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United States Environmental Protection Agency

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Learn about Dioxin

Dioxin Key Facts

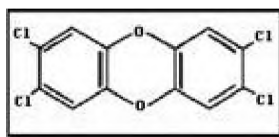
- Dioxins are called persistent organic pollutants (POPs), meaning they take a long time to break down once they are in the environment.
- Dioxins are highly toxic and can cause cancer, reproductive and developmental problems, damage to the immune system, and can interfere with hormones.
- Dioxins are found throughout the world in the environment and they accumulate in the food chain, mainly in the fatty tissue of animals
- More than 90% of human exposure is through food, mainly meat and dairy products, fish and shellfish.

What is Dioxin?

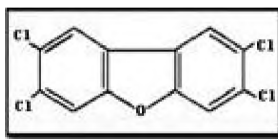
Applicable Laws

Research Timeline

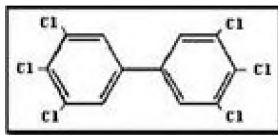
Figure 1: Dioxin chemical structures



2,3,7,8-Tetrachlorodibenzo-p-dioxin



2,3,7,8-Tetrachlorodibenzofuran



3,3',4,4',5,5'-Hexachlorobiphenyl

What is Dioxin?

Dioxins refers to a group of toxic chemical compounds that share certain chemical structures and biological characteristics (see figure 1). Several hundred of these chemicals exist and are members of three closely related families:

- Chlorinated dibenzo-p-dioxins (CDDs),
- Chlorinated dibenzofurans (CDFs) and
- Certain polychlorinated biphenyls (PCBs).

CDDs and CDFs are not created intentionally, but are produced as a result of human activities like the backyard burning of trash. Natural processes like forest fires also produce CDDs and CDFs. PCBs are manufactured products, but they are no longer produced in the United States.

Most Toxic Dioxin

The most studied and most toxic of all dioxins is **2,3,7,8-Tetrachlorodibenzo-p-dioxin**. In 2012, EPA released an updated IRIS assessment on this chemical.

What does dioxin look like?

Dioxin looks like white crystalline needles.

Where does dioxin come from?

Industrial activities: Dioxin is not produced or used commercially in the United States. It is a contaminant formed in the production of some chlorinated organic compounds, including a few herbicides such as silvex. Over the past decade, EPA

and industry have been working together to dramatically reduce the production of dioxin in the environment. However it should be noted that though levels have decreased in the last 30 years, dioxins are extremely persistent compounds and break down very slowly. In fact, a large part of the current exposures to dioxins in the US is due to releases that occurred decades ago.

Even if all human-generated dioxins were eliminated, low levels of naturally produced dioxins would remain. EPA is working with other parts of the government to look for ways to further reduce dioxin levels entering the environment and to reduce human exposure to them.

Other ways dioxins are produced:

Burning: Dioxins are formed as a result of combustion processes such as waste incineration (commercial or municipal) or from burning fuels (like wood, coal or oil). *EPA's 2006 Dioxin Inventory of Sources Report* summarizes that man-made emissions dominate current releases in the US, but acknowledges the need for more data on natural sources. You may not be aware that dioxins can also be formed when household trash is burned or from events like forest fires.

Dioxins produced by backyard burning

Bleaching: Chlorine bleaching of pulp and paper, based on certain types of chemical manufacturing and processing, and other industrial processes this can create small quantities of dioxins in the environment.

Smoking: Cigarette smoke also contains small amounts of dioxins.

Drinking Water: Dioxin can get into drinking water from:

- emissions from waste incineration and other combustion that get deposited into bodies of water; and
- discharges into water from chemical factories.

Learn more about dioxin in drinking water from the table of regulated drinking water contaminants.

EPA's private drinking water wells

How can dioxin affect my health?

Dioxins are highly toxic and can cause cancer, reproductive and developmental problems, damage to the immune system, and can interfere with hormones.

Related Resources

- More information about common sources of exposure
- FDA's Chemical Contaminants: Dioxin
- Questions and answers about dioxin and food safety - Dioxin Related Activities (Feb 2012) (Joint FDA and EPA)

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