

ACRYLONITRILE

ID~CAS #: 107-13-1

Acrylonitrile is a colorless, liquid, man-made chemical with a sharp, onion- or garlic-like odor. It can be dissolved in water and evaporates quickly.

USES~

Acrylonitrile is used to make other chemicals such as plastics, synthetic rubber, and acrylic fibers. A mixture of acrylonitrile and carbon tetrachloride was used as a pesticide in the past; however, all pesticide uses have stopped.

- Acrylonitrile may be found in the soil, water, or air near industrial sites where it is made, or at hazardous waste sites where it has been disposed of.
- Because acrylonitrile evaporates easily, most of it is released to the air from facilities where it is produced and used.
- In air, acrylonitrile breaks down quickly (about half will disappear within 5 to 50 hours) by reacting with other chemicals and sunlight.
- Acrylonitrile can enter groundwater by filtering through the soil, but it is not commonly found in groundwater.
- It is broken down by bacteria in surface water.
- When it is released to soil, some of it will be broken down by bacteria, but most of it will evaporate to the air or filter to groundwater.
- Acrylonitrile does not build up in the food chain.

EXPOSURE~

Exposure to acrylonitrile occurs mostly from breathing it in the air. Acrylonitrile primarily affects the nervous system and lungs. If it is spilled on the skin, the skin will turn red and blisters may form. This chemical has been found in at least 3 of the 1,177 National Priorities List sites identified by the Environmental Protection Agency (EPA).

- Unless you live near a factory where acrylonitrile is made or near a hazardous waste site that contains acrylonitrile, you are unlikely to be exposed to it.
- Breathing contaminated air near hazardous waste sites that contain acrylonitrile.
- Working in, or living near, industries where it is manufactured or used.
- Swallowing food and water that contains small amounts of acrylonitrile.

The Department of Health and Human Services (DHHS) has determined that acrylonitrile may reasonably be anticipated to cause cancer in people. Studies of people are inconclusive, while animal studies have shown cancers of the brain and mammary glands.

References

Agency for Toxic Substances & Disease Registry,
<http://www.atsdr.cdc.gov/substances/toxsubstance.asp?toxid=78>

ALDRIN Pesticides (chemicals used for killing pests, such as rodents, insects, or plants)

ID~CAS #: 309-00-2

Aldrin and dieldrin are insecticides with similar chemical 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. Neither substance occurs naturally in the environment

USES~

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

- Sunlight and bacteria change aldrin to dieldrin so that we mostly find dieldrin in the environment.
- They bind tightly to soil and slowly evaporate to the air.
- Dieldrin in soil and water 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.

EXPOSURE~

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 affect the nervous system. Aldrin has been found in at least 207 of the 1,613 National Priorities List sites identified by the Environmental Protection Agency (EPA). Dieldrin has been found in at least 287 of the 1,613 sites.

- Dieldrin is everywhere in the environment, but at very low levels.
- Eating food like fish or shellfish from lakes or streams contaminated with either chemical, or contaminated root crops, dairy products, or meats.
- Air, surface water, or soil near waste sites may contain higher levels.
- Living in homes that were once treated with aldrin or dieldrin to control termites.

References

Agency for Toxic Substances & Disease Registry,
<http://www.atsdr.cdc.gov/toxfaqs/tf.asp?id=316&tid=56>

PHTHALATES

ID~

Phthalates are a group of aromatic chemicals containing a phenyl ring with two attached and extended acetate groups. They are often referred to as “plasticizers”.

USES~

Phthalates are typically colorless liquids used to make plastics more flexible and resilient, and are often referred to as plasticizers. These plastics are found in products such as toothbrushes, automobile parts, tools, toys, and food packaging. Some are also used in cosmetics, insecticides, and aspirin.

EXPOSURE~

Because they are not a part of the chain of chemicals (polymers) that makes up plastics, they can be released fairly easily from these products in which they are used.

References

<http://www.atsdr.cdc.gov/substances/toxchemicallisting.asp?sysid=41>

Agency for Toxic Substances and Disease Registry, 4770 Buford Hwy NE, Atlanta, GA 30341

Agency for Toxic Substances and Disease Registry (ATSDR). 2002. [Toxicological profile for Di\(2-ethylhexyl\)phthalate \(DEHP\)](#). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Di(2-ethylhexyl)phthalate (DEHP):

AKA Bis(2-ethylhexyl) phthalate (BEHP) Phthalates Carcinogen

ID~CAS #: 117-81-7

Di(2-ethylhexyl) phthalate, is a manufactured chemical that is commonly added to plastics to make them flexible. Other names for this compound are dioctyl phthalate (DOP) and bis(2-ethylhexyl) phthalate (BEHP). (Note that di-n-octyl phthalate, however, is the name for a different chemical.)

Trade names used for DEHP include Platinol DOP, Octoil, Silicol 150, Bisoflex 81, and Eviplast 80. DEHP is a colorless liquid with almost no odor. It does not evaporate easily, and little will be present in the air even near sources of production. It dissolves more easily in materials such as gasoline, paint removers, and oils than it does in water.

Uses

It is present in many plastics, especially vinyl materials, which may contain up to 40% DEHP, although lower levels are common. DEHP is present in plastic products such as wall coverings, tablecloths, floor tiles, furniture upholstery, shower curtains, garden hoses, swimming pool liners, rainwear, baby pants, dolls, some toys, shoes, automobile upholstery and tops, packaging film and sheets, sheathing for wire and cable, medical tubing, and blood storage bags.

Exposure

Exposure to 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 the environment. In animals, high levels of DEHP damaged the liver and kidney and affected the ability to reproduce. DEHP has been found in at least 733 of the 1,613 National Priorities List sites identified by the Environmental Protection Agency (EPA).

- Medical products packaged in plastic such as blood products.
 - Some foods packaged in plastics, especially fatty foods like milk products, fish or seafood, and oils.
 - Well water near waste sites.
 - 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.
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- DEHP is everywhere in the environment because of its use in plastics, but it does not evaporate easily or dissolve in water easily.
 - DEHP can be released in small amounts to indoor air from plastic materials, coatings, and flooring.
 - It dissolves faster in water if gas, oil, or paint removers are present.
 - It attaches strongly to soil particles.
 - DEHP in soil or water can be broken down by microorganisms into harmless compounds.
 - DEHP does not break down easily when it is deep in the soil or at the bottom of lakes or rivers.
 - It is in plants, fish, and other animals, but animals high on the food chain are able to break down DEHP, so tissue levels are usually low.

At the levels found in the environment, DEHP is not expected to cause harmful health effects in humans.

The Department of Health and Human Services (DHHS) has determined that DEHP may reasonably be anticipated to be a human carcinogen. The EPA has determined that DEHP is a probable human carcinogen.

BENZENE Hydrocarbons (contain hydrogen and carbon atoms), Volatile organic compounds (VOCs) Class of chemicals that are volatile (evaporate easily) and are organic compounds (contain carbon atoms)

ID~CAS #: 71-43-2

Benzene is a chemical that is a colorless or light yellow liquid at room temperature. It has a sweet odor and is highly flammable.

Benzene evaporates into the air very quickly. Its vapor is heavier than air and may sink into low-lying areas.

Benzene dissolves only slightly in water and will float on top of water.

Some people who drink water containing benzene well in excess of the maximum contaminant level (MCL) for many years could experience anemia or a decrease in blood platelets, and may have an increased risk of getting cancer.

USES~

The greatest use of benzene is as a building block for making plastics, rubber, resins and synthetic fabrics like nylon and polyester.

Other uses include:

- Benzene is formed from both natural processes and human activities.
 - Natural sources of benzene include volcanoes and forest fires. Benzene is also a natural part of crude oil, gasoline, and cigarette smoke.
 - 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 that are used to make plastics, resins, and nylon and synthetic fibers. Benzene is also used to make some types of lubricants, rubbers, dyes, detergents, drugs, as a solvent in printing, paints, dry cleaning, etc. and pesticides.
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EXPOSURE~

- Outdoor air contains low levels of benzene from tobacco smoke, gas stations, motor vehicle exhaust, and industrial emissions.
- Indoor air generally contains levels of benzene higher than those in outdoor air. The benzene in indoor air comes from products that contain benzene such as glues, paints, furniture wax, and detergents.
- The air around hazardous waste sites or gas stations can contain higher levels of benzene than in other areas.
- Benzene leaks from underground storage tanks or from hazardous waste sites containing benzene can contaminate 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.

Benzene works by causing cells not to work correctly. For example, it can cause bone marrow not to produce enough red blood cells, which can lead to anemia. Also, it can damage the immune system by changing blood levels of antibodies and causing the loss of white blood cells.

The seriousness of poisoning caused by benzene depends on the amount, route, and length of time of exposure, as well as the age and preexisting medical condition of the exposed person.

- People who breathe in high levels of benzene may develop the following signs and symptoms within minutes to several hours:
 - Drowsiness
 - Dizziness
 - Rapid or irregular heartbeat
 - Headaches
 - Tremors
 - Confusion
 - Unconsciousness
 - Death (at very high levels)
- Eating foods or drinking beverages containing high levels of benzene can cause the following symptoms within minutes to several hours:
 - Vomiting
 - Irritation of the stomach
 - Dizziness
 - Sleepiness
 - Convulsions
 - Rapid or irregular heartbeat
 - Death (at very high levels)
- If a person vomits because of swallowing foods or beverages containing benzene, the vomit could be sucked into the lungs and cause breathing problems and coughing.
- Direct exposure of the eyes, skin, or lungs to benzene can cause tissue injury and irritation.
- Showing these signs and symptoms does not necessarily mean that a person has been exposed to benzene.

Long-term health effects of exposure to benzene

- The major effect of benzene from long-term exposure is on the blood. (Long-term exposure means exposure of a year or more.) 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.
- The Department of Health and Human Services (DHHS) has determined that benzene causes cancer in humans. Long-term exposure to high levels of benzene in the air can cause leukemia, cancer of the blood-forming organs.

References

<http://www.bt.cdc.gov/agent/benzene/basics/facts.asp>

<http://www.atsdr.cdc.gov/substances/toxsubstance.asp?toxid=14>

[Agency for Toxic Substances and Disease Registry](#)

BROMODICHLOROMETHANE Volatile organic compounds (VOCs) Class of chemicals that are volatile (evaporate easily) and are organic compounds (contain carbon atoms)

ID~ CAS #:75-27-4

Bromodichloromethane is a colorless, nonflammable liquid. Small amounts are formed naturally by algae in the oceans. Some of it will dissolve in water, but it readily evaporates into air.

USES~

Only small quantities of bromodichloromethane are produced in the United States. The small quantities that are produced are used in laboratories or to make other chemicals. However, most bromodichloromethane is formed as a by-product when chlorine is added to drinking water supply systems to kill bacteria.

EXPOSURE~

Bromodichloromethane is not known to cause adverse health effects in people, but animal studies show that high concentrations can damage the liver and kidneys and affect the brain. Bromodichloromethane has been found at 5 of the 1,518 National Priorities List sites identified by the Environmental Protection Agency (EPA).

- Bromodichloromethane released to air is slowly broken down by reactions with other chemicals and sunlight or it can be removed by rain.
- In water, it will evaporate to the air and/or be broken down slowly by bacteria.
- When released to soil, most will evaporate to the air but some of it will be broken down by bacteria.
- Some bromodichloromethane may filter into the groundwater.
- Bromodichloromethane does not build up in the food chain.

How might I be exposed to bromodichloromethane?

- The most likely way people are exposed to bromodichloromethane is by drinking chlorinated water.
- You may breathe vapors released from chlorinated water in a swimming pool or in the home (cooking, washing dishes, bathing, etc.).
- Some bromodichloromethane may enter your body directly through your skin when bathing or swimming.
- People who live near a waste site containing bromodichloromethane could be exposed by drinking contaminated groundwater or breathing vapors released to the air.
- People who work at or live near a laboratory or factory that makes or uses this chemical could be exposed by breathing bromodichloromethane in the air.

References

<http://www.atsdr.cdc.gov/>, Agency for Toxic Substances & Disease Registry

<http://www.atsdr.cdc.gov/toxfaqs/tf.asp?id=707&tid=127#bookmark02>

CARBON TETRACHLORIDE Volatile organic compounds (VOC)

Class of chemicals that are volatile (evaporate easily) and are organic compounds (contain carbon atoms)

ID~CAS #: 56-23-5

Carbon tetrachloride is a manufactured chemical that does not occur naturally. It is a clear liquid with a sweet smell that can be detected at low levels. In the United States, carbon tetrachloride is most commonly prepared by chlorinating methane or by a chlorinating cleavage reaction with less than or equal to C₃ hydrocarbons or chlorinated hydrocarbons (Rossberg, 2002). Prior to the late 1950s, carbon tetrachloride was produced primarily by carbon disulfide chlorination (NLM, 2003; Rossberg, 2002).

It is also called carbon chloride, methane tetrachloride, perchloromethane, tetrachloroethane, or benziform. Carbon tetrachloride is most often found in the air as a colorless gas. It is not flammable and does not dissolve in water very easily.

USES~

Carbon tetrachloride has been used as a dry-cleaning agent, fabric-spotting fluid, solvent, reagent in chemical synthesis, and it was used in the production of fluid and propellants for aerosol cans, as a pesticide, as a cleaning fluid and degreasing agent, in fire extinguishers, and in spot removers and grain fumigant (NLM, 2003; Holbrook, 1993), but its primary use was in chlorofluorocarbon (CFC) production (NLM, 2003; Rossberg, 2002).

Because of its harmful effects, these uses are now banned and it is only used in some industrial applications. The Consumer Product Safety Commission banned the use of carbon tetrachloride in consumer products in the 1970s. Decline in the use of carbon tetrachloride also accompanied U.S. EPA's increased regulation of the use of CFCs in propellants (a ban on CFCs in aerosol products went into effect in 1978).

EXPOSURE~

Exposure to this substance results mostly from breathing air, drinking water, or coming in contact with soil that is contaminated with it. Exposure to very high amounts of carbon tetrachloride can damage the liver, kidneys, and nervous system. Carbon tetrachloride can cause cancer in animals. Carbon tetrachloride has been found in at least 425 of the 1,662 National Priority List sites identified by the Environmental Protection Agency (EPA).

- It moves very quickly into the air upon release, so most of it is in the air.
- It evaporates quickly from 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 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 does not build up in animals. We do not know if it builds up in plants.
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- 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 ingesting contaminated soil at waste sites.

The Department of Health and Human Services (DHHS) has determined that carbon tetrachloride may reasonably be anticipated to be a carcinogen. The International Agency for Research on Cancer (IARC) has determined that carbon tetrachloride is possibly carcinogenic to humans, whereas the EPA determined that carbon tetrachloride is a probable human carcinogen.

References

<http://www.atsdr.cdc.gov/>, Agency for Toxic Substances & Disease Registry

<http://www.atsdr.cdc.gov/toxfaqs/tf.asp?id=195&tid=35>

<http://www.epa.gov/iris/toxreviews/0020tr.pdf> TOXICOLOGICAL REVIEW OF CARBON TETRACHLORIDE

CHLORDANE Pesticides (chemicals used for killing pests, such as rodents, insects, or plants)

ID~ CAS # 12789-03-6

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.

USES~

Chlordane was first produced in 1947 and was used as an insecticide for agricultural crops and livestock, for lawns and gardens, and also for underground treatment around the foundation of homes. Chlordane was also used as a pesticide in the United States. 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.

EXPOSURE~

In 1978, because of concern over cancer risk, evidence of human exposure and danger to wildlife, EPA canceled its use on food crops and phased out its other above-ground uses. From 1983 to 1988 its only approved use was as a termiticide around home foundations, and all uses were canceled after 1988. However, residues still exist in soils and sediments and chlordane bioaccumulates in fatty tissue of fish and humans; this bioaccumulation is a source of current concern.

- 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.

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.

- 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.
- By breathing air or by touching soil near waste sites or landfills.

References

<http://www.atsdr.cdc.gov/>, Agency for Toxic Substances & Disease Registry

<http://www.atsdr.cdc.gov/toxfaqs/tf.asp?id=354&tid=62>

<http://www.epa.gov/iris/toxreviews/0142tr.pdf> Toxicology Review of CHLORDANE (Technical)

4,4'-DDD Pesticides (chemicals used for killing pests, such as rodents, insects, or plants)

ID~CAS #:72-54-8

DDD (dichlorodiphenyldichloroethane) is a chemical similar to DDT that contaminate commercial DDT preparations. Both DDE and DDD are breakdown products of DDT.

USES~

DDD, like DDT, was also used to kill pests, but to a far lesser extent than DDT and its use has also been banned. One form of DDD (*o,p'*-DDD) has been used medically to treat cancer of the adrenal gland.

- DDD also enters the environment as a breakdown product of DDT.
- DDD in air is rapidly broken down by sunlight. Half of what's in air breaks down within 2 days.
- They stick strongly to soil; most DDT in soil is broken down slowly to DDE and DDD by microorganisms; half the DDT in soil will break down in 2-15 years, depending on the type of soil.
- Only a small amount will go through the soil into groundwater; they do not dissolve easily in water.

EXPOSURE~

Exposure to DDT, DDE, and DDD occurs mostly from eating foods containing small amounts of these compounds, particularly meat, fish and poultry. High levels of DDT can affect the nervous system causing excitability, tremors and seizures. In women, DDE can cause a reduction in the duration of lactation and an increased chance of having a premature baby. DDT, DDE, and DDD have been found in at least 441 of the 1,613 National Priorities List sites identified by the Environmental Protection Agency (EPA).

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

References

Agency for Toxic Substances & Disease Registry, <http://www.atsdr.cdc.gov/toxfaqs/tf.asp?id=80&tid=20>

4,4'-DDT Pesticides (chemicals used for killing pests, such as rodents, insects, or plants)

ID~CAS #: 50-29-3

DDT (1,1,1-trichloro-2,2-bis(*p*-chlorophenyl)ethane) is a pesticide that was once widely used to control insects on agricultural crops and insects that carry diseases like malaria and typhus, but is now used in only a few countries to control malaria. Technical-grade DDT is a mixture of three forms, *p,p'*-DDT (85%), *o,p'*-DDT (15%), and *o,o'*-DDT (trace amounts). All of these are white, crystalline, tasteless, and almost odorless solids.

Technical grade DDT may also contain DDE (1,1-dichloro-2,2-bis(*p*-chlorophenyl)ethylene) and DDD (1,1-dichloro-2,2-bis(*p*-chlorophenyl)ethane) as contaminants.

USES~

DDT is a pesticide once widely used to control insects in agriculture and insects that carry diseases such as malaria. Its use in the U.S. was banned in 1972 because of damage to wildlife, but is still used in some countries.

- DDT entered the environment when it was used as a pesticide; it still enters the environment due to current use in other countries.
- DDD also enters the environment as a breakdown product of DDT.
- DDT in air is rapidly broken down by sunlight. Half of what's in air breaks down within 2 days.
- They stick strongly to soil; most DDT in soil is broken down slowly to DDE and DDD by microorganisms; half the DDT in soil will break down in 2-15 years, depending on the type of soil.
- Only a small amount will go through the soil into groundwater; they do not dissolve easily in water.
- DDT, build up in plants and in fatty tissues of fish, birds, and other animals.

EXPOSURE~

Exposure to DDT, DDE, and DDD occurs mostly from eating foods containing small amounts of these compounds, particularly meat, fish and poultry. High levels of DDT can affect the nervous system causing excitability, tremors and seizures. In women, DDE can cause a reduction in the duration of lactation and an increased chance of having a premature baby. DDT, DDE, and DDD have been found in at least 441 of the 1,613 National Priorities List sites identified by the Environmental Protection Agency (EPA).

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

References

Agency for Toxic Substances & Disease Registry, <http://www.atsdr.cdc.gov/toxfaqs/tf.asp?id=80&tid=20>

DIELDRIN Pesticides (chemicals used for killing pests, such as rodents, insects, or plants)

ID~CAS #: 60-57-1

Dieldrin and aldrin are insecticides with similar chemical 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. Neither substance occurs naturally in the environment

USES~

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

- Sunlight and bacteria change aldrin to dieldrin so that we mostly find dieldrin in the environment.
- They bind tightly to soil and slowly evaporate to the air.
- Dieldrin in soil and water 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.

EXPOSURE~

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 affect the nervous system. Aldrin has been found in at least 207 of the 1,613 National Priorities List sites identified by the Environmental Protection Agency (EPA). Dieldrin has been found in at least 287 of the 1,613 sites.

- Dieldrin is everywhere in the environment, but at very low levels.
- Eating food like fish or shellfish from lakes or streams contaminated with either chemical, or contaminated root crops, dairy products, or meats.
- Air, surface water, or soil near waste sites may contain higher levels.
- Living in homes that were once treated with aldrin or dieldrin to control termites.

References

Agency for Toxic Substances & Disease Registry,
<http://www.atsdr.cdc.gov/toxfaqs/tf.asp?id=316&tid=56>

DIOXIN 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) Dioxins, Furans, PCBs (contain phenyl rings of carbon atoms)

ID~CAS #: 1746-01-6

A class of similar chlorinated aromatic organic compounds. Dioxins have two phenyl rings connected by two oxygen atoms.

USES~

Dioxins and dioxin-like furans have no known commercial or natural use. They are produced primarily during the incineration or burning of waste; the bleaching processes used in pulp and paper mills; and the chemical syntheses of trichlorophenoxyacetic acid, hexachlorophene, vinyl chloride, trichlorophenol, and pentachlorophenol.

EXPOSURE~

Dioxins have been characterized by EPA as likely to be human carcinogens and are anticipated to increase the risk of cancer at background levels of exposure.

In 1997 the International Agency for Research on Cancer classified 2,3,7,8, TCDD, the best studied member of the dioxin family, a known human carcinogen. 2,3,7,8 TCDD accounts for about 10% of our background dioxin risk.

At body burden levels 10 times or less above those attributed to average background exposure, adverse non-cancer health effects have been observed both in animals and, to a more limited extent, in humans. In animals these effects include changes in hormone systems, alterations in fetal development, reduced reproductive capacity, and immunosuppression. Effects specifically observed in humans include changes in markers of early development and hormone levels. At much higher doses, dioxins can cause a serious skin disease in humans called chloracne.

Dioxins can be commonly detected in air, soil, sediments and food. Dioxins are transported primarily through the air and are deposited on the surfaces of soil, buildings and pavement, water bodies, and the leaves of plants. Most dioxins are introduced to the environment through the air as trace products of combustion. The principal route by which dioxins are introduced to most rivers, streams and lakes is soil erosion and storm water runoff from urban areas. Industrial discharges can significantly elevate water concentrations near the point of discharge to rivers and streams. Major contributors of dioxin to the environment include:

- Incineration of Municipal Solid Waste
- Incineration of Medical Waste
- Secondary Copper Smelting
- Forest Fires
- Land Application of Sewage Sludge
- Cement Kilns
- Coal Fired Power Plants
- Residential Wood Burning
- Chlorine Bleaching of Wood Pulp
- Backyard burning of household waste may also be an important source.

Most of us receive almost all of our dioxin exposure from the food we eat: specifically from the animal fats associated with eating beef, pork, poultry, fish, milk, dairy products. Most of us get these foods through the commercial food supply. Since most of the meats and dairy products we consume are not produced locally but have been transported hundreds or thousands of miles, the majority of our dioxin exposure does not come from dioxin sources within our own community. Additionally, because we are all being exposed from the same national food supply, we are all receiving a similar exposure with the main difference between individuals being individual food preferences.

Important exceptions to this pattern of general population exposure are individuals who, over an extended period of time, eat primarily locally grown meat, fish or dairy products that have significantly greater dioxin levels than those found in the commercial food supply. Individuals in this situation receive greater exposure and are at greater risk than the general population. These elevated dioxin food levels can be the result of nearby local sources or from past contamination of soil or sediments. Another example of elevated exposure is nursing infants; however, health experts generally agree the overall benefits to infants of nursing far out weigh potential risks.

References

Agency for Toxic Substances & Disease Registry,
<http://www.atsdr.cdc.gov/toxfaqs/tf.asp?id=316&tid=56>

<http://www.epa.gov/pbt/pubs/dioxins.htm>

HEPTACHLOR Pesticides (chemicals used for killing pests, such as rodents, insects, or plants)

ID~CAS #: 76-44-8

USES~

Heptachlor is not found naturally in the earth. It is a man-made compound that looks like a white powder and smells like mothballs. Pure forms of heptachlor are white but less pure forms of this substance appear tan.

Between the 1960s and 1970s heptachlor was used to kill termites found in the home, and farmers used it to kill insects found on farm crops, especially corn crops. In the late 1970s, the use of heptachlor was phased out. This insecticide that was banned on some food products in 1975 and in all of them 1978. It was allowed for use in seed treatment until 1983. More recently it was found in milk and other dairy products in Arkansas and Missouri where dairy cattle were illegally fed treated seed. By 1988, the commercial sale of heptachlor was banned in the United States. The use of heptachlor is restricted to controlling fire ants in power transformers.

Heptachlor was used as an insecticide; however, nearly all registered uses of heptachlor have been canceled. Very limited information is available on the health effects of heptachlor in humans. Acute (short-term) inhalation exposure to heptachlor may result in nervous system effects, with oral studies showing gastrointestinal effects. Animal studies have reported effects on the liver and central nervous system from oral exposure. Chronic (long-term) inhalation and oral exposure by humans may be associated with neurological effects including irritability, salivation, and dizziness, while oral exposure may result in effects on the blood. Human studies are inconclusive regarding heptachlor and cancer. Animal oral studies have reported liver tumors. EPA has classified heptachlor as a Group B2, probable human carcinogen.

- Heptachlor is a constituent of technical grade chlordane, approximately 10 percent by weight. (1)
- Heptachlor was used as an insecticide in the United States from 1953 to 1974. In 1974, nearly all registered uses of heptachlor were canceled. (1)
- Heptachlor was used from 1953 to 1974 as a soil and seed treatment to protect corn, small grains, and sorghum from pests. It was also used to control ants, cutworms, maggots, termites, and other pests in agriculture and in the home. (1)
- The sale of heptachlor was voluntarily canceled in 1987 by its sole U.S. manufacturer. In 1988, the sale, distribution, and shipment of existing stocks of all canceled heptachlor and chlordane products was prohibited in the United States. (1)
- The only commercial use of heptachlor products still permitted is fire ant control in power transformers. In addition, homeowner's use of existing stocks of heptachlor-containing termite control products is also allowed. (1)

EXPOSURE~

Heptachlor can get into your body by breathing contaminated air over a long period of time. It can also enter the body if you eat and drink food, water, or even milk that is contaminated with heptachlor. Once in your body, heptachlor changes to heptachlor epoxide (a form of heptachlor that mixes with oxygen). Nursing mothers who are exposed to heptachlor may pass the substance on to their babies while breast feeding.

Heptachlor can enter the body through skin contact. Because heptachlor is no longer commercially available, exposure through skin contact is very limited.

How can you be exposed to heptachlor?

Heptachlor tends to stay in soil for long periods of time. One study found heptachlor epoxide in crops that were grown in heptachlor-treated soil 15 years earlier. You can be exposed to heptachlor by eating these crops. Because heptachlor is not widely available and its use is restricted, the greatest exposure is through the workplace. You can be exposed to heptachlor if you work in a job where it is made or at a hazardous waste site or landfill where it is disposed. You can be exposed if heptachlor was used in your home to control termites. It is possible that traces of heptachlor could linger if applied to soil underground.

What are the health effects of exposure to heptachlor?

The health effects from exposure to heptachlor will vary depending on how much you are exposed to and the length of time. There is very little information available about the short-term exposure to high doses of heptachlor to humans. But animal studies show that heptachlor is very toxic to humans and animals. Animals that were fed high levels of heptachlor during a short period of time experienced tremors and convulsions. Not much information is available about the health effects on humans from long-term exposure to heptachlor. But animal studies suggest that long-term exposure can affect the liver. The animals studied have shown enlarged livers, damage to liver and kidney tissue, and increased red blood cells. Animals also experienced tremors and convulsions. Animals that were fed heptachlor developed liver cancer. Studies show that female rats exposed to heptachlor were less likely to become pregnant. Those that did become pregnant had smaller litters or the offspring showed developmental problems. When baby rats were fed heptachlor, they developed cataracts just after their eyes opened. Other studies show that heptachlor fed to animals caused cancer. The U.S. Environmental Protection Agency believes heptachlor is a probable cancer causing agent because of the results of a number of studies. However, another agency, the International Agency for Research on Cancer, does not classify heptachlor as cancer causing to humans because there is not enough data.

- People whose homes were treated for termites with heptachlor may be exposed to heptachlor in the indoor air for many years after treatment. (1)
- Workers who use heptachlor to kill fire ants or who manufacture the chemical may be exposed to it in the air or through the skin. (1)
- Heptachlor has been detected in food, including fish, shellfish, dairy products, meat, and poultry. (1)
- Another possible source of exposure is drinking water; heptachlor has been detected at low concentrations in drinking water wells in several states. (1,2)

References

Agency for Toxic Substances & Disease Registry,
<http://www.atsdr.cdc.gov/toxfaqs/tf.asp?id=316&tid=56>

HEXACHLOROBENZENE Pesticides (chemicals used for killing pests, such as rodents, insects, or plants)

ID~CAS #: 118-74-1

Hexachlorobenzene is a white crystalline solid that is not very soluble in water. It does not occur naturally in the environment. It is formed as a by-product while making other chemicals, in the waste streams of chloralkali and wood-preserving plants, and when burning municipal waste.

USES~

Hexachlorobenzene was widely used as a pesticide to protect the seeds of onions and sorghum, wheat, and other grains against fungus until 1965. It was also used to make fireworks, ammunition, and synthetic rubber. Currently, there are no commercial uses of hexachlorobenzene in the United States.

EXPOSURE~

Exposure to hexachlorobenzene occurs primarily from eating low levels in contaminated food. The main health effect from eating highly contaminated food is a liver disease. Hexachlorobenzene has been found in at least 84 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA). Reasonably anticipated to be human carcinogens.

- Hexachlorobenzene can remain in the environment for a long time.
- It breaks down very slowly.
- It does not dissolve in water very well, so most of it will remain in particles on the bottom of lakes and rivers.
- Hexachlorobenzene sticks strongly to soil.
- High levels can build up in fish, marine mammals, birds, lichens, and animals that eat lichens (like caribou) or fish.
- It can also build up in wheat, grasses, some vegetables, and other plants.

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- Eating low levels in contaminated food.
 - Eating contaminated fish.
 - Drinking milk or eating dairy products or meat from cattle grazing on contaminated pastures.
 - Drinking small amounts in contaminated water.
 - Breathing low levels in contaminated air.
 - Eating or touching contaminated soil.
 - For babies, drinking contaminated breast milk from exposed mothers.
 - Working at a factory that uses or produces it unintentionally.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1996. [Toxicological Profile for Hexachlorobenzene](#). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

<http://www.atsdr.cdc.gov/toxfaqs/tf.asp?id=626&tid=115>

Polychlorinated Biphenyls (PCBs) Dioxins, Furans, PCBs (contain phenyl rings of carbon atoms), Pesticides (chemicals used for killing pests, such as rodents, insects, or plants)

ID~CAS #:1336-36-3

Polychlorinated biphenyls (PCBs) are synthetic organic chemicals comprising 209 individual chlorinated biphenyl compounds (known as congeners). There are no known natural sources of PCBs. PCBs are either oily liquids or solids that are colorless to light yellow. Some PCBs can exist as a vapor in air. PCBs have no known smell or taste. Many commercial PCB mixtures are known in the U.S. by the trade name Aroclor.

USES~

PCBs have been used as coolants and lubricants in transformers, capacitors, and other electrical equipment because they don't burn easily and are good insulators. The manufacture of PCBs was stopped in the U.S. in 1977 because of evidence they build up in the environment and can cause harmful health effects. Products made before 1977 that may contain PCBs include old fluorescent lighting fixtures and electrical devices containing PCB capacitors, and old microscope and hydraulic oils.

EXPOSURE~

Exposure to each of these compounds is associated with different levels of risk for harmful effects. There are no known natural sources of PCBs. Although PCBs are no longer manufactured in the United States, people can still be exposed to them. The two main sources of exposure to PCBs are the environment and the workplace. Because of resistance to degradation, PCBs persist in the environment for decades.

- PCBs entered the air, water, and soil during their manufacture, use, and disposal; from accidental spills and leaks during their transport; and from leaks or fires in products containing PCBs.
- PCBs can still be released to the environment from hazardous waste sites; illegal or improper disposal of industrial wastes and consumer products; leaks from old electrical transformers containing PCBs; and burning of some wastes in incinerators.
- PCBs do not readily break down in the environment and thus may remain there for very long periods of time. PCBs can travel long distances in the air and be deposited in areas far away from where they were released. In water, a small amount of PCBs may remain dissolved, but most stick to organic particles and bottom sediments. PCBs also bind strongly to soil.
- PCBs are taken up by small organisms and fish in water. They are also taken up by other animals that eat these aquatic animals as food. PCBs accumulate in fish and marine mammals, reaching levels that may be many thousands of times higher than in water.

Health effects that have been associated with exposure to PCBs include acne-like skin conditions in adults and neurobehavioral and immunological changes in children. PCBs are known to cause cancer in animals.

PCBs have been found in at least 500 of the 1,598 National Priorities List sites identified by the Environmental Protection Agency (EPA).

- Using old fluorescent lighting fixtures and electrical devices and appliances, such as television sets and refrigerators that were made 30 or more years ago. These items may leak small amounts of PCBs into the air when they get hot during operation, and could be a source of skin exposure.
- Eating contaminated food. The main dietary sources of PCBs are fish (especially sportfish caught in contaminated lakes or rivers), meat, and dairy products.
- Breathing air near hazardous waste sites and drinking contaminated well water.
- In the workplace during repair and maintenance of PCB transformers; accidents, fires or spills involving transformers, fluorescent lights, and other old electrical devices; and disposal of PCB materials.

Recent studies conducted in the Great Lakes basin indicate that a) fish consumption remains the major route of exposure to PCBs and b) health consequences are associated with these exposures.

Reasonably anticipated to be human carcinogens

References

Agency for Toxic Substances & Disease Registry, Public Health Implications of Exposure to Polychlorinated Biphenyls (PCBs)

<http://www.atsdr.cdc.gov/substances/toxsubstance.asp?toxid=26>

PENTACHLOROPHENOL Nitrosamines/ethers/alcohols, Pesticides
(chemicals used for killing pests, such as rodents, insects, or plants),
Phenols/phenoxy acids

ID~CAS #: 87-86-5

Pentachlorophenol PCP is a chlorinated aromatic compound that appears in a solid crystalline state and ranges in color from colorless to white, tan, or brown. A man-made organic biocide, is often contaminated with other toxic organic chemicals such as chlorinated phenols, dioxins, and dibenzofurans. The chemical, also referred to as penta, pentachlorofenol, 2,3,4,5,6-PCP, and chlorophen, has a phenolic odor that is pungent when heated. PCP is nonflammable and noncorrosive, and, although solubility is limited in water, it is readily soluble in alcohol (Budavari et al., 1996; NTP, 1989).

USES~

PCP has been used as a wood preservative to prevent decay from fungal organisms and insect damage since 1936 and is widely used as an antifungal agent. The first pesticidal product containing PCP as an active ingredient was registered in the United States in 1950 (U.S. EPA, 2008; Ahlborg and Thunberg, 1980). Historically, PCP was widely used as a biocide and could also be found in ropes, paints, adhesives, canvas, leather, insulation, and brick walls (U.S. EPA, 2008; Proudfoot, 2003; ATSDR, 2001). Indoor applications of PCP were prohibited in 1984; PCP application was limited to industrial areas (e.g., utility poles, cross arms, railroad cross ties, wooden pilings, fence posts, and lumber/timbers for construction). Currently, products containing PCP remain registered for heavy duty wood preservation, predominantly to treat utility poles and cross arms. Pentachlorophenol is a restricted use pesticide available to certified applicators only (U.S. EPA, 2008). Since 1984, the purchase and use of pentachlorophenol has been restricted to certified applicators. It is no longer available to the general public. It is still used industrially as a wood preservative for utility poles, railroad ties, and wharf pilings.

- Pentachlorophenol can be found in the air, water, and soil. It enters the environment through evaporation from treated wood surfaces, industrial spills, and disposal at uncontrolled hazardous waste sites.
- Pentachlorophenol is broken down by sunlight, other chemicals, and microorganisms to other chemicals within a couple of days to months.
- Pentachlorophenol is found in fish and other foods, but tissue levels are usually low.

EXPOSURE~

Studies show that PCP is rapidly and efficiently absorbed from the gastrointestinal and respiratory tracts (Reigner et al., 1992a, b, c). Once absorbed, PCP exhibits a small volume of distribution. Metabolism occurs primarily in the liver, to a limited extent, via oxidative dechlorination and conjugation. Tetrachlorohydroquinone (TCHQ) and the conjugation product, PCP-glucuronide, have been confirmed as the two major degradation products. PCP is predominantly excreted unchanged and found in the urine in the form of the parent compound. The low degree of metabolism is frequently attributed to extensive plasma protein binding.

Releases to soil can decrease in concentration due to slow biodegradation (half-life weeks to months) and leaching into groundwater. Releases to water, may photolyze (half-life hours to days with rate decreasing with depth of water), biodegrade, adsorb to sediments, or bioaccumulate in aquatic organisms. Biodegradation probably becomes significant after a period of acclimation (up to several weeks). An average BCF of 153 from 29 experimental BCF values suggests bioconcentration in aquatic organisms is high.

Exposure to high levels of pentachlorophenol can cause increases in body temperature, liver effects, damage to the immune system, reproductive effects, and developmental effects. This substance has been found in at least 313 of the 1,585 National Priorities List sites identified by the Environmental Protection Agency (EPA).

The EPA has determined that pentachlorophenol is a probable human carcinogen and the International Agency for Cancer Research (IARC) considers it possibly carcinogenic to humans.

References

<http://www.epa.gov/iris/toxreviews/0086tr.pdf> Toxicological Review of Pentachlorophenol, Sept. 2010. U.S. Environmental Protection Agency Washington, DC

<http://toxnet.nlm.nih.gov/cgi-bin/sis/search/f?./temp/~jGDes7:1>

<http://toxnet.nlm.nih.gov/cgi-bin/sis/search/f?./temp/~IY7tnb:5>

<http://www.atsdr.cdc.gov/toxfaqs/tf.asp?id=401&tid=70>

TETRACHLOROETHYLENE (PERC or PCE) Volatile organic compounds (VOC's) Class of chemicals that are volatile (evaporate easily) and are organic compounds (contain carbon atoms)

ID~CAS #: 127-18-4

Tetrachloroethylene is a colorless organic liquid with a mild, chloroform-like odor.

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.

USES~

The greatest use of tetrachloroethylene is in the textile industry, and as a component of aerosol dry-cleaning products. Its production and use as a dry cleaning agent, chemical intermediate, industrial solvent and metal degreasing, in desulfurization of coal, and transformer insulating fluid may result in its release to the environment through various waste streams. Its former use as a pesticide resulted in its direct release to 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.

EXPOSURE~

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).

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

References

<http://www.atsdr.cdc.gov/toxfaqs/tf.asp?id=264&tid=48>

<http://www.atsdr.cdc.gov/>, Agency for Toxic Substances & Disease Registry