

FACT SHEET

Bromine and Chlorine

– Human Health and Environmental Concerns

ORGANIC COMPOUNDS containing bromine and chlorine have traditionally been used in electronics due to their ability to effectively impart flame retardance in a cost-effective manner.

AS THEY ACCUMULATE OVER TIME, however, these organo-halogen compounds can become widespread pollutants in air, water, soil, and sediment, where they are increasingly ingested by humans and animals. Inorganic forms of these chemicals can also lead to the formation of dioxin and other problematic chemicals, particularly when they are mixed with organic matter.

OF PARTICULAR CONCERN IS the ability of halogenated organics to act as precursors for generating dioxin, a potent known human carcinogen¹ that is toxic in very low amounts. Exposing halogenated organics such as the brominated and chlorinated flame retardants (BFRs and CFRs) and polyvinyl chloride (PVC) in electronics to incineration at insufficiently high temperatures or the uncontrolled burning practices commonly used in informal recycling in the developing world can generate dioxins, as well as furans, which can be equally toxic.^{2,3,4}

Chlorinated dioxins and furans can cause severe health problems⁵, including:

- Cancer¹
- Endocrine disruption⁶
- Endometriosis^{7,8}
- Neurological damage⁹
- Birth defects and impaired child development^{10,11}
- Reproductive system damage^{12,13}
- Immune system damage¹⁴

BECAUSE DIOXINS AND FURANS BREAK DOWN SLOWLY, they endure in the environment for long periods of time^{15,16}. Like many organo-halogens, they bioaccumulate in animals' fatty tissue. The highest concentrations are found in animals at the top of the food chain, including humans.

DIOXINS AND FURANS CONCENTRATE IN BREAST MILK so that human infants now receive doses that are orders of magnitude greater than that endured by the average adult.¹⁷ Such exposure to newborns is of great concern because it occurs at their most vulnerable stage of development.

DIOXIN PRODUCTION IS A WORLDWIDE CONCERN due to the persistent organic pollutants' ability to travel throughout the globe. In many cases polluted air travels towards the poles, but it is sometimes carried on the trade winds from Asia to North America.¹⁸

ONCE BROMINATED AND CHLORINATED COMPOUNDS ARE WIDELY DISPERSED in our indoor and outdoor environments, we cannot control human exposure to them. We also lack cost-effective technologies for remediating areas that are contaminated by these pollutants. Replacing these compounds with safer compounds that do not persist or accumulate in the environment will improve the environmental footprint of electronic products.

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