

## The Formation of PCDDs and PCDFs from the Industrial Use of Chlorinated Compounds

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Chlorinated compounds such as solvents, catalysts or bleaching agents are widely used as auxiliary materials in industrial production. As most of these production processes operate at high temperatures the formation of PCDD/F is to be expected. Therefore a systematic investigation on the PCDD/F formation and mechanisms of avoidance was undertaken by the Federal Ministry of Research and Technology.

The following processes were examined:

- Synthesis/Extraction with chlorinated solvents,
- Metal finishing,
- Non-ferrous metal production,
- Pulp and paper industry,
- Dry cleaning,
- Petrochemical industry(oil refinery),

In all processes except the petrochemical industry PCDD/F(ng/g range) were identified in the production residues. High concentrations (>100 ng/g) of PCDD/F were formed in the synthesis of dyes (Phthalocyanines, Dioxazines), in the aluminum production from scrap and in dry cleaning. As source of the PCDD/F formation in the dye production chlorobenzene solvents and chloranil as intermediate product are expected. In the non-ferrous metal production scrap, contaminated with plastics or oil, can form PCDD/F. Experiments with dry cleaning machines and their distillation residues show that textile chemicals and re-distillation, to some minor part also dust, can contribute to the PCDD/F formation, independent of the type of solvent.

Methods to avoid or reduce the PCDD/F formation can be the use of non-chlorinated solvents and intermediates in the dye production, water-based metal degreasing, improved purity of aluminum scrap and chlorine-free bleaching agents. In dry cleaning reduced distillation cycles and precursor-free textile chemical can prevent the formation of PCDD/F.

