

IMPROVED PUFF-ADSORBER/IMPINGER-SAMPLING TRAIN
AND
WORKPLACE ANALYSIS FOR POLYBROMINATED DIBENZOFURANS AND DIBENZODIOXINS
DURING PRODUCTION OF DECABROMODIPHENYLETHER-BLENDED POLYBUTYLENETEREPHTHALATE

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During the last years different sampling techniques for the measurement and control of emissions from HVI's and IVI's and other emissions have been developed and constantly improved (1). We have developed our polyurethane-foam-plug (PUFP) technique (2) further to achieve lower detection limits and higher versatility, together with a high sampling efficiency for both vapours and fine particle/liquid aerosols, in order to meet the demands of research in connection with improvement of incinerators and incinerator control, and the requirements of governmental bodies. The PUFF-adsorber/impinger sampling train (see flow chart, Figure 1) consists of the probe, an impinger cooler, a first PUFF-adsorber (2 PU-plugs), two standard impingers (maximum flow rate about 1.5 to 2 m³/h), or the recently developed high-volume impingers (3), (flow rate 10 m³/h or greater) and a second PUFF-adsorber. This sampling method will become a VDI-Guideline Method (Verein Deutscher Ingenieure, Richtlinie) VDI 3499, Blatt 4 (Method No. 4). It has been validated for the sampling of highly dust-loaded gas streams, and for workplace control with respect to brominated dibenzodioxins and dibenzofurans at low concentrations (ng/m³).

Brominated flame retardants (BFR's), especially polybrominated diphenyl-ethers (PBDPE's) show a tendency to form polybrominated dibenzodioxins and dibenzofurans (PBDD's and PBDF's) under thermal stress. Of special interest are the temperature ranges from 200° to 300°C during production and injection moulding of BFR-blended plastic resins, and from about 500° to 800°C under pyrolysis-; smoldering- or real fire-conditions. Literature data (4) and our own findings (5) proved the preferential formation of PBDF's from neat PBDPE's at 700°C. The conversion rates found per homologue group were, depending on the experimental technique used, up to 25-30% (4) and up to 7000 ppm (5) respectively. After laboratory micro tests at 300°C, BASF AG decided to survey workplaces in a pilot and a production plant (extrusion compounding, see situation and sampling points for sampling trains, Figure 2) for polybutyleneterephthalate (PBTP)/glassfibre/decabromodiphenylether resin blends. The results of this extended test, performed with the knowledge, agreement and approval of the governmental bodies, together with the BASF Safety Department and Medical Center, led BASF AG to the conclusion to stop the production of decabromodiphenylether blended PBTP-plastic resins and the use of PBDPE's in general.

REFERENCES

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2. K. S. Brenner, *Chemosphere*, 15, Nos. 9-12, pp. 1917-1922, (1986).
3. BASF AG patent, K. S. Brenner, see Symposium Abstracts, Dioxin 1990.
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Sampling Train, Flow Chart, VDI 3499, Bl.4
 Fig.1
 probe

