

Destruction and Formation of Chemicals in the Flame: Physical and Analytical Considerations

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The current knowledge of the occurrence, kinetics of formation and fate of polychlorinated dibenzodioxins (PCDDs), polychlorinated dibenzofurans (PCDFs) and related compounds will be presented. These families of chemical compounds are as old as earth, if we assume that the flames are part of the generation of the earth. However, the great number of these chemicals became only of knowledge to a broader community at a single day, namely on July 10, 1976. An uncontrolled exothermic reaction occurred at a chemical plant site at Meda, Seveso, Italy. A reaction vessel, which was set over the weekend on hold filled with the starting material 2,4,5-trichlorophenol and partially with the final product, namely hexachlorophene in ethylene glycol reached a rather high temperature leading to an explosion. As a consequence, a cloud containing all the chemicals of the bursting vessel was spread over the vicinity of the plant. Rather fast, the analysis of the collected materials revealed among other constituents the highly toxic 2,3,7,8-tetrachlordibenzo-p-dioxin (TCDD).

The public interest and the political actions taken was the start for a great number of scientific investigations starting with the literature data for the toxicity and physico-chemical characterization of TCDD and related compounds.

In the following, my personal involvement in the subject was given through the fact, that the president of CIBA-GEIGY AG Basel made the commitment to the government of Switzerland to incinerate the highly toxic waste collected in Seveso in the hazardous waste incinerator standing in a distance of 100 m from my laboratories.

Under the Committee of Experts, I became the project leader for "Thermokinetics and flue-gas analysis for TCDD".

As an introduction, the exposure of man to dioxins shall be outlined [1].

The presentation will be concentrated on the physicochemical aspects of the destruction and formation of TCDD and related compounds as well as on the thermochemical investigations performed.

Reference:

- 1 Exposure of Man to Dioxins, Tech. Report 49, ECETOC, Brussels 1992
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