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Dioxin (chemical)

Dioxin is a [heterocyclic](#), [organic](#), [antiaromatic compound](#) with the [chemical formula](#) C₄H₄O₂. There are two [isomers](#), **1,2-dioxin** (or ***o*-dioxin**) and **1,4-dioxin** (or ***p*-dioxin**). Their [chemical structures](#) are shown below. 1,2-Dioxin is very unstable due to its [peroxide](#)-like characteristics. The known properties of 1,4-dioxin are listed in the infobox to the right.

The term "dioxin" is most commonly used for a family of derivatives of dioxin, known as [polychlorinated dibenzodioxins](#) (PCDDs).

Preparation

1,4-Dioxin can be prepared by [cycloaddition](#), namely by the Diels-Alder reaction. ^[1]

Derivatives

The word "dioxin" can refer in a general way to compounds which have a dioxin core skeletal structure with [substituent](#) molecular groups attached to it. For example, dibenzo-1,4-dioxin is a compound whose structure consists of two benzo-groups fused onto a 1,4-dioxin ring as shown in figure 1 (see also [dibenzodioxin](#)).

Polychlorinated dibenzodioxins

Main article: [polychlorinated dibenzodioxins](#)

Because of their extreme importance as environmental pollutants, current scientific literature uses the name **dioxins** commonly for simplification to denote the chlorinated derivatives of dibenzo-1,4-dioxin, more precisely the [polychlorinated dibenzodioxins](#) (PCDDs), among which [2,3,7,8-tetrachlorodibenzodioxin](#) (TCDD), a tetrachlorinated derivative, is the best known. The polychlorinated dibenzodioxins, which can also be classified in the family of [halogenated organic compounds](#), have been shown to bioaccumulate in humans and [wildlife](#) due to their lipophilic properties, and are known teratogens, mutagens, and carcinogens.

PCDDs are formed through [combustion](#), [chlorine](#) bleaching and [manufacturing](#) processes. ^[2] The combination of heat and chlorine creates dioxin. ^[2] Since chlorine is often a part of the Earth's [environment](#), natural ecological activity such as volcanic activity and forest fires can lead to the formation of PCDDs. ^[2] Nevertheless, PCDDs are mostly created by human activity. ^[2]

PCDD exposures are proven/suspected in famous cases including [Agent Orange](#) produced by [Monsanto](#) sprayed over vegetation during the Vietnam war, the [Seveso disaster](#), and the poisoning of [Viktor Yushchenko](#).

[Polychlorinated dibenzofurans](#) are a related class compounds to PCDDs which are often included within the general term "dioxins".

References

1. ^ R. Alan Aitken, J. I. G. Cadogan and Ian Gosney (1994). "Effect of ring strain on the formation and pyrolysis of some Diels–Alder adducts of 2-sulfolene (2,3-dihydrothiophene 1,1-dioxide) and maleic anhydride with 1,3-dienes and products derived therefrom". *J. Chem. Soc., Perkin Trans. 1*: 927–931. doi:10.1039/p19940000927.
2. ^ ^{a b c d} Dioxin from State of Maine's Department of Environmental Protection

en:Dioxin (chemical)