

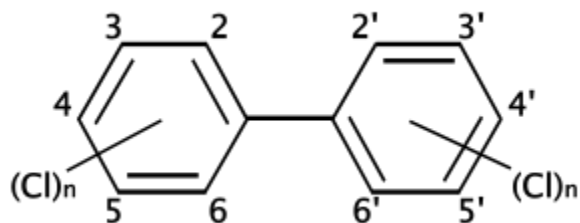
POLYCHLORINATED BIPHENYLS (PCBS)

Overview

Polychlorinated biphenyls (PCBs) belong to a broad family of man-made organic chemicals known as chlorinated hydrocarbons. PCBs were domestically manufactured from 1929 until their manufacture was banned in 1979. Although PCBs are no longer made in the United States, people can still be exposed to them. They have a range of toxicity and vary in consistency from thin, light-colored liquids to yellow or black waxy solids. PCBs have been demonstrated to cause a variety of adverse health effects. They have been shown to cause cancer and non-cancer health effects in animals, including effects on the immune system, reproductive system, nervous system, endocrine system and also other health effects. Studies in humans provide supportive evidence for potential carcinogenic and non-carcinogenic effects of PCBs. In the environment PCBs do not readily break down and therefore may remain for long periods of time cycling between air, water, and soil ([#EPA](#)).

Chemical Description

PCBs are a class of chemical compounds in which 2-10 chlorine atoms are attached to the biphenyl molecule.



An important property of PCBs is their general inertness; they resist both acids and alkalis and have thermal stability. This made them useful in a wide variety of applications (see Uses).

In general, PCBs are relatively insoluble in water, and the solubility decreases with increased chlorination. PCBs are also soluble in nonpolar organic solvents and biological lipids. PCBs are combustible liquids, and the products of combustion may be more hazardous than the material itself. By-products of combustion include hydrogen chloride, polychlorinated dibenzodioxins (PCDDs), and polychlorinated dibenzofurans (PCDFs) ([#ATSDR-Toxicological Profile for PCBs](#)).

With few exceptions, PCBs were manufactured as a mixture of various PCB congeners, through progressive chlorination of batches of biphenyl until a certain target percentage of chlorine by weight was achieved. Commercial mixtures with higher percentages of chlorine contained higher proportions of the more heavily chlorinated congeners, but all congeners could be expected to be present at some level in all mixtures. While PCBs were manufactured and sold under many names, the most common was the Aroclor series ([#EPA](#)).

PCBs were manufactured and sold under many different names ([#Japan Offspring Fund/CMES](#)):

Name	Producing Country
APIROLIO	Italy
AROCLOR	U.K. / U.S.A
ASBESTOL	U.S.A
ASKAREL	U.K. / U.S.A
BAKOLA131	U.S.A
CHLOREXTOL	U.S.A
CLOPHEN	Germany
DELOR	Czechoslovakia
DK	Italy

Name	Producing Country
DIACLOR	U.S.A
DYKANOL	U.S.A
ELEMEX	U.S.A
FENCLOR	Italy
HYDOL	U.S.A
INTERTEEN	U.S.A
KANECLOR	Japan
NOFLAMOL	U.S.A
PHENCLOR	France
PYRALENE	France
PYRANOL	U.S.A
PYROCLOR	U.K.
SAFT-KUHL	U.S.A
SOVOL	Former Soviet Union
SOVTOL	Former Soviet Union

Uses

Although no longer commercially produced in the United States, PCBs may be present in products and materials produced before the 1979 PCB ban. Products that may contain PCBs include:

- Transformers and capacitors
- Other electrical equipment including voltage regulators, switches, reclosers, bushings, and electromagnets
- Oil used in motors and hydraulic systems
- Old electrical devices or appliances containing PCB capacitors
- Fluorescent light ballasts
- Cable insulation
- Thermal insulation material including fiberglass, felt, foam, and cork
- Adhesives and tapes
- Oil-based paint
- Caulking
- Plastics
- Carbonless copy paper
- Floor finish ([#EPA](#)).

Routes of Exposure and Metabolism

PCBs can enter human cells and tissues when contaminated air is breathed in, when contaminated food enters the digestive system, or through contact with the skin. Tests on laboratory animals show that PCBs are readily absorbed through the digestive tract when swallowed, and to a lesser extent through the skin. The main PCB elimination routes are through the faeces, urine, and breast milk ([#GreenFacts](#), [#ATSDR-Public Health Statement](#)).

Once in the gastrointestinal tract, ingested PCBs diffuse across cell membranes and enter blood vessels and the lymphatic system. PCBs, especially those that contain a greater number of chlorine atoms, are readily soluble in fats and thus tend to accumulate in fat-rich tissues such as the liver, brain and skin. PCBs can undergo different transformations in the body and then either be stored in certain tissues or excreted ([#GreenFacts](#)). In mothers, PCBs have also been found to pass into the placenta, umbilical cord blood, and breast milk ([#GreenFacts](#)).

A common way for PCBs to enter the human body is by eating meat or fish products or other foods that contain PCBs. Exposure from drinking water is less than from food. It is also possible that PCBs can enter your body by breathing indoor air or by skin contact in buildings that have the kinds of old electrical devices that contain and can leak PCBs. For people living near waste sites or processing or storage facilities, and for people who work with or around PCBs, the most likely ways that PCBs will enter their bodies are from skin contact with contaminated soil and from breathing PCB vapors ([#ATSDR-Public Health Statement](#)).