Administration (FDA) limits the types of food packaging materials containing DEHP.

The Occupational Safety and Health Administration (OSHA) limits the average level of DEHP in workplace air to 5 milligrams per cubic meter (mg/m^3) over an 8-hour workday and 10 mg/m^3 for a 15-minute exposure.

The American Conference of Governmental Industrial Hygienists (ACGIH) has established the same guidelines as the OSHA regulations for the workplace.

Glossary

Carcinogen: Substance that can cause cancer.
Ingesting: Taking food or drink into you body.
PPB: Parts per billion.
Milligram (mg): One thousandth of a gram.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1993. Toxicological profile for di(2-ethylhexyl)phthalate. Atlanta: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information?

ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns. For more information, contact: Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333, Phone: 404-639-6000.

DI-*N*-OCTYLPHTHALATE (DNOP)
CAS # 117-84-0

Agency for Toxic Substances and Disease Registry ToxFAQs September 1997

This fact sheet answers the most frequently asked health questions (FAQs) about di-*N*-octylphthalate (DNOP). For more information, call the ATSDR Information Center at 1-800-447-1544. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to di-*n*-octylphthalate occurs mainly from eating food or drinking water that is stored in plastic containers. The health effects of breathing, ingesting, or touching di-*n*-octylphthalate are not known. This substance has been found in at least 300 of the 1,416 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is di-*n*-octylphthalate?

Di-*n*-octylphthalate is a colorless, odorless, oily liquid that doesn't evaporate easily. It is a man-made substance used to keep plastics soft or more flexible. This type of plastic can be used for medical tubing and blood storage bags, wire and cables, carpetback coating, floor tile, and adhesives. It is also used in cosmetics and pesticides.

What happens to di-*n*-octylphthalate when it enters the environment?

- Di-*n*-octylphthalate can be released to water or air during its manufacture, by leaking from plastics in landfills, or from the burning of plastic products.
- If di-*n*-octylphthalate is released into the air, it may be deposited on the ground or to surface water in rain or dust particles.
- Di-*n*-octylphthalate sticks tightly to soil, sediment, and dust particles.
- Di-*n*-octylphthalate is mainly broken down into other substances by microorganisms.
- It can also be broken down in reactions with sunlight, other chemicals in the atmosphere, or water.
- Small amounts of di-*n*-octylphthalate can build up in animals that live in water, such as fish and oysters.

How might I be exposed to di-*n*-octylphthalate?

- Eating foods stored in containers made with di-*n*-octylphthalate that has leaked into the food.
- Receiving blood transfusions, dialysis, or other medical treatments in which the equipment is made of plastics containing di-*n*-octylphthalate.
- Breathing contaminated air, drinking contaminated water, or touching contaminated soil near hazardous waste sites or an industrial manufacturing facility that uses or makes di-*n*-octylphthalate.

How can di-*n*-octylphthalate affect my health?

Little information is known about the health effects that might be caused by di-*n*-octylphthalate. It is not known what happens when you breathe or ingest the chemical.

Some rats and mice that were given very high doses of di-*n*-octylphthalate by mouth died. Mildly harmful effects have been seen in the livers of some rats and mice given very high doses of di-*n*-octylphthalate by mouth for short (14 days or less) or intermediate periods (15 to 365 days) of time, but lower doses given for short periods of time generally caused no harmful effects.

No information is available on the health effects of having di-*n*-octylphthalate in contact with human skin. It can be mildly irritating when applied to the skin of animals.

It is not known whether or not di-*n*-octylphthalate could affect the ability to have children, or if it could cause birth defects.

How likely is di-*n*-octylphthalate to cause cancer?

Di-*n*-octylphthalate is not known to cause cancer in humans or animals.

Di-*n*-octylphthalate has not been classified as to its carcinogenicity by the **Department of Health and Human Services (DHHS)**, the **International Agency for Research on Cancer (IARC)**, or the **EPA**.

Is there a medical test to show whether I've been exposed to di-*n*-octylphthalate?

Di-*n*-octylphthalate and its principal breakdown products can be measured in urine, blood, and tissues. However, it is not known if they are specific for di-*n*-octylphthalate or for how long after exposure occurs the test is useful. These facts cannot be used to determine how much di-*n*-octylphthalate you were exposed to or predict whether harmful effects will occur.

This test is not part of a routine medical examination, but it can be done by the doctor's request at special laboratories.

Has the federal government made recommendations to protect human health?

The **EPA** has recently determined that there is not enough evidence to say that di-*n*-octylphthalate causes harmful effects in humans or the environment.

The **EPA** requires that spills or accidental releases into the environment of 5,000 pounds or more of di-*n*-octylphthalate be reported to the **EPA**.

Glossary

CAS: Chemical Abstracts Service

Carcinogenicity: Ability to cause cancer

Evaporate: To change into a vapor or a gas

Ingest: To eat or drink something

Sediment: Mud and debris that have settled to the bottom of a body of water

Source of Information

This ToxFAQs information is taken from the 1997 Toxicological Profile for Di-n-octylphthalate produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

Animal testing is sometimes necessary to find out how toxic substances might harm people and how to treat people who have been exposed. Laws today protect the welfare of research animals and scientists must follow strict guidelines.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-800-447-1544, FAX: 404-639-6359. ToxFAQs Internet address via WWW is http://atsdr1.atsdr.cdc.gov:8080/ToxFAQ.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

ETHYLBENZENE

CAS # 100-41-4

Agency for Toxic Substances and Disease Registry ToxFAQs June 1999

This fact sheet answers the most frequently asked health questions (FAQs) about ethylbenzene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Ethylbenzene is a colorless liquid found in a number of products including gasoline and paints. Breathing very high levels can cause dizziness and throat and eye irritation. Ethylbenzene has been found in at least 731 of the 1,467 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is ethylbenzene?

(Pronounced ĕth′ əl bĕn′ zēn′)

Ethylbenzene is a colorless, flammable liquid that smells like gasoline. It is found in natural products such as coal tar and petroleum and is also found in manufactured products such as inks, insecticides, and paints.

Ethylbenzene is used primarily to make another chemical, styrene. Other uses include as a solvent, in fuels, and to make other chemicals.

What happens to ethylbenzene when it enters the environment?

- Ethylbenzene moves easily into the air from water and soil.
- It takes about 3 days for ethylbenzene to be broken down in air into other chemicals.
- Ethylbenzene may be released to water from industrial discharges or leaking underground storage tanks.
- In surface water, ethylbenzene breaks down by reacting with other chemicals found naturally in water.
- In soil, it is broken down by soil bacteria.

How might I be exposed to ethylbenzene?

- Breathing air containing ethylbenzene, particularly in areas near factories or highways
- Drinking contaminated tap water
- Working in an industry where ethylbenzene is used or made
- Using products containing it, such as gasoline, carpet glues, varnishes, and paints

How can ethylbenzene affect my health?

Limited information is available on the effects of ethylbenzene on people's health. The available information shows dizziness, throat and eye irritation, tightening of the chest, and a burning sensation in the eyes of people exposed to high levels of ethylbenzene in air.

Animals studies have shown effects on the nervous system, liver, kidneys, and eyes from breathing ethylbenzene in air.

How likely is ethylbenzene to cause cancer?

The EPA has determined that ethylbenzene is not classifiable as to human carcinogenicity.

No studies in people have shown that ethylbenzene exposure can result in cancer. Two available animal studies suggest that ethylbenzene may cause tumors.

How can ethylbenzene affect children?

Children may be exposed to ethylbenzene through inhalation of consumer products, including gasoline, paints, inks, pesticides, and carpet glue. We do not know whether children are more sensitive to the effects of ethylbenzene than adults.

It is not known whether ethylbenzene can affect the development of the human fetus. Animal studies have shown that when pregnant animals were exposed to ethylbenzene in air, their babies had an increased number of birth defects.

How can families reduce the risk of exposure to ethylbenzene?

Exposure to ethylbenzene vapors from household products and newly installed carpeting can be minimized by using adequate ventilation.

Household chemicals should be stored out of reach of children to prevent accidental poisoning. Always store household chemicals in their original containers; never store them in containers children would find attractive to eat or drink from, such as old soda bottles. Gasoline should be stored in a gasoline can with a locked cap.

Sometimes older children sniff household chemicals, including ethyl-benzene, in an attempt to get high. Talk with your children about the dangers of sniffing chemicals.

Is there a medical test to show whether I've been exposed to ethylbenzene?

Ethylbenzene is found in the blood, urine, breath, and some body tissues of exposed people. The most common way to test for ethylbenzene is in the urine. This test measures substances formed by the breakdown of ethylbenzene. This test needs to be done within a few hours after exposure occurs, because the substances leave the body very quickly.

These tests can show you were exposed to ethylbenzene, but cannot predict the kind of health effects that might occur.

Has the federal government made recommendations to protect human health?

The EPA has set a maximum contaminant level of 0.7 milligrams of ethylbenzene per liter of drinking water (0.7 mg/L).

The EPA requires that spills or accidental releases into the environment of 1,000 pounds or more of ethylbenzene be reported to the EPA.

The Occupational Safety and Health Administration (OSHA) has set an occupational exposure limit of 100 parts of ethylbenzene per million parts of air (100 ppm) for an 8-hour workday, 40-hour workweek.

Source of information

Agency for Toxic Substances and Disease Registry (ATSDR). 1999. Toxicological Profile for Ethylbenzene. Atlanta: U.S. Department of Health and Human Services, Public Health Service.

Animal testing is sometimes necessary to find out how toxic substances might harm people or to treat those who have been exposed. Laws today protect the welfare of research animals and scientists must follow strict guidelines.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-639-6359. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

FLUORIDES, HYDROGEN FLUORIDE, AND FLUORINE (F)

Agency for Toxic Substances and Disease Registry

April 1993

This fact sheet answers the most frequently asked health questions about fluorides, hydrogen fluoride, and fluorine. For more information, you may call 404-639-6000. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to fluorides, hydrogen fluoride, and fluorine happens mostly from eating contaminated foods, breathing workplace air, or eating toothpaste. Exposures are usually low and not harmful. High exposures can cause lung, skin, and bone damage. Fluorides, hydrogen fluoride, and fluorine have been found in at least 130, 19, and 28 sites, respectively, of 1,334 National Priorities List sites identified by the Environmental Protection Agency.

What are fluorides, hydrogen fluoride, and fluorine?

(Pronounced flō′ ō-rīds, hy′dro-jen flō′ ō-rīds, flō′ ō-rēn).

Fluorides, hydrogen fluoride, and fluorine are chemically related. Fluorine is a pale, yellow-green gas that has a strong, sharp odor. It combines with hydrogen to make hydrogen fluoride, a colorless gas. Hydrogen fluoride dissolves in water to form hydrofluoric acid.

Fluorine also combines with metals to make fluorides like sodium fluoride and calcium fluoride, both white solids. Sodium fluoride dissolves easily in water, but calcium fluoride doesn't.

Fluorine is used in rocket fuels, glass, enamel, and bricks. Hydrogen fluoride is used mainly to make aluminum and chlorofluorocarbons (CFCs). Fluorides are used in making steel, chemicals, ceramics, lubricants, dyes, plastics, and pesticides (for ants and roaches).

Toothpaste and mouth rinses have fluorides added to prevent cavities. If drinking water supplies are low in fluoride, many communities add fluorides to help prevent cavities. Some skin medicines and cancer treatment drugs also contain fluorides.

What happens to fluorides, hydrogen fluoride, and fluorine when they enter the environment?

- ❑ Fluorine forms salts with minerals in soil, and doesn't evaporate back into air as a gas.
- ❑ Fluorides in released to the air from volcanoes and industry are carried by wind and rain to nearby water, soil, and food sources.
- ❑ They erode from rocks into soil and water, and leach from phosphorus fertilizers into food and water supplies.
- ❑ Some plants take up and store fluorides in their leaves and stems.

How might I be exposed to fluorides, hydrogen fluoride, and fluorine?

- ❑ Breathing workplace air where fluorides are used or released
- ❑ Eating food from soil with high natural levels or high levels from fertilizers or nearby waste sites
- ❑ Eating toothpaste that contains fluorides
- ❑ Drinking contaminated water
- ❑ Ingesting contaminated soil particles.

How can fluorides, hydrogen fluoride, and fluorine affect my health?

Fluorides are everywhere throughout the environment, but at very low levels that are not believed to be harmful.

At **high levels,** fluorine gas and hydrogen fluoride gas can harm the lungs and heart and can cause death. Even at low levels, these gases can irritate your eyes, skin, and lungs. Contact with hydrofluoric acid can burn the eyes and skin. This mainly happens in the workplace.

Small amounts of sodium fluoride help reduce tooth cavities, but high levels can harm your health. In children whose teeth are forming, high fluoride exposure can cause dental fluorosis with visible changes in the teeth. In adults, high fluoride over a long time can lead to skeletal fluorosis with denser bones, joint pain, and a limited joint movement. This is extremely rare in the U.S.

We don't know the effects of fluoride on reproduction or developing fetuses. Cows and various birds are known to have reproductive problems when they eat or drink large amounts of fluoride. The results from laboratory studies in animal are mixed.

How likely are fluorides, hydrogen fluoride, and fluorine to cause cancer?

Fluorine, hydrogen fluoride, and fluorides have not been classified for carcinogenic effects. Studies in people have not shown fluorides to be carcinogenic, and the studies in animals are mixed. More research is in progress.

Is there a medical test to show whether I've been exposed to fluorides, hydrogen fluoride, and fluorine?

Tests are available to determine recent high exposures to fluorides. The test measures fluorides in the urine. This test cannot predict any specific health effects from fluoride exposure. Most laboratories that test for chemical exposure can perform the test. Bone sampling is done in special cases to measure a long-term exposure to fluorides. Because fluorine, hydrogen fluoride, and fluorides all enter the body as fluoride, these tests do not distinguish the source of the fluoride.

Has the federal government made recommendations to protect human health?

The Environmental Protection Agency (EPA) sets a maximum amount of 4 milligrams fluoride per liter of drinking water (4 mg/L). EPA recommends that states limit fluoride in drinking water to 2 mg/L. Spills of more than 10 pounds of fluorine, 100 pounds of hydrogen fluoride, or 1,000 pounds of sodium fluoride must be reported to the National Response Center.

The Occupational Safety and Health Administration (OSHA) limits an 8-hour work day, 40-hour work week to 0.2 milligrams of fluorides per cubic meter air (0.2 mg/m^3). The level for hydrogen fluoride is 2.5 mg/m^3. The highest level of fluoride allowed by OSHA for an 8-hour work day, 40-hour work week is 2.5 mg/m^3.

Glossary

Carcinogenic: Ability to cause cancer.
Ingestion: Taking food or drink into your body.
Milligram (mg): One thousandth of a gram.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1993. Toxicological profile for fluorides, hydrogen fluoride, and fluorine (F). Atlanta: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information?

ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns. For more information, contact: Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333, Phone: 404-639-6000.

HEXACHLORO-CYCLOHEXANES

CAS # 319-84-6, 319-85-7, 319-86-8, 58-89-9

Agency for Toxic Substances and Disease Registry ToxFAQs June 1999

This fact sheet answers the most frequently asked health questions (FAQs) about hexachlorocyclohexanes. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to hexachlorocyclohexanes happens mostly from eating contaminated foods or by breathing contaminated air in the workplace. Exposure to high levels of hexachlorocyclohexanes can cause blood disorders, dizziness, headaches, seizures, and changes in the levels of sex hormones. These substances have been found in at least 144 of the 1,467 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What are hexachlorocyclohexanes?

(Pronounced hĕk′sə klôr′ ō sī′klō hĕks′ āns)

Hexachlorocyclohexanes (HCH) are a group of manufactured chemicals that do not occur naturally in the environment. HCH has eight chemical forms (called isomers). The four most common are alpha-, beta-, gamma, and delta-HCH. The most common of these is gamma-HCH (also known as lindane). Lindane is a white solid substance that may evaporate into the air as a colorless vapor with a slightly musty odor. It is the common form of hexachlorocyclohexane.

Lindane was used as an insecticide on fruit and vegetable crops (including greenhouse vegetables and tobacco) and forest crops (including Christmas trees). It is still used in ointments to treat head and body lice, and scabies.

Lindane has not been produced in the United States since 1977. It is still imported to and formulated in the United States.

What happens to hexachlorocyclohexanes when they enter the environment?

- In air, HCH can be present as a vapor or attached to small particles such as soil or dust.
- Lindane can remain in the air for up to 17 weeks and travel long distances.
- Particles with attached HCH may be removed from the air by rain.
- In soil, sediments, and water, it is broken down by algae, fungi, and bacteria to less harmful substances.
- HCH isomers are broken down quickly in water; lindane does not remain in water longer than 30 days.
- The length of time that HCH isomers remain in soil is not known.
- It can accumulate in the fatty tissue of fish.

How might I be exposed to hexachlorocyclohexanes?

- Eating contaminated foods, such as plants, meat, and milk
- Breathing contaminated air in or near factories where products using HCH are made
- Through skin when applied as a lotion or shampoo to control lice and scabies
- Drinking contaminated water or breathing contaminated air near waste sites or landfills

How can hexachlorocyclohexanes affect my health?

Some people who breathed contaminated workplace air during the manufacturing of pesticides, including lindane, had blood disorders, dizziness, headaches, and changes in the

levels of sex hormones. Some people who swallowed large amounts had seizures and sometimes died.

Animals fed high levels of HCH had convulsions and some became comatose. Liver and kidney effects and a reduced ability to fight infections occurred at moderate levels.

Animal showed a decreased ability to reproduce when they were fed moderate to high levels of HCH.

How likely are hexachlorocyclohexanes to cause cancer?

The Department of Health and Human Services (DHHS) has determined that HCH may reasonably be anticipated to be a carcinogen. Liver cancer has been seen in laboratory rodents that ate HCH for a long period of time.

How can hexachlorocyclohexanes affect children?

There are no studies on the effects of HCH on children. It is not known whether HCH can cause birth defects in people. Animal studies have not shown birth defects in the babies of animals fed HCH during pregnancy. HCH has been detected in human breast milk.

How can families reduce the risk of exposure to hexachlorocyclohexanes?

If you work with HCH, take all safety precautions to avoid bringing the dust home on your clothing. If you use products containing HCH, follow directions for use carefully. Make sure that you keep it in tightly covered containers and store the containers safely where children cannot reach them. Always store chemicals in the original labeled containers. Do not store HCH in containers that children would find attractive to eat or drink from, such as soda bottles.

Is there a medical test to show whether I've been exposed to hexachlorocyclohexanes?

Laboratory tests can measure HCH in blood, urine, and semen. These tests do not tell you how much HCH you've been exposed to or if harmful effects will occur. The tests are not routinely available at your doctor's office.

Has the federal government made recommendations to protect human health?

The EPA has set a limit in drinking water of 0.2 parts of lindane per billion parts of water (0.2 ppb). The EPA requires that spills or accidental discharges of lindane into the environment of 1 pound or more must be reported to the EPA.

The Occupational Safety and Health Administration (OSHA), the National Institute for Occupational Safety and Health (NIOSH), and the American Conference of Governmental Industrial Hygienists (ACGIH) recommend a maximum level of 0.5 milligrams lindane per cubic meter (0.5 mg/m^3) of workplace air for an 8-hour workday, 40-hour workweek. These agencies advise avoiding eye and skin contact because this may be a route of significant exposure.

Source of information

Agency for Toxic Substances and Disease Registry (ATSDR). 1999. Toxicological Profile for Alpha-, Beta-, Gamma-, and Delta-hexachlorocyclohexane. Atlanta: U.S. Department of Health and Human Services, Public Health Service.

Animal testing is sometimes necessary to find out how toxic substances might harm people and how to treat people who have been exposed. Laws today protect the welfare of research animals and scientists must follow strict guidelines.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-639-6359. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

2-HEXANONE

Agency for Toxic Substances and Disease Registry September 1995

This fact sheet answers the most frequently asked health questions about 2-hexanone. For more information, you may call 404-639-6000. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to 2-hexanone is most likely to occur from living near or working in plants that make gas from coal, process oil shale, or produce wood pulp. You may also be exposed if you live near a hazardous waste site where 2-hexanone is found. In people, exposure to hexanone is most likely to affect the nervous system. This chemical has been found in at least 199 of 1,416 National Priorities List sites identified by the Environmental Protection Agency.

What is 2-hexanone?

(Pronounced 2-hĕk′sə-nōn)

2-Hexanone is also known as methyl n-butyl ketone, MBK, or propyl acetone. It is a clear, colorless liquid with a sharp odor. It dissolves very easily in water, and can evaporate easily into the air as a vapor.

It was used in the past in paint and paint thinner, to make other chemical substances, and to dissolve oils and waxes.

It is no longer made or used in the United States because it has harmful health effects. It is formed as a waste product resulting from industrial activities such as making wood pulp and producing gas from coal, and in oil shale operations.

What happens to 2-hexanone when it enters the environment?

- 2-Hexanone dissolves easily in water.
- It evaporates quickly into the air.
- It may be broken down into other chemicals in the atmosphere or may be removed by rain or snow.
- 2-Hexanone may be broken down by microorganisms in water and soil.
- It doesn't usually attach to soils or sediment.
- It doesn't usually build up in plants and animals.
- Half of the 2-hexanone in river water breaks down or evaporates in about 10–15 days.
- In the air, half of the 2-hexanone breaks down in about 36 hours.
- It is not known how long it takes to break down in soil.

How might I be exposed to 2-hexanone?

- Breathing contaminated air
- Drinking contaminated water
- Absorbing it through your skin if you touch liquid or soil that contains it
- Eating some foods that naturally contain low levels of 2-hexanone
- Using products manufactured before 1982 that contain 2-hexanone (such as paint thinners)
- Working in coal gasification, oil shale processing, or wood pulping operations
- Living near hazardous waste sites where it is found.

How can 2-hexanone affect my health?

Breathing 2-hexanone can harm your nervous system. Workers who were exposed to 2-hexanone in the air for almost a year felt weakness, numbness, and tingling in the skin of the hands and feet.

Similar effects were seen in different animals that ate or breathed **high levels** of 2-hexanone.

In one study, pregnant rats that breathed 2-hexanone did not gain as much weight during their pregnancy, had fewer babies, and had babies that were smaller and less active than the rats that were not exposed.

We do not know if breathing 2-hexanone affects human reproduction or causes birth defects.

We do not know whether touching or ingesting 2-hexanone would affect your health. Animal studies have shown that ingesting **high levels** of 2-hexanone harms the nervous system. Also, animals that ingested 2-hexanone experienced decreased body weight and effects on reproduction.

How likely is 2-hexanone to cause cancer?

The **Department of Health and Human Services** has not classified 2-hexanone as to human carcinogenicity.

Also, the **International Agency for Research on Cancer** and the **Environmental Protection Agency (EPA)** have not classified 2-hexanone as to human carcinogenicity.

There is no information available on the potential carcinogenic effects of 2-hexanone in people or in experimental animals.

Is there a medical test to show whether I've been exposed to 2-hexanone?

Several tests are available to tell whether you have been exposed to 2-hexanone. These tests can measure the levels of 2-hexanone, or its breakdown products, in your blood or urine. This test only tells you if you have been exposed and cannot predict whether your health will be affected.

These tests are not routinely performed at your doctor's office, but your doctor can take blood or urine samples and send them to a testing laboratory.

Has the federal government made recommendations to protect human health?

The **Occupational Safety and Health Agency (OSHA)** has set a limit for exposure of workers to an average level of 100 parts of 2-hexanone per million parts of air (ppm) for an 8-hour workday over a 40-hour workweek.

The **American Conference of Governmental Industrial Hygienists (ACGIH)** recommends an exposure limit of 5 ppm for an 8-hour workday over a 40-hour workweek in workplace air.

The **National Institute for Occupational Safety and Health (NIOSH)** recommends that workers be exposed to no more than an average of 1 ppm for up to a 10-hour workday over a 40-hour workweek.

Glossary

Carcinogenicity: Ability to cause cancer

CAS: Chemical Abstract Services

Gasification: Conversion of coal to gas

Ingesting: Taking food or drink into your body

PPM: Parts per million

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1992. Toxicological profile for 2-hexanone. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns. For more information, contact: Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333, Phone: 404-639-6000, FAX: 404-639-6315ATSDR Internet home page via WWW is http://atsdr1.atsdr.cdc.gov.8080/atsdrhome.html

LEAD
CAS # 7439-92-1

Agency for Toxic Substances and Disease Registry ToxFAQs June 1999

This fact sheet answers the most frequently asked health questions (FAQs) about lead. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to lead can happen from breathing workplace air or dust, eating contaminated foods, or drinking contaminated water. Children can be exposed from eating lead-based paint chips or playing in contaminated soil. Lead can damage the nervous system, kidneys, and reproductive system. Lead has been found in at least 1,026 of 1,467 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is lead?

(Pronounced lĕd)

Lead is a naturally occurring bluish-gray metal found in small amounts in the earth's crust. Lead can be found in all parts of our environment. Much of it comes from human activities including burning fossil fuels, mining, and manufacturing.

Lead has many different uses. It is used in the production of batteries, ammunition, metal products (solder and pipes), and devices to shield X-rays.

Because of health concerns, lead from gasoline, paints and ceramic products, caulking, and pipe solder has been dramatically reduced in recent years.

What happens to lead when it enters the environment?

- Lead itself does not break down, but lead compounds are changed by sunlight, air, and water.
- When lead is released to the air, it may travel long distances before settling to the ground.
- Once lead falls onto soil, it usually sticks to soil particles.
- Movement of lead from soil into groundwater will depend on the type of lead compound and the characteristics of the soil.
- Much of the lead in inner-city soils comes from old houses painted with lead-based paint.

How might I be exposed to lead?

- Eating food or drinking water that contains lead
- Spending time in areas where lead-based paints have been used and are deteriorating
- Working in a job where lead is used
- Using health-care products or folk remedies that contain lead
- Engaging in certain hobbies in which lead is used (for example, stained glass)

How can lead affect my health?

Lead can affect almost every organ and system in your body. The most sensitive is the central nervous system, particularly in children. Lead also damages kidneys and the reproductive system. The effects are the same whether it is breathed or swallowed.

At high levels, lead may decrease reaction time, cause weakness in fingers, wrists, or ankles, and possibly affect the memory. Lead may cause anemia, a disorder of the blood. It can also damage the male reproductive system. The connection between these effects and exposure to low levels of lead is uncertain.

How likely is lead to cause cancer?

The Department of Health and Human Services has determined that lead acetate and lead phosphate may reasonably

be anticipated to be carcinogens based on studies in animals. There is inadequate evidence to clearly determine lead's carcinogenicity in people.

How can lead affect children?

Small children can be exposed by eating lead-based paint chips, chewing on objects painted with lead-based paint, or swallowing house ducst or soil that contains lead.

Children are more vulnerable to lead poisoning than adults. A child who swallows large amounts of lead may develop blood anemia, severe stomachache, muscle weakness, and brain damage. A large amount of lead might get into a child's body if the child ate small pieces of old paint that contained large amounts of lead. If a child swallows smaller amounts of lead, much less severe effects on blood and brain function may occur. Even at much lower levels of exposure, lead can affect a child's mental and physical growth.

Exposure to lead is more dangerous for young and unborn children. Unborn children can be exposed to lead through their mothers. Harmful effects include premature births, smaller babies, decreased mental ability in the infant, learning difficulties, and reduced growth in young children. These effects are more common if the mother or baby was exposed to high levels of lead.

How can families reduce the risk of exposure to lead?

Avoid exposure to sources of lead. Do not allow children to chew or mouth painted surfaces that may have been painted with lead-based paint (homes built before 1978). Run your water for 15 to 30 seconds before drinking or cooking with it. This will get rid of lead that may have leached out of pipes. Some types of paints and pigments that are used as make-up or hair coloring contain lead. Keep these kinds of products away from children. Wash children's hands and faces often to remove lead dusts and soil, and regularly clean the house of dust and tracked in soil.

Is there a medical test to show whether I've been exposed to lead?

A blood test is available to measure the amount of lead in your blood and to estimate the amount of your exposure to lead. Blood tests are commonly used to screen children for lead poisoning. Lead in teeth and bones can be measured with X-rays, but this test is not as readily available. Medical treatment may be necessary in children if the lead concentration in blood is higher than 45 micrograms per deciliter (45 μg/dL).

Has the federal government made recommendations to protect human health?

The Centers for Disease Control and Prevention (CDC) recommends that children ages 1 and 2 be screened for lead poisoning. Children who are 3 to 6 years old should be tested for lead if they have never been tested for lead before and if they receive services from public assistance programs; if they live in or regularly visit a building built before 1950; if they live in or visit a home built before 1978 that is being remodeled; or if they have a brother, sister, or playmate who has had lead poisoning. CDC considers children to have an elevated level of lead if the amount in the blood is 10 μg/dL.

The EPA requires lead in air not to exceed 1.5 micrograms per cubic meter (1.5 $\mu g/m^3$) averaged over 3 months. EPA limits lead in drinking water to 15 μg per liter.

The Occupational Health and Safety Administration (OSHA) develops regulations for workers exposed to lead. The Clean Air Act Amendments of 1990 banned the sale of leaded gasoline. The Federal Hazardous Substance Act bans children's products that contain hazardous amounts of lead.

Source of information

Agency for Toxic Substances and Disease Registry (ATSDR). 1999. Toxicological Profile for Lead. Atlanta: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-639-6359. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

MERCURY
CAS # 7439-97-6

Agency for Toxic Substances and Disease Registry ToxFAQs April 1999

This fact sheet answers the most frequently asked health questions (FAQs) about mercury. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to mercury occurs from breathing contaminated air, ingesting contaminated water and food, and having dental and medical treatments. Mercury, at high levels, may damage the brain, kidneys, and developing fetus. This chemical has been found in at least 714 of 1,467 National Priorities List sites identified by the Environmental Protection Agency.

What is mercury?

Mercury is a naturally occurring metal which has several forms. The metallic mercury is a shiny, silver-white, odorless liquid. If heated, it is a colorless, odorless gas.

Mercury combines with other elements, such as chlorine, sulfur, or oxygen, to form inorganic mercury compounds or "salts," which are usually white powders or crystals. Mercury also combines with carbon to make organic mercury compounds. The most common one, methylmercury, is produced mainly by microscopic organisms in the water and soil. More mercury in the environment can increase the amounts of methylmercury that these small organisms make.

Metallic mercury is used to produce chlorine gas and caustic soda, and is also used in thermometers, dental fillings, and batteries. Mercury salts are sometimes used in skin lightening creams and as antiseptic creams and ointments.

What happens to mercury when it enters the environment?

- ❑ Inorganic mercury (metallic mercury and inorganic mercury compounds) enters the air from mining ore deposits, burning coal and waste, and from manufacturing plants.
- ❑ It enters the water or soil from natural deposits, disposal of wastes, and volcanic activity
- ❑ Methylmercury may be formed in water and soil by small organisms called bacteria.
- ❑ Methylmercury builds up in the tissues of fish. Larger and older fish tend to have the highest levels of mercury.

How might I be exposed to mercury?

- ❑ Eating fish or shellfish contaminated with methylmercury.
- ❑ Breathing vapors in air from spills, incinerators, and industries that burn mercury-containing fuels.
- ❑ Release of mercury from dental work and medical treatments.
- ❑ Breathing contaminated workplace air or skin contact during use in the workplace (dental, health services, chemical, and other industries that use mercury).
- ❑ Practicing rituals that include mercury.

How can mercury affect my health?

The nervous system is very sensitive to all forms of mercury. Methylmercury and metallic mercury vapors are more harmful than other forms, because more mercury in these forms reaches the brain. Exposure to high levels of metallic, inorganic, or organic mercury can permanently damage the brain, kidneys, and developing fetus. Effects on brain functioning may result in irritability, shyness, tremors, changes in vision or hearing, and memory problems.

Short-term exposure to high levels of metallic mercury vapors may cause effects including lung damage, nausea, vomiting, diarrhea, increases in blood pressure or heart rate, skin rashes, and eye irritation.

ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html

How likely is mercury to cause cancer?

There are inadequate human cancer data available for all forms of mercury. Mercuric chloride has caused increases in several types of tumors in rats and mice, and methylmercury has caused kidney tumors in male mice. The EPA has determined that mercuric chloride and methylmercury are possible human carcinogens.

How can mercury affect children?

Very young children are more sensitive to mercury than adults. Mercury in the mother's body passes to the fetus and may accumulate there. It can also can pass to a nursing infant through breast milk. However, the benefits of breast feeding may be greater than the possible adverse effects of mercury in breast milk.

Mercury's harmful effects that may be passed from the mother to the fetus include brain damage, mental retardation, incoordination, blindness, seizures, and inability to speak. Children poisoned by mercury may develop problems of their nervous and digestive systems, and kidney damage.

How can families reduce the risk of exposure to mercury?

Carefully handle and dispose of products that contain mercury, such as thermometers or fluorescent light bulbs. Do not vacuum up spilled mercury, because it will vaporize and increase exposure. If a large amount of mercury has been spilled, contact your health department. Teach children not to play with shiny, silver liquids.

Properly dispose of older medicines that contain mercury. Keep all mercury-containing medicines away from children.

Pregnant women and children should keep away from rooms where liquid mercury has been used.

Learn about wildlife and fish advisories in your area from your public health or natural resources department.

Is there a medical test to show whether I've been exposed to mercury?

Tests are available to measure mercury levels in the body. Blood or urine samples are used to test for exposure to metallic mercury and to inorganic forms of mercury. Mercury in whole blood or in scalp hair is measured to determine exposure to methylmercury. Your doctor can take samples and send them to a testing laboratory.

Has the federal government made recommendations to protect human health?

The EPA has set a limit of 2 parts of mercury per billion parts of drinking water (2 ppb).

The Food and Drug Administration (FDA) has set a maximum permissible level of 1 part of methylmercury in a million parts of seafood (1 ppm).

The Occupational Safety and Health Administration (OSHA) has set limits of 0.1 milligram of organic mercury per cubic meter of workplace air (0.1 mg/m^3) and 0.05 mg/m^3 of metallic mercury vapor for 8-hour shifts and 40-hour work weeks.

Source of Information

Agency for Toxic Substances and Disease Register (ATSDR). 1999. Toxicological Profile for Mercury. Atlanta: U.S. Department of Health and Human Services, Public Health Service.

Animal testing is sometimes necessary to find out how toxic substances might harm people and how to treat people who have been exposed. Laws today protect the welfare of research animals and scientists must follow strict guidelines.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-639-6359. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

METHYLENE CHLORIDE

Agency for Toxic Substances and Disease Registry April 1993

This fact sheet answers the most frequently asked health questions about methylene chloride. For more information, you may call 404-639-6000. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to methylene chloride happens mostly from breathing air in the workplace were it is used. In people, direct skin contact causes intense burning and mild skin redness. This substance has been found in at least 746 of 1,300 National Priorities List sites identified by the Environmental Protection Agency.

What is methylene chloride?

(Pronounced meth″ i̇ - lēn klo′ rīd)

Methylene chloride is a colorless liquid with a mild, sweet odor. Another name for it is dichloromethane.

It does not occur naturally in the environment. It's made from methane gas or wood alcohol. It's widely used as a solvent in paint strippers, as a propellant in aerosols, and as a process solvent in the manufacturing of drugs. It's also used as a metal cleaning and finishing solvent.

Most methylene chloride gets in the environment from its use in industry and from home use of aerosols and paint removers. Because of concern over the health effects, its use in aerosols has declined.

Methylene chloride is approved as an extraction solvent for spices and hops. It used to be popular for removing caffeine from coffee, but most coffee producers no longer use it.

What happens to methylene chloride when it enters the environment?

- It evaporates very easily, so it's found mostly in air.
- More than 99 percent of the methylene chloride in air comes from industry and consumer products.
- It doesn't stick to soil particles or dissolve in water, so it moves from both soil and water to air.
- Soil and water organisms break it down to simpler compounds.
- Some drinking water has been shown to contain small amounts of methylene chloride.
- Plants and aquatic organisms do not appear to store it.

How might I be exposed to methylene chloride?

- Breathing workplace air where it is used
- Breathing fumes from paint strippers that contain it (check the label)
- Breathing fumes from aerosol cans that use it (check the label)
- Breathing contaminated air near waste sites.

How can methylene chloride affect my health?

Methylene chloride harms the human central nervous system.

High levels in the air (nearly 1,000 times average levels) may affect your ability to react fast, remain steady, or perform tasks that require precise hand movements. If you continue to breathe high levels, you may get:

- dizziness
- nausea
- tingling
- numbness in the fingers and toes.

In most cases, these effects will stop shortly after exposure ends. In animals, however, very high exposures have caused unconsciousness and death.

Exposure to **lower levels** of methylene chloride in air can lead to slightly impaired hearing and vision. Many

people can smell methylene chloride at these lower levels. However, people differ in their ability to smell methylene chloride, so odors may not help you avoid an unwanted exposure.

In humans, direct skin contact with methylene chloride causes intense burning and mild redness of the skin. Direct contact with the eyes can burn the cornea. In animals that have been exposed to vapors or directly to methylene chloride, the cornea was damaged. The damage healed within a few days after the exposure ended.

How likely is methylene chloride to cause cancer?

The Department of Health and Human Services (DHHS) has determined that methylene chloride may reasonably be anticipated to be a carcinogen. Methylene chloride has not been shown to cause cancer in humans exposed to vapors in the workplace. However, breathing high concentrations of it for long periods did increase the incidence of cancer in mice.

Is there a medical test to show whether I've been exposed to methylene chloride?

Several tests measure exposure to methylene chloride. These tests are not routinely available in your doctor's office.

The most direct test measures methylene chloride in the air you breathe out. Your blood can also be tested to determine if methylene chloride is present. Since it stays in the blood a very short time, you must have these tests soon after exposure.

Doctors can also test urine for methylene chloride or for chemicals such as formic acid that are produced as methylene chloride breaks down in the body.

Has the federal government made recommendations to protect human health?

The Environmental Protection Agency (EPA) requires that releases of methylene chloride of 1,000 pounds or more be reported to the federal government. The EPA has guidelines as to how much of this chemical you may be exposed and for how long without harming your health. EPA recommends that children not drink water that contains more than 13.3 parts of methylene chloride per million parts of water (13.3 ppm) for longer than 1 day or with more than 1.5 ppm for longer than 10 days.

The Food and Drug Administration (FDA) has established limits on how much methylene chloride can remain in spice, hops extract, and decaffeinated coffee.

The Occupational Safety and Health Administration (OSHA) proposes to reduce the current occupational exposure limits to methylene chloride in air. The limit would go from 500 ppm to 25 ppm for an 8-hour workday.

The National Institute for Occupational Safety and Health (NIOSH) currently recommends a permissible limit of 75 ppm of methylene chloride in the air over a 10-hour workday in the presence of carbon monoxide concentrations less than or equal to 9.9 ppm.

Glossary

Carcinogen: Substance that can cause cancer.
PPM: Parts per million.
Cornea: The clear front part of the eye.
Propellant: The gas used in spray cans to force out the contents of the can.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1993. Toxicological profile for methylene chloride. Atlanta: U.S. Department of Health and Human Services, Public Health Service.

Agency for Toxic Substances and Disease Registry (ATSDR). 1990. Case studies in environmental medicine: Methylene chloride toxicity. Atlanta: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information?

ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact community or state health or environmental quality departments if you have any more questions or concerns. For more information, contact: Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333, Phone: 404-639-6000.

NAPHTHALENE

CAS # 91-20-3

Agency for Toxic Substances and Disease Registry September 1996

This fact sheet answers the most frequently asked health questions about naphthalene. For more information, you may call 404-639-6000. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to naphthalene happens mostly from breathing air contaminated from the burning of wood or fossil fuels, industrial discharges, tobacco smoke, or moth repellents. Exposure to large amounts of naphthalene may damage or destroy some of your red blood cells. Naphthalene has been found in at least 536 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is naphthalene?

(Pronounced năf′thə-lēn′)

Naphthalene is a white solid that is found naturally in fossil fuels. Burning tobacco or wood produces naphthalene. It has a strong, but not unpleasant smell.

The major products made from naphthalene are moth repellents. It is also used for making dyes, resins, leather, tanning agents, and the insecticide, carbaryl.

What happens to naphthalene when it enters the environment?

- Naphthalene enters the environment from industrial uses, and from its use as a moth repellent.
- It also enters from the burning of wood or tobacco, and from accidental spills.
- Naphthalene evaporates easily.
- In air, moisture and sunlight break it down, often within 1 day.
- Naphthalene in water is destroyed by bacteria or evaporates into the air.
- Naphthalene binds weakly to soils and sediment.
- It does not accumulate in animals or fish.
- If dairy cows are exposed to naphthalene, some of it will be in their milk.
- If laying hens are exposed, some of it will be in their eggs.

How might I be exposed to naphthalene?

- Breathing low levels in outdoor air.
- Breathing air contaminated from industrial discharges or from burning wood or fossil fuels.
- Breathing air in homes or businesses where cigarettes are smoked, wood is burned, or moth repellents are used.
- Drinking water from contaminated wells.
- Touching clothing, blankets, or coverlets that are treated with naphthalene.

How can naphthalene affect my health?

Exposure to large amounts of naphthalene may damage or destroy some of your red blood cells. This could cause you to have too few red blood cells until your body replaces the destroyed cells. People, particularly children, have developed this problem after eating naphthalene-containing mothballs or deodorant blocks. Some of the symptoms of

this problem are fatigue, lack of appetite, restlessness, and pale skin. Exposure to **large amounts** of naphthalene may also cause nausea, vomiting, diarrhea, blood in the urine, and a yellow color to the skin.

Animals sometimes develop cloudiness in their eyes after swallowing naphthalene. It is not clear if this also develops in people.

When mice were repeatedly exposed to naphthalene vapors for 2 years, their noses and lungs became inflamed and irritated.

How likely is naphthalene to cause cancer?

The **Department of Health and Human Services (DHHS)**, the **International Agency for Research on Cancer (IARC)** and the **EPA** have not classified naphthalene as to its human carcinogenicity.

No studies are available in people. Naphthalene has caused cancer in studies in female mice, but not in male mice or in rats of either sex.

Is there a medical test to show whether I've been exposed to naphthalene?

Tests are available that measure levels of naphthalene and its breakdown products in urine, stool, blood, or maternal milk. A small sample of your body fat can also be removed and analyzed for naphthalene. These tests are not routinely available in a doctor's office. However, a sample taken in a doctor's office can be sent to a special laboratory, if needed.

These tests cannot determine exactly how much naphthalene you were exposed to or predict whether harmful effects will occur.

Has the federal government made recommendations to protect human health?

The **EPA** recommends that children not drink water containing over 0.5 parts of naphthalene per million parts of water (0.5 ppm) for more than 10 days, or 0.4 ppm for longer than 7 years. Adults should not drink water with more than 1 ppm for more than 7 years. For water consumed over a lifetime, the **EPA** suggests it contain no more than 0.02 ppm naphthalene. The **EPA** requires that discharges or spills into the environment of 100 pounds or more be reported.

The **Occupational Safety and Health Administration (OSHA)** has set a limit of 10 parts per million (10 ppm) for the level of naphthalene in workplace air over an 8-hour workday, 40-hour workweek.

The **National Institute for Occupational Safety and Health (NIOSH)** considers more than 250 ppm of naphthalene in air to be immediately dangerous to life or health. This is the exposure level of a chemical that is likely to cause permanent health problems or death.

Glossary

Carcinogenicity: Ability of a substance to cause cancer.

CAS: Chemical Abstract Service.

Insecticide: A substance that kills insects.

Sediment: Mud and debris that have settled to the bottom of a body of water.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1995. Toxicological profile for naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene (Update). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Services.

Where can I get more information? ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns. For more information, contact: Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333, Phone: 404-639-6000, FAX: 404-639-6315. ATSDR Internet home page via WWW is http://atsdr1.atsdr.cdc.gov:8080/atsdrhome.html

NICKEL

CAS # 7440-02-0

Agency for Toxic Substances and Disease Registry ToxFAQs September 1997

This fact sheet answers the most frequently asked health questions (FAQs) about nickel. For more information, call the ATSDR Information Center at 1-800-447-1544. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Nickel is a hard, silvery-white metal used to make stainless steel and other metal alloys. Skin effects are the most common effects in people who are sensitive to nickel. Workers who breathed very large amounts of nickel compounds have developed lung and nasal sinus cancers. Nickel has been found in at least 709 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is nickel?

(Pronounced nĭk′əl)

Nickel is a very abundant element. In the environment, it is found primarily combined with oxygen (oxides) or sulfur (sulfides). It is found in all soils and is emitted from volcanos.

Pure nickel is a hard, silvery-white metal that is combined with other metals to form mixtures called alloys. Some of the metals that nickel can be alloyed with are iron, copper, chromium, and zinc. These alloys are used in the making of metal coins and jewelry and in industry for making metal items.

Nickel compounds are also used for nickel plating, to color ceramics, to make some batteries, and as substances known as catalysts that increase the rate of chemical reactions. Nickel and its compounds have no characteristic odor or taste.

What happens to nickel when it enters the environment?

- Small nickel particles in the air settle to the ground or are taken out of the air in rain.
- Much of the nickel in the environment is found with soil and sediments because nickel attaches to particles that contain iron or manganese, which are often present in soil and sediments.
- Nickel does not appear to collect in fish, plants, or animals used for food.

How might I be exposed to nickel?

- By breathing air or smoking tobacco containing nickel
- By eating food containing nickel, which is the major source of exposure for most people
- By drinking water which contains small amounts of nickel
- By handling coins and touching other metals containing nickel, such as jewelry

How can nickel affect my health?

Nickel is required to maintain health in animals. A small amount of nickel is probably essential for humans, although a lack of nickel has not been found to affect the health of humans.

The most common adverse health effect of nickel in humans is an allergic reaction. People can become sensitive to nickel when jewelry or other things containing it are in direct contact with the skin. Once a person is sensitized to nickel, further contact with it will produce a reaction. The most common reaction is a skin rash at the site of contact.

Less frequently, some people who are sensitive to nickel have asthma attacks following exposure to nickel. People who are sensitive to nickel have reactions when it is in contact with the skin, and some sensitized persons react when they eat nickel in food, drink it in water, or breathe dust containing it.

Lung effects, including chronic bronchitis and reduced lung function, have been observed in workers who breathed large amounts of nickel. Current levels of nickel in workplace air are much lower than in the past, and today few workers show symptoms of nickel exposure.

People who are not sensitive to it must eat very large amounts of nickel to show adverse health effects. Workers who accidently drank water containing very high levels of nickel (100,000 times more than in normal drinking water) had stomachaches and effects on their blood and kidneys.

Animal studies show that breathing high levels of nickel compounds may result in inflammation of the respiratory tract. Eating or drinking large amounts of nickel has been reported to cause lung disease in dogs and rats and to affect the stomach, blood, liver, kidneys, immune system, and reproduction and development in rats and mice.

How likely is nickel to cause cancer?

The **Department of Health and Human Services (DHHS)** has determined that nickel and certain nickel compounds may reasonably be anticipated to be carcinogens. Cancers of the lung and nasal sinus have resulted when workers breathed dust containing high levels of nickel compounds while working in nickel refineries or nickel processing plants.

When rats and mice breathed nickel compounds for a lifetime, nickel compounds that were hard to dissolve caused cancer, while a soluble nickel compound did not cause cancer.

Is there a medical test to show whether I've been exposed to nickel?

Measurements of the amount of nickel in your blood, feces, and urine can be used to estimate your exposure to nickel. These measurements are most useful if the type of nickel compound you have been exposed to is known. However, these tests cannot predict whether you will experience any health effects.

Has the federal government made recommendations to protect human health?

The **EPA** recommends that children drink water containing no more than 0.04 milligrams of nickel per liter of water (0.04 mg/L) for 1-10 days of exposure.

The **Occupational Safety and Health Administration (OSHA)** has set an occupational exposure limit of 1 milligram of nickel per cubic meter of air (1 mg/m^3) for an 8-hour workday, 40-hour workweek.

Glossary

Carcinogen: A substance with the ability to cause cancer

CAS: Chemical Abstracts Service

Milligram (mg): One thousandth of a gram

Sediments: Mud and debris that have settled to the bottom of a body of water

Soluble: Dissolves in water

Source of Information

This ToxFAQs information is taken from the 1997 Toxicological Profile for Nickel (update) produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

Animal testing is sometimes necessary to find out how toxic substances might harm people and how to treat people who have been exposed. Laws today protect the welfare of research animals and scientists must follow strict guidelines.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-800-447-1544, FAX: 404-639-6359. ToxFAQs Internet address via WWW is http://atsdr1.atsdr.cdc.gov:8080/ToxFAQ.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

ATSDR N-NITROSODIPHENYLAMINE

Agency for Toxic Substances and Disease Registry April 1993

This fact sheet answers the most frequently asked health questions about *N*-nitrosodiphenylamine. For more information, you may call 404-639-6000. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: The general population and people in the workplace are probably not exposed to *N*-nitrosodiphenylamine. People living near hazardous waste sites may, however, be exposed to *N*-nitrosodiphenylamine by drinking contaminated water or by touching or breathing contaminated soil and dust. Limited animal studies suggest that *N*-nitrosodiphenylamine can damage the bladder and kidneys. It has been found in at least 172 of 1,300 National Priorities List sites identified by the Environmental Protection Agency.

What is *N*-nitrosodiphenylamine? (Pronounced ni - tro″ so - di - fen″ il - ah - mēn′)

N-Nitrosodiphenylamine is an industrial compound. It is an orange-brown or yellow solid that has been produced since 1945. It is used to make rubber products such as tires or to make other chemicals.

In the early 1980s, most U.S. rubber manufacturers replaced it with more efficient chemicals. Today, only one manufacturer in the United States produces *N*-nitrosodiphenylamine. We do not know if it occurs naturally in the environment. There is some evidence that microorganisms make it.

What happens to *N*-nitrosodiphenylamine when it enters the environment?

- It evaporates slowly to the air or leaks into the ground from waste sites.
- In air, *N*-nitrosodiphenylamine attaches to dust particles and can move with the wind.
- It dissolves in water, but it binds to soil and does not move quickly through soil.
- It breaks down in air, water, and soil within several weeks.
- We don't know what the breakdown substances are in humans or whether they are harmful to you.
- We don't find it in our normal drinking water, foods, or air.
- Water organisms take some into their bodies, but they don't appear to build up high levels.
- We don't know if land animals or plants take it up and store it in their bodies.

How might I be exposed to *N*-nitrosodiphenylamine?

- The likelihood of exposure is very low.
- Exposure in the workplace is not likely (only one company makes it today).
- Drinking water near hazardous waste sites may be contaminated.
- Touching or breathing contaminated waste or soils near hazardous waste sites may result in higher exposures.

Agency for Toxic Substances and Disease Registry April 1993

How can *N*-nitrosodiphenylamine affect my health?

There is very little information on the effects of *N*-nitrosodiphenylamine on human health. There is also not enough information from animal studies to estimate how exposure to it will affect your health.

Animal studies have identified levels and exposures that can cause death. Animals given high levels of *N*-nitrosodiphenylamine in their diets for long periods of time developed swelling, cancer of the bladder, and changes in body weight. We don't know if these effects would occur in humans. We also don't know if it can affect pregnancy or cause birth defects.

How likely is *N*-nitrosodiphenylamine to cause cancer?

The Environmental Protection Agency has determined that *N*-nitrosodiphenylamine is a probable human carcinogen. This is based on a long-term study in rats showing an increase in bladder cancer in the group exposed to high levels of *N*-nitrosodiphenylamine. There is no evidence that it causes bladder cancer in people.

Although EPA has classified *N*-nitrosodiphenylamine as a probable carcinogen, the animal data are limited. Other public health agencies have concluded that no evaluation of *N*-nitrosodiphenylamine's carcinogenicity in people is currently possible. Additional research is needed.

Is there a medical test to show whether I've been exposed to *N*-nitrosodiphenylamine?

No tests are available to determine if you have been exposed to *N*-nitrosodiphenylamine. There are tests to detect *N*-nitrosodiphenylamine and its breakdown products in the blood and urine of exposed animals, but these tests have not been used for people.

Has the federal government made recommendations to protect human health?

The Environmental Protection Agency (EPA) recommends limits on how much *N*-nitrosodiphenylamine can be present in bodies of water such as lakes and rivers. The recommended levels are 49,000 nanograms or less of *N*-nitrosodiphenylamine per liter of water (49,000 ng/L). One nanogram is one billionth of a gram. At this level, EPA estimates that your risk of getting cancer is very low.

For drinking water, the EPA sets a limit of 700 micrograms or less of *N*-nitrosodiphenylamine per liter of drinking water (700 µg/L). One microgram is one millionth of a gram. *N*-nitrosodiphenylamine is also considered to be a hazardous waste, and the EPA requires industry to immediately report a spill of more than 100 pounds to the National Response Center of the federal government.

Glossary

Carcinogenicity: Ability to cause cancer.
Ingestion: Taking food or drink into your body.
Microgram (µg): One millionth of a gram.
Nanogram (ng): One billionth of a gram.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1993. Toxicological profile for *N*-nitrosodiphenylamine. Atlanta: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information?

ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns. For more information, contact: Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333, Phone: 404-639-6000.

Federal Recycling Program Printed on Recycled Paper

PENTACHLOROPHENOL

Agency for Toxic Substances and Disease Registry September 1995

This fact sheet answers the most frequently asked health questions about pentachlorophenol. For more information, you may call 404-639-6000. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to pentachlorophenol happens mostly to workers at lumber mills and wood-treatment facilities where it is used as a wood preservative. Pentachlorophenol can harm the liver, kidneys, blood, lungs, nervous system, immune system, and gastrointestinal tract. It can also irritate the skin and eyes. This chemical has been found in at least 260 of 1,416 National Priorities List sites identified by the Environmental Protection Agency.

What is pentachlorophenol?

(Pronounced pĕn′tə klôr′ ō fē′ nol)

Pentachlorophenol is a manufactured chemical not found naturally in the environment. Pure pentachlorophenol occurs as a colorless crystal. The impure form is dark gray to brown dust, beads, or flakes. It has a sharp chemical odor when hot, but very little smell at room temperature.

Pentachlorophenol was used as a biocide and wood preservative. It was one of the most heavily used pesticides in the United States. Now, only certified applicators can purchase and use pentachlorophenol.

It is still used in industry as a wood preservative for power line poles, railroad ties, cross arms, and fence posts. It is no longer found in wood preserving solutions or insecticides and herbicides that you can buy for home and garden use.

What happens to pentachlorophenol when it enters the environment?

- ❑ Pentachlorophenol generally sticks to soil particles, but its movement in soils depends on the soil's acidity.
- ❑ Not much pentachlorophenol will evaporate into the air.
- ❑ It lasts for hours or days in air, soils, and surface waters.
- ❑ It doesn't dissolve easily in water.
- ❑ In soils and surface waters, microorganisms break it down into other compounds.
- ❑ Sunlight breaks it down in surface waters and air.
- ❑ Some of the break-down compounds may harm people.
- ❑ It is present in fish, but tissue levels are usually low because pentachlorophenol breaks down in the body.

How might I be exposed to pentachlorophenol?

- ❑ Breathing contaminated air while working with treated wood at wood-treatment facilities and lumber mills
- ❑ Touching treated lumber, for example, in wood-treatment facilities and lumber mills or in construction or farming
- ❑ Breathing contaminated air from log homes made from pentachlorophenol-treated logs
- ❑ Breathing contaminated air near waste sites, sites of accidental spills, and work sites
- ❑ Touching contaminated soil at waste sites and landfills
- ❑ Drinking contaminated water near waste sites, sites of accidental spills, and work sites
- ❑ Eating contaminated food, such as fish, or drinking contaminated water, but these exposures are low and are not very common.

Agency for Toxic Substances and Disease Registry September 1995

How can pentachlorophenol affect my health?

Short-term exposures to **large amounts** of pentachlorophenol or long-term exposure to **low levels** can harm the liver, kidneys, blood, lungs, nervous system, immune system, and gastrointestinal tract. Researchers have seen similar effects in animals. Impurities in commercial pentachlorophenol may cause many, but not all, of its harmful effects. Direct contact with pentachlorophenol can irritate the skin, eyes, and mouth, particularly when it is a hot vapor.

We do not know whether pentachlorophenol causes birth defects in people. It caused a decrease in the number of offspring born to animals that were exposed to it while they were pregnant.

How likely is pentachlorophenol to cause cancer?

The **International Agency for Research on Cancer** has determined that pentachlorophenol is possibly carcinogenic to humans. This conclusion is based on animal studies that showed an increased risk of cancer, specifically in the livers and adrenal glands of mice. There is no good evidence that pentachlorophenol can cause cancer in people.

Is there a medical test to show whether I've been exposed to pentachlorophenol?

Laboratory tests can measure pentachlorophenol in the blood, urine, and body tissues. These tests are only useful shortly after you are exposed because pentachlorophenol leaves the body fairly quickly.

These tests do not tell you how much pentachlorophenol you've been exposed to or if your health will be harmed. The tests are not routinely available at your doctor's office.

Has the federal government made recommendations to protect human health?

The **Environmental Protection Agency (EPA)** has set a limit for drinking water of 1 part of pentachlorophenol per billion parts of water (1 ppb). **EPA** recommends that children not drink water containing more than 0.3 parts of pentachlorophenol per million parts of water (0.3 ppm) for longer than one day; adults should not drink water with more than 1 ppm. The **EPA** requires that spills and accidental releases of pentachlorophenol into the environment of 10 pounds or more must be reported to the **EPA**.

The **Occupational Safety and Health Administration (OSHA)**, the **National Institute for Occupational Safety and Health (NIOSH)**, and the **American Conference of Governmental and Industrial Hygienists (ACGIH)** recommend a maximum level of 0.5 milligrams of pentachlorophenol per cubic meter (0.5 mg/m^3) of workplace air for an 8-hour workday over a 40-hour workweek. These agencies advise avoiding eye and skin contact because this may be a route of significant exposure.

Glossary

Biocide: A substance that can kill living things

Carcinogenic: Ability to cause cancer

Long-term: Lasting one year or longer

Milligram (mg): One thousandth of a gram

Short-term: Lasting 14 days or less

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1994. Toxicological profile for pentachlorophenol (update). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information?

ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns. For more information, contact: Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333, Phone: 404-639-6000, FAX: 404-639-6315.

PHENOL
CAS # 108-95-2

Agency for Toxic Substances and Disease Registry ToxFAQs June 1999

This fact sheet answers the most frequently asked health questions (FAQs) about phenol. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Phenol is a manufactured substance found in a number of consumer products. Skin exposure to high levels of phenol has resulted in liver damage, diarrhea, dark urine, and hemolytic anemia. Phenol has been found in at least 481 of the 1,467 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is phenol?
(Pronounced fē′ nôl′)

Phenol is a manufactured substance. It is a colorless-to-white solid when pure. The commercial product is a liquid. It has sickeningly sweet and tarry odor.

You can taste and smell it at levels lower than those that are associated with harmful effects. Phenol evaporates more slowly than water, and a moderate amount can form a solution with water. Phenol can catch fire.

Phenol is used primarily in the formation of phenolic resins. It is also used in the manufacture of nylon and other synthetic fibers. It is also used in slimicides (chemicals that kill bacteria and fungi in slimes), as a disinfectant, as an antiseptic, and in medicinal preparations, such as mouthwash and sore throat lozenges.

What happens to phenol when it enters the environment?

- Following small, single releases, phenol does not remain in the air long (generally, half is removed from the air in less than a day).
- It generally remains in the soil only about 2 to 5 days.
- It can remain in water for longer than 9 days.
- Larger or repeated releases can remain in the air, water and soil for much longer periods of time.
- Small amounts of phenol may be found in organisms that live in contaminated water.

How might I be exposed to phenol?

- You may be exposed to phenol if you work with or manufacture it.
- You may be exposed to very low levels in your home because it is found in a number of products, including some medicines, lotions, and ointments.
- Low levels of phenol are found in some foods, including smoked summer sausage, fried chicken, mountain cheese, and some species of fish.
- Phenol enters the lungs when you inhale tobacco smoke.
- It can be present in low levels in air and drinking water.

How can phenol affect my health?

In people, the effects of breathing phenol in air are not known. People who had skin exposure to high levels had liver damage, diarrhea, dark urine, and hemolytic anemia.

In animals, breathing air with high levels of phenol re-

sulted in irritation of the lungs. Repeated exposures led to muscle tremors and loss of coordination. Exposure to high levels of phenol for several weeks caused paralysis and severe injury to the heart, liver, kidneys, and lungs, and in some cases, death.

Phenol can have beneficial effects when used medically as an antiseptic or anesthetic

How likely is phenol to cause cancer?

It is not known if phenol causes cancer in people. Cancer occured in mice when phenol was applied to the skin several times each week for the lifetime of the animal. Phenol did not cause cancer in mice or rats when they drank water containing it for 2 years. The International Agency for Research on Cancer (IARC) has determined that phenol is not classifiable as to its carcinogenicity to humans.

How can phenol affect children?

Children are exposed to phenol in the same way adults are. Children are at greater risk of accidently ingesting home products that contain phenol. The effects of exposure to phenol on the human fetus are not known. Pregnant animals that drank water containing high concentrations of phenol gave birth to babies that had low birth weights and minor birth defects.

How can families reduce the risk of exposure to phenol?

If your doctor finds that you have been exposed to high levels of phenol, ask if children may also be exposed. Your doctor may need to ask your state department of health to investigate.

Is there a medical test to show whether I've been exposed to phenol?

There is a urine test that can tell if you have been exposed to phenol recently (within 1 or 2 days). However, the test cannot tell if you were exposed only to phenol since many substances are converted to phenol in the body.

Has the federal government made recommendations to protect human health?

EPA has a lifetime health advisory for adults for phenol in drinking water of 4 milligrams per liter (4 mg/L). EPA also recommends that the level of phenol in surface water (lakes, streams) should be limited to 3.5 mg/L to protect people from drinking contaminated water or eating contaminated fish.

The Occupational Safety and Health Administration (OSHA) has set a limit of 5 parts per million (5 ppm) for workers during an 8-hour workshift in a 40-hour workweek.

The National Institute for Occupational Safety and Health (NIOSH) recommends that workroom air be limited to 5 ppm over a 10-hour workday and that concentrations should not exceed 16 ppm during a 15-minute period.

Source of information

Agency for Toxic Substances and Disease Register (ATSDR). 1998. Toxicological Profile for Phenol. Atlanta: U.S. Department of Health and Human Services, Public Health Service.

Animal testing is sometimes necessary to find out how toxic substances might harm people and how to treat people who have been exposed. Laws today protect the welfare of research animals and scientists must follow strict guidelines.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-639-6359. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

POLYCHLORINATED BIPHENYLS (PCBs)

Agency for Toxic Substances and Disease Registry ToxFAQs September 1997

This fact sheet answers the most frequently asked health questions (FAQs) about polychlorinated biphenyls (PCBs) . For more information, call the ATSDR Information Center at 1-800-447-1544. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Polychlorinated biphenyls are a mixture of individual chemicals which are no longer produced in the United States, but are still found in the environment. Polychlorinated biphenyls can cause irritation of the nose and throat, and acne and rashes. They have been shown to cause cancer in animal studies. Polychlorinated biphenyls have been found in at least 383 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What are polychlorinated biphenyls?

(Pronounced pŏl′ē-klôr′ə-nāt ĭd′ bī-fē′nôlz′)

Polychlorinated biphenyls (PCBs) are a group of manufactured organic chemicals that contain 209 individual chlorinated chemicals (known as congeners). PCBs are either oily liquids or solids and are colorless to light yellow in color. They have no known smell or taste. There are no known natural sources of PCBs. Some commercial PCB mixtures are known in the United States by their industrial trade name, Aroclor.

PCBs don't burn easily and are good insulating material. They have been used widely as coolants and lubricants in transformers, capacitors, and other electrical equipment. The manufacture of PCBs stopped in the United States in 1977 because of evidence that they build up in the environment and cause harmful effects. Products containing PCBs are old fluorescent lighting fixtures, electrical appliances containing PCB capacitors, old microscope oil, and hydraulic fluids.

What happens to PCBs when they enter the environment?

- Before 1977, PCBs entered the air, water, and soil during their manufacture and use.
- Today, PCBs can be released into the environment from hazardous waste sites that contain PCBs, illegal or improper dumping of PCB wastes, and leaks from electrical transformers containing PCBs.
- PCBs may be carried long distances in the air; they remain in the air for approximately 10 days.
- In water, a small amount of the PCBs may remain dissolved, but most sticks to organic particles and sediments.
- PCBs in water build up in fish and marine mammals and can reach levels thousands of times higher than the levels in water.

How might I be exposed to PCBs?

- Using old fluorescent lighting fixtures and old appliances such as television sets and refrigerators; these may leak small amounts of PCBs into the air when they get hot during operation
- Eating food, including fish, meat and dairy products containing PCBs
- Breathing air near hazardous waste sites that contain PCBs
- Drinking PCB-contaminated well water
- Repairing or maintaining PCB transformers

How can PCBs affect my health?

People exposed to PCBs in the air for a long time have experienced irritation of the nose and lungs, and skin irritations, such as acne and rashes.

It is not known whether PCBs may cause birth defects or reproductive problems in people. Some studies have shown that babies born to women who consumed PCB-contaminated fish had problems with their nervous systems at birth. However, it is not known whether these problems were definitely due to PCBs or other chemicals.

Animals that breathed very high levels of PCBs had liver and kidney damage, while animals that ate food with large amounts of PCBs had mild liver damage. Animals that ate food with smaller amounts of PCBs had liver, stomach, and thyroid gland injuries, and anemia, acne, and problems with their reproductive systems. Skin exposure to PCBs in animals resulted in liver, kidney, and skin damage.

How likely are PCBs to cause cancer?

It is not known whether PCBs causes cancer in people. In a long-term (365 days or longer) study, PCBs caused cancer of the liver in rats that ate certain PCB mixtures.

The **Department of Health and Human Services (DHHS)** has determined that PCBs may reasonably be anticipated to be carcinogens.

Is there a medical test to show whether I've been exposed to PCBs?

There are tests to find out if PCBs are in your blood, body fat, and breast milk. Blood tests are probably the easiest, safest, and best method for detecting recent exposures to large amounts of PCBs.

However, since all people in the industrial countries have some PCBs in their bodies, these tests can only show if you have been exposed to higher-than-background levels of PCBs. However, these measurements cannot determine the exact amount or type of PCBs you have been exposed to or how long you have been exposed. In addition, they cannot predict whether you will experience any harmful health effects.

Has the federal government made recommendations to protect human health?

The **EPA** has set a maximum contaminant level of 0.0005 milligrams PCBs per liter of drinking water (0.0005 mg/L). The **EPA** requires that spills or accidental releases into the environment of 1 pound or more of PCBs be reported to the **EPA**.

The **Food and Drug Administration (FDA)** requires that milk, eggs, other dairy products, poultry fat, fish, shellfish, and infant foods contain not more that 0.2–3 parts of PCBs per million parts (0.2–3 ppm) of food.

Glossary

Carcinogen: A substance with the ability to cause cancer

CAS: Chemical Abstracts Service

Milligram (mg): One thousandth of a gram

PPM: Parts per million

Source of Information

This ToxFAQs information is taken from the 1997 Toxicological Profile for Polychlorinated biphenyls (PCBs) (update) produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

Animal testing is sometimes necessary to find out how toxic substances might harm people and how to treat people who have been exposed. Laws today protect the welfare of research animals and scientists must follow strict guidelines.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-800-447-1544, FAX: 404-639-6359. ToxFAQs Internet address via WWW is http://atsdr1.atsdr.cdc.gov:8080/ToxFAQ.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

POLYCYCLIC AROMATIC HYDROCARBONS (PAHs)

Agency for Toxic Substances and Disease Registry September 1996

This fact sheet answers the most frequently asked health questions about polycyclic aromatic hydrocarbons. For more information, you may call 404-639-6000. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to polycyclic aromatic hydrocarbons usually occurs by breathing air contaminated by wild fires or coal tar, or by eating foods that have been grilled. PAHs have been found in at least 600 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What are polycyclic aromatic hydrocarbons?

(Pronounced pŏl′ĭ-sī′klĭk ăr′ə-măt′ĭk hī′drə-kar′bənz)

Polycyclic aromatic hydrocarbons (PAHs) are a group of over 100 different chemicals that are formed during the incomplete burning of coal, oil and gas, garbage, or other organic substances like tobacco or charbroiled meat. PAHs are usually found as a mixture containing two or more of these compounds, such as soot.

Some PAHs are manufactured. These pure PAHs usually exist as colorless, white, or pale yellow-green solids. PAHs are found in coal tar, crude oil, creosote, and roofing tar, but a few are used in medicines or to make dyes, plastics, and pesticides.

What happens to PAHs when they enter the environment?

- PAHs enter the air mostly as releases from volcanoes, forest fires, burning coal, and automobile exhaust.
- PAHs can occur in air attached to dust particles.
- Some PAH particles can readily evaporate into the air from soil or surface waters.
- PAHs can break down by reacting with sunlight and other chemicals in the air, over a period of days to weeks.
- PAHs enter water through discharges from industrial and wastewater treatment plants.
- Most PAHs do not dissolve easily in water. They stick to solid particles and settle to the bottoms of lakes or rivers.
- Microorganisms can break down PAHs in soil or water after a period of weeks to months.
- In soils, PAHs are most likely to stick tightly to particles; certain PAHs move through soil to contaminate underground water.
- PAH contents of plants and animals may be much higher than PAH contents of soil or water in which they live.

How might I be exposed to PAHs?

- Breathing air containing PAHs in the workplace of coking, coal-tar, and asphalt production plants; smokehouses; and municipal trash incineration facilities.
- Breathing air containing PAHs from cigarette smoke, wood smoke, vehicle exhausts, asphalt roads, or agricultural burn smoke.
- Coming in contact with air, water, or soil near hazardous waste sites.
- Eating grilled or charred meats; contaminated cereals, flour, bread, vegetables, fruits, meats; and processed or pickled foods.

- Drinking contaminated water or cow's milk.
- Nursing infants of mothers living near hazardous waste sites may be exposed to PAHs through their mother's milk.

How can PAHs affect my health?

Mice that were fed **high levels** of one PAH during pregnancy had difficulty reproducing and so did their offspring. These offspring also had higher rates of birth defects and lower body weights. It is not known whether these effects occur in people.

Animal studies have also shown that PAHs can cause harmful effects on the skin, body fluids, and ability to fight disease after both **short-** and **long-term exposure**. But these effects have not been seen in people.

How likely are PAHs to cause cancer?

The **Department of Health and Human Services (DHHS)** has determined that some PAHs may reasonably be expected to be carcinogens.

Some people who have breathed or touched mixtures of PAHs and other chemicals for **long periods** of time have developed cancer. Some PAHs have caused cancer in laboratory animals when they breathed air containing them (lung cancer), ingested them in food (stomach cancer), or had them applied to their skin (skin cancer).

Is there a medical test to show whether I've been exposed to PAHs?

In the body, PAHs are changed into chemicals that can attach to substances within the body. There are special tests that can detect PAHs attached to these substances in body tissues or blood. However, these tests cannot tell whether any health effects will occur or find out the extent or source of your exposure to the PAHs. The tests aren't usually available in your doctor's office because special equipment is needed to conduct them.

Has the federal government made recommendations to protect human health?

The **Occupational Safety and Health Administration (OSHA)** has set a limit of 0.2 milligrams of PAHs per cubic meter of air (0.2 mg/m^3). The **OSHA** Permissible Exposure Limit (PEL) for mineral oil mist that contains PAHs is 5 mg/m^3 averaged over an 8-hour exposure period.

The **National Institute for Occupational Safety and Health (NIOSH)** recommends that the average workplace air levels for coal tar products not exceed 0.1 mg/m^3 for a 10-hour workday, within a 40-hour workweek. There are other limits for workplace exposure for things that contain PAHs, such as coal, coal tar, and mineral oil.

Glossary

Carcinogen: A substance that can cause cancer.

Ingest: Take food or drink into your body.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1995. Toxicological profile for polycyclic aromatic hydrocarbons. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns. For more information, contact: Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333, Phone: 404-639-6000, FAX: 404-639-6315. ATSDR Internet home page via WWW is http://atsdr1.atsdr.cdc.gov:8080/atsdrhome.html

STYRENE

Agency for Toxic Substances and Disease Registry September 1995

This fact sheet answers the most frequently asked health questions about styrene. For more information, you may call 404-639-6000. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to styrene is most likely to occur from breathing indoor air that is contaminated with styrene vapors from building materials, tobacco smoke, and consumer products. People who work where styrene is used or manufactured are likely to be exposed by breathing workplace air. Breathing styrene is most likely to affect the nervous system. Styrene has been found in at least 213 of 1,416 National Priorities List sites identified by the Environmental Protection Agency.

What is styrene?

(Pronounced stī′rēn)

Styrene is primarily a synthetic chemical. It is also known as vinylbenzene, ethenylbenzene, cinnamene, or phenylethylene. It's a colorless liquid that evaporates easily and has a sweet smell. It often contains other chemicals that give it a sharp, unpleasant smell.

It dissolves in some liquids but doesn't dissolve easily in water. Billions of pounds are produced each year to make products such as rubber, plastic, insulation, fiberglass, pipes, automobile parts, food containers, and carpet backing.

Most of these products contain styrene linked together in a long chain (polystyrene) as well as unlinked styrene. **Low levels** of styrene also occur naturally in a variety of foods such as fruits, vegetables, nuts, beverages, and meats.

What happens to styrene when it enters the environment?

- Styrene enters the environment during the manufacture, use, and disposal of styrene-based products. It can be found in air, water, and soil.
- It is quickly broken down in the air, usually within 1 to 2 days.
- It evaporates from shallow soils and surface water.
- It doesn't stick easily to soils and sediments.
- It's broken down by bacteria in the soil and water.
- It's not expected to build up in animals.
- Styrene breaks down to half the amount within a few days in surface water; in groundwater, however, it takes between 6 weeks and 7.5 months.

How might I be exposed to styrene?

- Breathing indoor air that is contaminated with styrene vapors from building materials, consumer products, and tobacco smoke
- Breathing contaminated workplace air
- Drinking contaminated water
- Living near industrial facilities or hazardous waste sites
- Smoking cigarettes or eating a lot of food packaged in polystyrene containers.

How can styrene affect my health?

If you breathe **high levels** of styrene for a short time, you're most likely to experience nervous system effects such as depression, concentration problems, muscle weakness, tiredness, and nausea, and possibly eye, nose, and throat irritation.

When animals breathed styrene vapors in short-term studies, they damaged the lining of their noses. Long-term exposure damaged their livers, but there is no evidence that this will occur in people because there is no information on human health effects of breathing **low levels** for a long time.

There is also little information on human health effects from swallowing or touching styrene. Animal studies show that ingestion of **high levels** of styrene over several weeks can cause damage to the liver, kidneys, brain, and lungs. When styrene was applied to the skin of rabbits, it caused irritation.

There is no information as to whether breathing, ingesting, or touching styrene affects fetal development or human reproduction. In animal studies, short-term exposure to **very high levels** resulted in some reproductive and developmental effects.

How likely is styrene to cause cancer?

The **International Agency for Research on Cancer** has determined that styrene is possibly carcinogenic to humans.

Several studies of workers have shown that breathing styrene may cause leukemia. There is no information on the carcinogenicity of styrene in people who swallow it or get it on their skin. Studies in animals that breathed or swallowed styrene suggest that it is weakly carcinogenic.

Is there a medical test to show whether I've been exposed to styrene?

Styrene and its breakdown products can be measured in your blood, urine, and body tissues. Styrene leaves your body quickly. If you are tested within one day, the actual amount of exposure can be estimated. However, it is difficult to predict if the exposure will affect your health.

The test for styrene and its breakdown products requires special methods and equipment and is not usually available at your doctor's office. Your doctor can take samples and send them to a testing laboratory.

Has the federal government made recommendations to protect human health?

The **Environmental Protection Agency (EPA)** has determined that 0.1 part of styrene per million parts of water (0.1 ppm) is the maximum amount that may be present in drinking water. The **EPA** also requires that spills or accidental releases into the environment of 1,000 pounds or more of styrene be reported.

The **Occupational Health and Safety Administration (OSHA)** has limited workers' exposure to an average of 100 ppm for an 8-hour workday, 40-hour workweek.

Glossary

Carcinogen: A substance that can cause cancer

Ingesting: Taking food or drink into your body

Leukemia: Cancer of the blood-forming tissues

Long-term: Lasting one year or longer

Polystyrene: A long chain of styrene molecules joined together

Short-term: Lasting 14 days or less

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1992. Toxicological profile for styrene. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information?

ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns. For more information, contact: Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333, Phone: 404-639-6000, FAX: 404-639-6315.

TETRACHLOROETHYLENE

CAS # 127-18-4

Agency for Toxic Substances and Disease Registry ToxFAQs September 1997

This fact sheet answers the most frequently asked health questions (FAQs) about tetrachloroethylene. For more information, call the ATSDR Information Center at 1-800-447-1544. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Tetrachloroethylene is a manufactured chemical used for dry cleaning and metal degreasing. Exposure to very high concentrations of tetrachloroethylene can cause dizziness, headaches, sleepiness, confusion, nausea, difficulty in speaking and walking, unconsciousness, and death. Tetrachloroethylene has been found in at least 771 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is tetrachloroethylene?

(Pronounced tĕt′rə-klôr′ ō-ĕth′ə-lēn′)

Tetrachloroethylene is a manufactured chemical that is widely used for dry cleaning of fabrics and for metal-degreasing. It is also used to make other chemicals and is used in some consumer products.

Other names for tetrachloroethylene include perchloroethylene, PCE, and tetrachloroethene. It is a nonflammable liquid at room temperature. It evaporates easily into the air and has a sharp, sweet odor. Most people can smell tetrachloroethylene when it is present in the air at a level of 1 part tetrachloroethylene per million parts of air (1 ppm) or more, although some can smell it at even lower levels.

What happens to tetrachloroethylene when it enters the environment?

- Much of the tetrachloroethylene that gets into water or soil evaporates into the air.
- Microorganisms can break down some of the tetrachloroethylene in soil or underground water.
- In the air, it is broken down by sunlight into other chemicals or brought back to the soil and water by rain.
- It does not appear to collect in fish or other animals that live in water.

How might I be exposed to tetrachloroethylene?

- When you bring clothes from the dry cleaners, they will release small amounts of tetrachloroethylene into the air.
- When you drink water containing tetrachloroethylene, you are exposed to it.

How can tetrachloroethylene affect my health?

High concentrations of tetrachloroethylene (particularly in closed, poorly ventilated areas) can cause dizziness, headache, sleepiness, confusion, nausea, difficulty in speaking and walking, unconsciousness, and death.

Irritation may result from repeated or extended skin contact with it. These symptoms occur almost entirely in work (or hobby) environments when people have been accidentally exposed to high concentrations or have intentionally used tetrachloroethylene to get a "high."

In industry, most workers are exposed to levels lower than those causing obvious nervous system effects. The health effects of breathing in air or drinking water with low levels of tetrachloroethylene are not known.

Results from some studies suggest that women who work in dry cleaning industries where exposures to tetrachloroethylene can be quite high may have more menstrual problems and

spontaneous abortions than women who are not exposed. However, it is not known if tetrachloroethylene was responsible for these problems because other possible causes were not considered.

Results of animal studies, conducted with amounts much higher than those that most people are exposed to, show that tetrachloroethylene can cause liver and kidney damage. Exposure to very high levels of tetrachloroethylene can be toxic to the unborn pups of pregnant rats and mice. Changes in behavior were observed in the offspring of rats that breathed high levels of the chemical while they were pregnant.

How likely is tetrachloroethylene to cause cancer?

The **Department of Health and Human Services (DHHS)** has determined that tetrachloroethylene may reasonably be anticipated to be a carcinogen. Tetrachloroethylene has been shown to cause liver tumors in mice and kidney tumors in male rats.

Is there a medical test to show whether I've been exposed to tetrachloroethylene?

One way of testing for tetrachloroethylene exposure is to measure the amount of the chemical in the breath, much the same way breath-alcohol measurements are used to determine the amount of alcohol in the blood.

Because it is stored in the body's fat and slowly released into the bloodstream, tetrachloroethylene can be detected in the breath for weeks following a heavy exposure.

Tetrachloroethylene and trichloroacetic acid (TCA), a breakdown product of tetrachloroethylene, can be detected in the blood. These tests are relatively simple to perform. These tests aren't available at most doctors' offices, but can be performed at special laboratories that have the right equipment.

Because exposure to other chemicals can produce the same breakdown products in the urine and blood, the tests for breakdown products cannot determine if you have been exposed to tetrachloroethylene or the other chemicals.

Has the federal government made recommendations to protect human health?

The **EPA** maximum contaminant level for the amount of tetrachloroethylene that can be in drinking water is 0.005 milligrams tetrachloroethylene per liter of water (0.005 mg/L).

The **Occupational Safety and Health Administration (OSHA)** has set a limit of 100 ppm for an 8-hour workday over a 40-hour workweek.

The **National Institute for Occupational Safety and Health (NIOSH)** recommends that tetrachloroethylene be handled as a potential carcinogen and recommends that levels in workplace air should be as low as possible.

Glossary

Carcinogen: A substance with the ability to cause cancer

CAS: Chemical Abstracts Service

Milligram (mg): One thousandth of a gram

Nonflammable: Will not burn

Source of Information

This ToxFAQs information is taken from the 1997 Toxicological Profile for Tetrachloroethylene (update) produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

Animal testing is sometimes necessary to find out how toxic substances might harm people and how to treat people who have been exposed. Laws today protect the welfare of research animals and scientists must follow strict guidelines.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-800-447-1544, FAX: 404-639-6359. ToxFAQs Internet address via WWW is http://atsdr1.atsdr.cdc.gov:8080/ToxFAQ.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

THALLIUM

Agency for Toxic Substances and Disease Registry September 1995

This fact sheet answers the most frequently asked health questions about thallium. For more information, you may call 404-639-6000. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to thallium occurs mainly from eating food. Exposure to higher levels of thallium may occur in the workplace. Breathing high levels of thallium may result in effects on the nervous system, while ingesting high levels of it results in vomiting, diarrhea, temporary hair loss, and other effects. This chemical has been found in at least 210 of 1,416 National Priorities List sites identified by the Environmental Protection Agency.

What is thallium?

(Pronounced thăl′ē-əm)

Pure thallium is a bluish-white metal that is found in trace amounts in the earth's crust. In the past, thallium was obtained as a by-product from smelting other metals; however, it has not been produced in the United States since 1984. Currently, all the thallium is obtained from imports and from thallium reserves.

In its pure form, thallium is odorless and tasteless. It can also be found combined with other substances such as bromine, chlorine, fluorine, and iodine. When it's combined, it appears colorless-to-white or yellow.

Thallium is used mostly in manufacturing electronic devices, switches, and closures, primarily for the semiconductor industry. It also has limited use in the manufacture of special glass and for certain medical procedures.

What happens to thallium when it enters the environment?

- Thallium enters the environment primarily from coal-burning and smelting, in which it is a trace contaminant of the raw materials.
- It stays in the air, water, and soil for a long time and is not broken down.
- Some thallium compounds are removed from the atmosphere in rain and snow.
- It's absorbed by plants and enters the food chain.
- It builds up in fish and shellfish.

How might I be exposed to thallium?

- Eating food contaminated with thallium may be a major source of exposure for most people
- Breathing workplace air in industries that use thallium
- Smoking cigarettes
- Living near hazardous waste sites containing thallium (may result in higher than normal exposures)
- Touching or, for children, eating soil contaminated with thallium
- Breathing low levels in air and water.

How can thallium affect my health?

Exposure to **high levels** of thallium can result in harmful health effects. A study on workers exposed on the job over several years reported nervous system effects, such as numbness of fingers and toes, from breathing thallium.

Studies in people who ingested **large amounts** of thallium over a short time have reported vomiting, diarrhea, temporary hair loss, and effects on the nervous system, lungs,

heart, liver, and kidneys. It has caused death. It is not known what the effects are from ingesting **low levels** of thallium over a long time.

Birth defects were not reported in the children of mothers exposed to **low levels** from eating vegetables and fruits contaminated with thallium. Studies in rats, however, exposed to **high levels** of thallium, showed adverse developmental effects.

It is not known if breathing or ingesting thallium affects human reproduction. Studies showed that rats that ingested thallium for several weeks had some adverse reproductive effects. Animal data suggest that the male reproductive system may be susceptible to damage by **low levels** of thallium.

There is no information available on the health effects of skin contact with thallium in people or animals.

How likely is thallium to cause cancer?

The **Department of Health and Human Services**, the **International Agency for Research on Cancer,** and the **Environmental Protection Agency (EPA)** have not classified thallium as to its human carcinogenicity.

No studies are available in people or animals on the carcinogenic effects of breathing, ingesting, or touching thallium.

Is there a medical test to show whether I've been exposed to thallium?

There are medical tests available to measure levels of thallium in urine and hair. In addition, thallium can also be measured in blood; however, this is not a good indicator of exposure since thallium only stays in blood a very short time.

These tests require special equipment that is not usually available in most doctor's offices. In addition, these tests cannot determine if adverse health effects will occur from the exposure to thallium.

Has the federal government made recommendations to protect human health?

The **EPA** requires that discharges or accidental spills into the environment of 1,000 pounds or more of thallium be reported.

The **Occupational Safety and Health Administration (OSHA)** has set an exposure limit of 0.1 milligrams per cubic meter (0.1 mg/m^3) for thallium in workplace air. The **American Conference of Governmental Industrial Hygienists (ACGIH)** has established the same guidelines as **OSHA** for the workplace.

The **National Institute for Occupational Safety and Health (NIOSH)** has recommended that 15 mg/m^3 of thallium be considered immediately dangerous to life and health. This is the exposure level of a chemical that is likely to cause permanent health problems or death.

Glossary

Carcinogenicity: Ability to cause cancer

Ingesting: Taking food or drink into your body

Milligram (mg): One thousandth of a gram

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1992. Toxicological profile for thallium. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information?

ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns. For more information, contact: Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333, Phone: 404-639-6000, FAX: 404-639-6315.

1,1,1-TRICHLOROETHANE
CAS # 71-55-6

Agency for Toxic Substances and Disease Registry September 1996

This fact sheet answers the most frequently asked health questions about 1,1,1-trichloroethane. For more information, you may call 404-639-6000. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to 1,1,1-trichloroethane usually occurs by breathing contaminated air. It is found in building materials, cleaning products, paints, and metal degreasing agents. It can cause unconsciousness and other effects if inhaled in large amounts, but usually the effects will disappear after exposure ends. This substance has been found in at least 696 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is 1,1,1-trichloroethane?

(Pronounced trī-klōr′ō-ĕth′ān′)

1,1,1-Trichloroethane is a colorless liquid with a sharp, sweet odor. Even though it is usually found as a liquid, it evaporates quickly and becomes a vapor. It is also known as methyl chloroform, methyltrichloromethane, and trichloromethylmethane; its registered trade names are Chloroethene NU and Aerothene TT. Use of trade names is for identification only and does not imply endorsement by the Agency for Toxic Substances and Disease Registry, the Public Health Service, or the U.S. Department of Health and Human Services.

1,1,1-Trichloroethane does not occur naturally in the environment. It is found in many common products such as glue, paint, industrial degreasers, and aerosol sprays. By 1996, 1,1,1-trichloroethane will no longer be made in the United States due to its effects on the ozone layer.

What happens to 1,1,1-trichloroethane when it enters the environment?

- Most of the 1,1,1-trichloroethane released into the environment is evaporated into the air, where it may last for about 6 years.
- It may travel to the ozone layer, where sunlight can break it down into chemicals that destroy the ozone layer.
- Contaminated water from hazardous waste sites may also contaminate surrounding soil and nearby surface or groundwater.
- From lakes and rivers, most of the 1,1,1-trichloroethane evaporates quickly into the air.
- Water can carry 1,1,1-trichloroethane through the soil and into the groundwater where it can evaporate and pass through the soil as a gas, then be released to the air.
- Organisms living in soil or water may also break down 1,1,1-trichloroethane.
- It will not build up in plants or animals.

How might I be exposed to 1,1,1-trichloroethane?

- Breathing contaminated air; it is used in many building materials, so you are likely to be exposed to higher levels indoors than outdoors or near hazardous waste sites.
- Breathing contaminated air in the workplace while using cleaning products, aerosol sprays, paint, and metal degreasing agents.
- Ingesting contaminated drinking water and food.
- Allowing liquids containing it to touch your skin.

How can 1,1,1-trichloroethane affect my health?

If you breathe air containing high levels of 1,1,1-trichloroethane for a **short time** you may become dizzy, lightheaded, and may lose your balance. These symptoms will

disappear if you stop breathing contaminated air. Breathing much **higher levels** may cause unconsciousness, low blood pressure, and loss of heartbeat. The effects of breathing 1,1,1-trichloroethane for a **long time** are not known. In animals such as rats and dogs, exposure to **high levels** damages the breathing passages, affects the nervous system, and causes mild effects on the liver.

After pregnant rats or rabbits were exposed to 1,1,1-trichloroethane, effects on the offspring, such as delayed development and changes in the setting of the bone structure, were usually only seen at levels that were toxic to the mother. It isn't known whether this chemical affects human reproduction or development.

There are no studies in people to tell whether harmful health effects occur from eating food or drinking water contaminated with 1,1,1-trichloroethane. Placing large amounts of it in an animal's stomach has caused effects on the nervous system, mild liver damage, unconsciousness, and even death.

If your skin comes into contact with 1,1,1-trichloroethane, you might feel some irritation. Studies in animals have shown that skin contact may affect the liver and very large amounts may cause death.

How likely is 1,1,1-trichloroethane to cause cancer?

No information is available to show that 1,1,1-trichloroethane causes cancer. The **International Agency for Research on Cancer (IARC)** has determined that 1,1,1-trichloroethane is not classifiable as to its human carcinogenicity.

Is there a medical test to show whether I've been exposed to 1,1,1-trichloroethane?

Breath, blood, and urine samples can be tested to determine if you have recently been exposed to 1,1,1-trichloroethane. These tests can sometimes estimate how much 1,1,1-trichloroethane has entered your body. Blood and breath tests need to be taken within a few hours of exposure, and urine tests need to be taken within 1–2 days. These tests, however, can't tell whether your health will be affected as a result of your exposure. The exposure tests aren't routinely available in hospitals and clinics because special equipment is required to perform them.

Has the federal government made recommendations to protect human health?

The **EPA** has set a limit of 0.2 parts of 1,1,1-trichloroethane per million parts of drinking water (0.2 ppm). **EPA** has recommended that the level of 1,1,1-trichloroethane in lakes and streams shouldn't exceed 18 ppm to prevent possible health effects from drinking water or eating contaminated fish.

The **Occupational Safety and Health Administration (OSHA)** has set a workplace exposure limit of 350 ppm for an 8-hour workday, 40-hour workweek.

Glossary

Carcinogenicity: Ability of a substance to cause cancer.

CAS: Chemical Abstract Service.

Long time: Lasting one year or longer.

PPM: Parts per million.

Short time: Lasting 14 days or less.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1995. Toxicological profile for 1,1,1-trichloroethane. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns. For more information, contact: Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333, Phone: 404-639-6000, FAX: 404-639-6315. ATSDR Internet home page via WWW is http://atsdr1.atsdr.cdc.gov:8080/atsdrhome.html

TRICHLOROETHYLENE

CAS # 79-01-6

Agency for Toxic Substances and Disease Registry ToxFAQs September 1997

This fact sheet answers the most frequently asked health questions (FAQs) about trichloroethylene. For more information, call the ATSDR Information Center at 1-800-447-1544. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Trichloroethylene is a colorless liquid which is used as a solvent for cleaning metal parts. Drinking or breathing high levels of trichloroethylene may cause nervous system effects, liver and lung damage, abnormal heartbeat, coma, and possibly death. Trichloroethylene has been found in at least 852 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is trichloroethylene?

(Pronounced trī-klôr′ō-ĕth′ə-lēn′)

Trichloroethylene (TCE) is a nonflammable, colorless liquid with a somewhat sweet odor and a sweet, burning taste. It is used mainly as a solvent to remove grease from metal parts, but it is also an ingredient in adhesives, paint removers, typewriter correction fluids, and spot removers.

Trichloroethylene is not thought to occur naturally in the environment. However, it has been found in underground water sources and many surface waters as a result of the manufacture, use, and disposal of the chemical.

What happens to trichloroethylene when it enters the environment?

- Trichloroethylene dissolves a little in water, but it can remain in ground water for a long time.
- Trichloroethylene quickly evaporates from surface water, so it is commonly found as a vapor in the air.
- Trichloroethylene evaporates less easily from the soil than from surface water. It may stick to particles and remain for a long time.
- Trichloroethylene may stick to particles in water, which will cause it to eventually settle to the bottom sediment.
- Trichloroethylene does not build up significantly in plants and animals.

How might I be exposed to trichloroethylene?

- Breathing air in and around the home which has been contaminated with trichloroethylene vapors from shower water or household products such as spot removers and typewriter correction fluid
- Drinking, swimming, or showering in water that has been contaminated with trichloroethylene
- Contact with soil contaminated with trichloroethylene, such as near a hazardous waste site
- Contact with the skin or breathing contaminated air while manufacturing trichloroethylene or using it at work to wash paint or grease from skin or equipment

How can trichloroethylene affect my health?

Breathing small amounts may cause headaches, lung irritation, dizziness, poor coordination, and difficulty con centrating.

Breathing large amounts of trichloroethylene may cause impaired heart function, unconsciousness, and death. Breathing it for long periods may cause nerve, kidney, and liver damage.

Drinking large amounts of trichloroethylene may cause nausea, liver damage, unconsciousness, impaired heart function, or death.

ToxFAQs Internet address via WWW is http://atsdr1.atsdr.cdc.gov:8080/ToxFAQ.html

Drinking small amounts of trichloroethylene for long periods may cause liver and kidney damage, impaired immune system function, and impaired fetal development in pregnant women, although the extent of some of these effects is not yet clear.

Skin contact with trichloroethylene for short periods may cause skin rashes.

How likely is trichloroethylene to cause cancer?

Some studies with mice and rats have suggested that high levels of trichloroethylene may cause liver or lung cancer. Some studies of people exposed over long periods to high levels of trichloroethylene in drinking water or in workplace air have found evidence of increased cancer. However, these results are inconclusive because the cancer could have been caused by other chemicals.

The **International Agency for Research on Cancer (IARC)** has determined that trichloroethylene is probably carcinogenic to humans.

Is there a medical test to show whether I've been exposed to trichloroethylene?

If you have recently been exposed to trichloroethylene, it can be detected in your breath, blood, or urine. The breath test, if it is performed soon after exposure, can tell if you have been exposed to even a small amount of trichloroethylene.

Exposure to larger amounts is assessed by blood and urine tests, which can detect trichloroethylene and many of its breakdown products for up to a week after exposure. However, exposure to other similar chemicals can produce the same breakdown products, so their detection is not absolute proof of exposure to trichloroethylene. This test isn't available at most doctors' offices, but can be done at special laboratories that have the right equipment.

Has the federal government made recommendations to protect human health?

The **EPA** has set a maximum contaminant level for trichloroethylene in drinking water at 0.005 milligrams per liter (0.005 mg/L) or 5 parts of TCE per billion parts water.

The **EPA** has also developed regulations for the handling and disposal of trichloroethylene.

The **Occupational Safety and Health Administration (OSHA)** has set an exposure limit of 100 parts of trichloroethylene per million parts of air (100 ppm) for an 8-hour workday, 40-hour workweek.

Glossary

Carcinogenicity: The ability of a substance to cause cancer

CAS: Chemical Abstracts Service

Evaporate: To change into a vapor or gas

Milligram (mg): One thousandth of a gram

Nonflammable: Will not burn

PPM: Parts per million

Sediment: Mud and debris that have settled to the bottom of a body of water

Solvent: A chemical that dissolves other substances

Source of Information

This ToxFAQs information is taken from the 1997 Toxicological Profile for Trichloroethylene (update) produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

Animal testing is sometimes necessary to find out how toxic substances might harm people and how to treat people who have been exposed. Laws today protect the welfare of research animals and scientists must follow strict guidelines.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-800-447-1544, FAX: 404-639-6359. ToxFAQs Internet address via WWW is http://atsdr1.atsdr.cdc.gov:8080/ToxFAQ.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

TOLUENE

Agency for Toxic Substances and Disease Registry September 1995

This fact sheet answers the most frequently asked health questions about toluene. For more information, you may call 404-639-6000. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to toluene happens mostly through breathing it in workplace air, in automobile exhaust, or during deliberate glue sniffing or solvent abuse. It is also used in many consumer products. Breathing high levels of toluene affects the brain and can cause headaches, confusion, dizziness, sleepiness, and memory loss. This chemical has been found in at least 869 of 1,416 National Priorities List sites identified by the Environmental Protection Agency.

What is toluene?

(Pronounced tŏl′ yōō ēn′)

Toluene is a colorless liquid with a distinctive sweet and pungent smell. It occurs naturally in crude oil and in the tolu tree. You can smell toluene at 8 parts of toluene per million parts of air (ppm) and taste it in water at 0.04-1 ppm.

Toluene is produced during the process of making gasoline and other fuels from crude oil, in making coke from coal, and as a by-product in the manufacture of styrene.

It is also used in making paints, paint thinners, fingernail polish, lacquers, adhesives, and rubber and in some printing and leather tanning processes.

What happens to toluene when it enters the environment?

- Toluene has been found in waste sites and landfills when discarded as used solvent or in paints, paint thinners, and nail polish.
- It does not stay in the environment long.
- It is readily broken down by microorganisms in the soil.
- It evaporates quickly from the soil and surface water into the air.
- Toluene in the air combines with oxygen to form benzaldehyde and cresol, which can be harmful to people.
- Toluene can be taken up by fish, shellfish, plants, and animals living in water, but high levels do not build up.

How might I be exposed to toluene?

- People may be exposed through breathing toluene in workplace air or in automobile exhaust.
- Sniffing glue or using solvents improperly could lead to high exposures.
- Breathing contaminated air or touching it when working with gasoline, kerosene, heating oil, paints, and lacquers puts people at the greatest risk of exposure to toluene in air and on the skin.
- High exposures can occur at home and outdoors while using gasoline, nail polish, rubber cement, paints, paintbrush cleaners, stain removers, fabric dyes, inks, and adhesives.
- Drinking contaminated water or breathing air near waste sites and landfills could lead to higher exposures.
- The amount of toluene in food is likely to be low.
- People are also exposed to toluene by breathing cigarette smoke that has small amounts of toluene in it.

How can toluene affect my health?

Toluene affects the brain. **Low-to-moderate** levels from long-term exposure can cause tiredness, confusion, weakness, drunken-type actions, memory loss, nausea and loss of appetite, and hearing loss.

Inhaling a **high level** of toluene in a short time can make you feel light-headed, dizzy, or sleepy. It can cause unconsciousness, and even death.

Repeated exposure to **high levels** can cause permanent brain and speech damage, vision and hearing problems, loss of muscle control, and poor balance. It can also cause memory loss and decreased mental ability. Toluene also affects the kidneys.

Several studies have shown that unborn animals were harmed when **high levels** of toluene were breathed by their mothers. Babies can have neurologic problems and retarded growth and development if their mothers breathe a **high level** of toluene during pregnancy. We do not know if toluene harms the unborn child if the mother is exposed to **low levels** of toluene during pregnancy.

How likely is toluene to cause cancer?

The **Department of Health and Human Services** and the **International Agency for Research on Cancer** have not classified toluene for carcinogenic effects. Studies in workers and animals indicate that toluene does not cause cancer.

Is there a medical test to show whether I've been exposed to toluene?

Laboratory tests can detect toluene or its breakdown products in exhaled air, blood, or urine. These tests are only useful within 12 hours of exposure and do not tell if harmful effects will occur. These tests are not routinely available at your doctor's office.

Has the federal government made recommendations to protect human health?

The **Environmental Protection Agency (EPA)** has set a limit in drinking water of 1 ppm toluene. **EPA** recommends that children should not drink water containing more than 20 ppm toluene for 1 day, or 2 ppm for longer lengths of time (7 years). Adults should not drink water containing more than 7 ppm toluene for longer times.

The **EPA** requires that spills or accidental releases of toluene into the environment of 1,000 pounds or more must be reported to **EPA**.

The **Occupational Safety and Health Administration (OSHA)** set a maximum level of 200 ppm toluene in workplace air for an 8-hour workday, 40-hour workweek. The **National Institute for Occupational Safety and Health (NIOSH)** recommends an exposure limit of 100 ppm of toluene in workplace air and the **American Conference of Governmental Industrial Hygienists (ACGIH)** recommends an exposure limit of 50 ppm in workplace air.

Glossary

Carcinogenic: Ability to cause cancer

Long-term: Lasting one year or longer

PPM: Parts per million

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1994. Toxicological profile for toluene (update). Atlanta, GA.: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information?

ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns. For more information, contact: Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333, Phone: 404-639-6000, FAX: 404-639-6315.

VANADIUM

Agency for Toxic Substances and Disease Registry September 1995

This fact sheet answers the most frequently asked health questions about vanadium. For more information, you may call 404-639-6000. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Everyone is exposed to low levels of vanadium in air, water, and food; however, most people are exposed mainly from food. Breathing high levels of vanadium may cause lung irritation, chest pain, coughing, and other effects. This chemical has been found in at least 385 of 1,416 National Priorities List sites identified by the Environmental Protection Agency.

What is vanadium?

(Pronounced və-nā′dē-əm)

Vanadium is a compound that occurs in nature as a white-to-gray metal, and is often found as crystals. Pure vanadium has no smell. It usually combines with other elements such as oxygen, sodium, sulfur, or chloride. Vanadium and vanadium compounds can be found in the earth's crust and in rocks, some iron ores, and crude petroleum deposits.

Vanadium is mostly combined with other metals to make special metal mixtures called alloys. Vanadium in the form of vanadium oxide is a component in special kinds of steel that is used for automobile parts, springs, and ball bearings. Most of the vanadium used in the United States is used to make steel. Vanadium oxide is a yellow-orange powder, dark-gray flakes, or yellow crystals. Vanadium is also mixed with iron to make important parts for aircraft engines.

Small amounts of vanadium are used in making rubber, plastics, ceramics, and other chemicals.

What happens to vanadium when it enters the environment?

- ❑ Vanadium mainly enters the environment from natural sources and from the burning of fuel oils.
- ❑ It stays in the air, water, and soil for a long time.
- ❑ It does not dissolve well in water.
- ❑ It combines with other elements and particles.
- ❑ It sticks to soil sediments.
- ❑ Low levels have been found in plants, but it is not likely to build up in the tissues of animals.

How might I be exposed to vanadium?

- ❑ Exposure to very low levels in air, water, and food
- ❑ Eating higher levels of it in certain foods
- ❑ Breathing air near an industry that burns fuel oil or coal; these industries release vanadium oxide into the air
- ❑ Working in industries that process it or make products containing it
- ❑ Breathing contaminated air or drinking contaminated water near waste sites or landfills containing vanadium
- ❑ Vanadium is not readily absorbed by the body from the stomach, gut, or contact with the skin.

How can vanadium affect my health?

Exposure to **high levels** of vanadium can cause harmful health effects. The major effects from breathing **high levels** of vanadium are on the lungs, throat, and eyes. Workers who breathed it for short and long periods sometimes had lung irritation, coughing, wheezing, chest pain, runny nose, and a

sore throat. These effects stopped soon after they stopped breathing the contaminated air. Similar effects have been observed in animal studies. No other significant health effects of vanadium have been found in people.

We do not know the health effects in people of ingesting vanadium. Animals that ingested **very large** doses have died. Lower, but still **high levels** of vanadium in the water of pregnant animals resulted in minor birth defects. Some animals that breathed or ingested vanadium over a long term had minor kidney and liver changes.

The amounts of vanadium given in these animal studies that resulted in harmful effects are much higher than those likely to occur in the environment.

How likely is vanadium to cause cancer?

The **Department of Health and Human Services**, the **International Agency for Research on Cancer**, and the **Environmental Protection Agency (EPA)** have not classified vanadium as to its human carcinogenicity.

No human studies are available on the carcinogenicity of vanadium. No increase in tumors was noted in a long-term animal study where the animals were exposed to vanadium in the drinking water.

Is there a medical test to show whether I've been exposed to vanadium?

There are medical tests available to measure levels of vanadium in urine and blood. These tests are not routinely performed at doctors' offices because they require special equipment, but your doctor can take samples and send them to a testing laboratory. These tests can't determine if harmful health effects will occur from the exposure to vanadium.

Another indicator of high vanadium exposure in people is that their tongues may have a green color on top.

Has the federal government made recommendations to protect human health?

The **EPA** requires discharges or spills of 1,000 pounds or more of vanadium into the environment to be reported.

The **Occupational Safety and Health Administration (OSHA)** has set an exposure limit of 0.05 milligrams per cubic meter (0.05 mg/m^3) for vanadium pentoxide dust and 0.1 mg/m^3 for vanadium pentoxide fumes in workplace air for an 8-hour workday, 40-hour workweek.

The **American Conference of Governmental Industrial Hygienists (ACGIH)** has recommended an occupational exposure limit of 0.05 mg/m^3 for vanadium pentoxide.

The **National Institute for Occupational Safety and Health (NIOSH)** has recommended that 35 mg/m^3 of vanadium be considered immediately dangerous to life and health. This is the exposure level of a chemical that is likely to cause permanent health problems or death.

Glossary

Carcinogenicity: Ability to cause cancer

Ingesting: Taking food or drink into your body

Long-term: Lasting one year or longer

Milligram (mg): One thousandth of a gram

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1992. Toxicological profile for vanadium. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information?

ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns. For more information, contact: Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333, Phone: 404-639-6000, FAX: 404-639-6315.

VINYL CHLORIDE
CAS # 75-01-4

Agency for Toxic Substances and Disease Registry ToxFAQs September 1997

This fact sheet answers the most frequently asked health questions (FAQs) about vinyl chloride. For more information, call the ATSDR Information Center at 1-800-447-1544. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to vinyl chloride occurs mainly in the workplace. Breathing high levels of vinyl chloride for short periods of time can cause dizziness, sleepiness, unconsciousness, and at extremely high levels can cause death. Breathing vinyl chloride for long periods of time can result in permanent liver damage, immune reactions, nerve damage, and liver cancer. This substance has been found in at least 496 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is vinyl chloride?
(Pronounced vī′nəl klôr′īd′)

Vinyl chloride is a colorless, flammable gas at normal temperatures with a mild, sweet odor. It is a manufactured substance that is used to make polyvinyl chloride (PVC). PVC is used to make a variety of plastic products, including pipes, wire and cable coatings, and the furniture and automobile upholstery.

Vinyl chloride also results from the breakdown of other substances, such as trichloroethane, trichloroethylene, and tetrachloroethylene. Vinyl chloride is also known as chloroethene, chloroethylene, and ethylene monochloride.

What happens to vinyl chloride when it enters the environment?

- Liquid vinyl chloride evaporates easily into the air. Vinyl chloride, if it is near the surface of soil or water, can also evaporate.
- Vinyl chloride in the air can break down within a few days to other substances, some of which can be harmful.
- Small amounts of vinyl chloride can dissolve in water.
- Vinyl chloride formed from the breakdown of other chemicals can enter groundwater.
- Vinyl chloride is unlikely to build up in plants or animals.

How might I be exposed to vinyl chloride?

- Breathing vinyl chloride that has been released from plastics industries, hazardous waste sites, and landfills
- Breathing vinyl chloride in air or during contact with your skin or eyes in the workplace
- Drinking water from contaminated wells

How can vinyl chloride affect my health?

Breathing high levels of vinyl chloride can cause you to feel dizzy or sleepy. Breathing very high levels can cause you to pass out, and breathing extremely high levels can cause death.

Most of the studies on long-term exposure (365 days or longer) to vinyl chloride are about workers that make or use vinyl chloride. They were exposed to much higher levels of vinyl chloride in the air than is the general population. People who breathe vinyl chloride for long periods of time can have changes to the structure of their livers.

People who work with vinyl chloride have developed nerve damage and immune reactions. Other workers have developed problems with the blood flow in their hands; the

tips of their fingers turn white and hurt when they are in cold temperatures. Sometimes, the bones in the tips of their fingers have broken down.

The effects of drinking high levels of vinyl chloride are unknown. If you spill vinyl chloride on your skin, it will cause numbness, redness, and blisters.

Animal studies have shown that long-term (365 days or longer) exposure to vinyl chloride can damage the sperm and testes. It has not been proven that vinyl chloride causes birth defects in humans, but animal studies have shown that breathing vinyl chloride can harm unborn offspring and may also cause increases in early miscarriages.

How likely is vinyl chloride to cause cancer?

The **Department of Health and Human Services (DHHS)** has determined that vinyl chloride is a known human carcinogen. Vinyl chloride exposure results in liver cancer in people.

Is there a medical test to show whether I've been exposed to vinyl chloride?

The results of several tests can sometimes show if you've been exposed to vinyl chloride. If breath samples are taken just after exposure, vinyl chloride can be measured, but this is not helpful for measuring very low levels of the chemical.

Better information is gotten by measuring a breakdown product of vinyl chloride, thiodiglycolic acid, in the urine shortly after exposure. However, this test will not give information on the level of exposure. Exposure to other chemicals can produce the same breakdown product in the urine.

The binding of vinyl chloride to genetic material in your blood or tissue can tell whether you have been exposed to vinyl chloride, but this is not sensitive enough to determine the effects resulting from exposure. These tests are not available at most doctors' offices, but can be done at special laboratories that have the right equipment.

Has the federal government made recommendations to protect human health?

The **EPA** requires that the amount of vinyl chloride in drinking water not exceed 0.002 milligrams of vinyl chloride per liter of water (0.002 mg/L). The **EPA** requires that spills or accidental releases into the environment of 1 pound or more of vinyl chloride be reported to the **EPA**.

The **Occupational Safety and Health Administration (OSHA)** has set the maximum allowable level of vinyl chloride in workroom air during an 8-hour workday in a 40-hour workweek at 1 part vinyl chloride per million parts of air (1 ppm).

Glossary

CAS: Chemical Abstracts Service

Carcinogen: A substance with the ability to cause cancer

Immune reaction: Sensitizing response of the body to a chemical

Milligram (mg): One thousandth of a gram

Miscarriage: Pregnancy loss

PPM: Parts per million

Source of Information

This ToxFAQs information is taken from the 1997 Toxicological Profile for Vinyl chloride (update) produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

Animal testing is sometimes necessary to find out how toxic substances might harm people and how to treat people who have been exposed. Laws today protect the welfare of research animals and scientists must follow strict guidelines.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-800-447-1544, FAX: 404-639-6359. ToxFAQs Internet address via WWW is http://atsdr1.atsdr.cdc.gov:8080/ToxFAQ.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

XYLENE
CAS # 1330-20-7

Agency for Toxic Substances and Disease Registry September 1996

This fact sheet answers the most frequently asked health questions about xylene. For more information, you may call 404-639-6000. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to xylene occurs in the workplace and when you use paint, gasoline, paint thinners and other products that contain it. People who breathe high levels may have dizziness, confusion, and a change in their sense of balance. This substance has been found in at least 658 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is xylene?

(Pronounced zī-lēn′)

Xylene is a colorless, sweet-smelling liquid that catches on fire easily. It occurs naturally in petroleum and coal tar and is formed during forest fires. You can smell xylene in air at 0.08–3.7 parts of xylene per million parts of air (ppm) and begin to taste it in water at 0.53–1.8 ppm.

Chemical industries produce xylene from petroleum. It's one of the top 30 chemicals produced in the United States in terms of volume.

Xylene is used as a solvent and in the printing, rubber, and leather industries. It is also used as a cleaning agent, a thinner for paint, and in paints and varnishes. It is found in small amounts in airplane fuel and gasoline.

What happens to xylene when it enters the environment?

- Xylene has been found in waste sites and landfills when discarded as used solvent, or in varnish, paint, or paint thinners.
- It evaporates quickly from the soil and surface water into the air.
- In the air, it is broken down by sunlight into other less harmful chemicals.
- It is broken down by microorganisms in soil and water.
- Only a small amount of it builds up in fish, shellfish, plants, and animals living in xylene-contaminated water.

How might I be exposed to xylene?

- Breathing xylene in workplace air or in automobile exhaust.
- Breathing contaminated air.
- Touching gasoline, paint, paint removers, varnish, shellac, and rust preventatives that contain it.
- Breathing cigarette smoke that has small amounts of xylene in it.
- Drinking contaminated water or breathing air near waste sites and landfills that contain xylene.
- The amount of xylene in food is likely to be low.

How can xylene affect my health?

Xylene affects the brain. High levels from exposure for **short periods** (14 days or less) or **long periods** (more than 1 year) can cause headaches, lack of muscle coordination,

dizziness, confusion, and changes in one's sense of balance. Exposure of people to **high levels** of xylene for **short periods** can also cause irritation of the skin, eyes, nose, and throat; difficulty in breathing; problems with the lungs; delayed reaction time; memory difficulties; stomach discomfort; and possibly changes in the liver and kidneys. It can cause unconsciousness and even death at **very high levels**.

Studies of unborn animals indicate that **high concentrations** of xylene may cause increased numbers of deaths, and delayed growth and development. In many instances, these same concentrations also cause damage to the mothers. We do not know if xylene harms the unborn child if the mother is exposed to low levels of xylene during pregnancy.

How likely is xylene to cause cancer?

The **International Agency for Research on Cancer (IARC)** has determined that xylene is not classifiable as to its carcinogenicity in humans.

Human and animal studies have not shown xylene to be carcinogenic, but these studies are not conclusive and do not provide enough information to conclude that xylene does not cause cancer.

Is there a medical test to show whether I've been exposed to xylene?

Laboratory tests can detect xylene or its breakdown products in exhaled air, blood, or urine. There is a high degree of agreement between the levels of exposure to xylene and the levels of xylene breakdown products in the urine. However, a urine sample must be provided very soon after exposure ends because xylene quickly leaves the body. These tests are not routinely available at your doctor's office.

Has the federal government made recommendations to protect human health?

The **EPA** has set a limit of 10 ppm of xylene in drinking water.

The **EPA** requires that spills or accidental releases of xylenes into the environment of 1,000 pounds or more must be reported.

The **Occupational Safety and Health Administration (OSHA)** has set a maximum level of 100 ppm xylene in workplace air for an 8-hour workday, 40-hour workweek.

The **National Institute for Occupational Safety and Health (NIOSH)** and the **American Conference of Governmental Industrial Hygienists (ACGIH)** also recommend exposure limits of 100 ppm in workplace air.

NIOSH has recommended that 900 ppm of xylene be considered immediately dangerous to life or health. This is the exposure level of a chemical that is likely to cause permanent health problems or death.

Glossary

Evaporate: To change from a liquid into a vapor or a gas.

Carcinogenic: Having the ability to cause cancer.

CAS: Chemical Abstract Service.

PPM: Parts per million.

Solvent: A liquid that can dissolve other substances.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1995. Toxicological profile for xylenes (Update). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns. For more information, contact: Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333, Phone: 404-639-6000, FAX: 404-639-6315. ATSDR Internet home page via WWW is http://atsdr1.atsdr.cdc.gov:8080/atsdrhome.html

ZINC

Agency for Toxic Substances and Disease Registry September 1995

This fact sheet answers the most frequently asked health questions about zinc. For more information, you may call 404-639-6000. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to high levels of zinc occurs mostly from eating food, drinking water, or breathing workplace air that is contaminated. Exposure to large amounts of zinc can be harmful. However, zinc is an essential element for our bodies, so too little zinc can also be harmful. This chemical has been found in at least 801 of 1,416 National Priorities List sites identified by the Environmental Protection Agency.

What is zinc?

(Pronounced zĭngk)

Zinc is one of the most common elements in the earth's crust. It's found in air, soil, and water, and is present in all foods. Pure zinc is a bluish-white shiny metal.

Zinc has many commercial uses as coatings to prevent rust, in dry cell batteries, and mixed with other metals to make alloys like brass and bronze. A zinc and copper alloy is used to make pennies in the United States.

Zinc combines with other elements to form zinc compounds. Common zinc compounds found at hazardous waste sites include zinc chloride, zinc oxide, zinc sulfate, and zinc sulfide. Zinc compounds are widely used in industry to make paint, rubber, dye, wood preservatives, and ointments.

What happens to zinc when it enters the environment?

- Some is released into the environment by natural processes, but most comes from activities of people like mining, steel production, coal burning, and burning of waste.
- It attaches to soil, sediments, and dust particles in the air.
- Rain and snow remove zinc dust particles from the air.
- Zinc compounds can move into the groundwater and into lakes, streams, and rivers.
- Most of the zinc in soil stays bound to soil particles.
- It builds up in fish and other organisms, but it doesn't build up in plants.

How might I be exposed to zinc?

- Ingesting small amounts present in your food and water
- Drinking contaminated water near manufacturing or waste sites
- Drinking contaminated water or a beverage that has been stored in metal containers or flows through pipes that have been coated with zinc to resist rust
- Eating too many dietary supplements that contain zinc
- Breathing zinc particles in the air at manufacturing sites.

How can zinc affect my health?

Zinc is an essential element in our diet. **Too little** zinc can cause health problems, but **too much** zinc is also harmful.

The recommended dietary allowance (RDA) for zinc is 15 milligrams a day for men (15 mg/day); 12 mg/day for women; 10 mg/day for children; and 5 mg/day for infants. Not enough zinc in your diet can result in a loss of appetite, a decreased sense of taste and smell, slow wound healing and

skin sores, or a damaged immune system. Young men who don't get enough zinc may have poorly developed sex organs and slow growth. If a pregnant woman doesn't get enough zinc, her babies may have growth retardation.

Too much zinc, however, can also be damaging to your health. Harmful health effects generally begin at levels from 10-15 times the RDA (in the 100 to 250 mg/day range). Eating **large amounts** of zinc, even for a short time, can cause stomach cramps, nausea, and vomiting. Taken longer, it can cause anemia, pancreas damage, and lower levels of high density lipoprotein cholesterol (the good form of cholesterol).

Breathing **large amounts** of zinc (as dust or fumes) can cause a specific short-term disease called metal fume fever. This is believed to be an immune response affecting the lungs and body temperature. We do not know the long-term effects of breathing high levels of zinc.

It is not known if high levels of zinc affect human reproduction or cause birth defects. Rats that were fed **large amounts** of zinc became infertile or had smaller babies. Irritation was also observed on the skin of rabbits, guinea pigs, and mice when exposed to some zinc compounds. Skin irritation will probably occur in people.

How likely is zinc to cause cancer?

The **Department of Health and Human Services**, the **International Agency for Research on Cancer**, and the **Environmental Protection Agency (EPA)** have not classified zinc for carcinogenicity.

Is there a medical test to show whether I've been exposed to zinc?

Zinc can be measured in your blood or feces. This can tell you how much zinc you have been exposed to. Zinc can also be measured in urine, saliva, and hair. The amount of zinc in your hair tells us something about long-term exposure, but the relationship between levels in your hair and the amount that you were exposed to is not clear. These tests are not routinely performed at doctors' offices, but your doctor can take samples and send them to a testing laboratory.

Has the federal government made recommendations to protect human health?

EPA recommends that there be no more than 5 parts of zinc in 1 million parts of drinking water (5 ppm) because of taste. **EPA** also requires that releases of more than 1,000 (or in some cases 5,000) pounds of zinc or its compounds into the environment be reported.

The **Occupational Safety and Health Administration (OSHA)** has set a maximum concentration limit for zinc chloride fumes in workplace air of 1 milligram of zinc per cubic meter of air (1 mg/m^3) for an 8-hour workday over a 40-hour work week and 5 mg/m^3 for zinc oxide fumes. The **National Institute for Occupational Safety and Health (NIOSH)** has set the same standards for up to a 10-hour workday over a 40-hour workweek.

Glossary

Anemia: A decreased ability of the blood to transport oxygen

Carcinogenicity: Ability to cause cancer

Milligram (mg): One thousandth of a gram

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1994. Toxicological profile for zinc. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information?

ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns. For more information, contact: Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333, Phone: 404-639-6000, FAX: 404-639-6315.