

**APPLICATIONS OF THE IN VITRO ARYL HYDROCARBON
HYDROXYLASE INDUCTION ASSAY FOR DETERMINING
“2,3,7,8-TETRACHLORODIBENZO-*p*-DIOXIN EQUIVALENTS”:
PYROLYZED BROMINATED FLAME RETARDANTS**

T. ZACHAREWSKI^a, M. HARRIS^a, S. SAFE^{a*}, H. THOMA^b and O. HUTZINGER^b

^a*Department of Physiology and Pharmacology, College of Veterinary Medicine, Texas A and M University, College Station, TX 77843 (U.S.A.) and* ^b*Chair of Ecological Chemistry and Geochemistry, University of Bayreuth, Bayreuth (F.R.G.)*

SUMMARY

The pyrolysis of brominated flame retardants FR 300 BA (decabromobiphenyl) ether, FireMaster BP-6 (polybrominated biphenyls), Bromkal 70-5-DE (primarily pentabromodiphenylether), Bromkal 70-DE (primarily penta and tetrabromodiphenylether) and Bromkal G1 (pentabromodiphenylether) resulted in the formation of relatively high levels of polybrominated dibenzofurans (PBDFs) and dibenzo-*p*-dioxins (PBDDs) as determined by gas chromatography-mass spectrometric analysis. The dose response EC₅₀ values for the induction of aryl hydrocarbon hydroxylase (AHH) and ethoxyresorufin *O*-deethylase (EROD) by the flame retardant pyrolysates was determined in rat hepatoma H-4-II E cells and compared to the relative induction activities of 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (TCDD) and the concentrations of “2,3,7,8-TCDD equivalents” were calculated. The range of “2,3,7,8-TCDD equivalents” levels (μg/g or ppm) derived from values obtained from the AHH and EROD bioassays for each of the pyrolyzed flame retardant samples was: 174–194, 480–1400, 2140–4680, 6740–8780 and 3920–5260 ppm for FR 300 BA, FireMaster BP-6, Bromkal 70 DE, Bromkal 70-5 DE and Bromkal G1, respectively. The *in vivo* dose-response effects of 2 pyrolyzed flame retardants were determined in immature male Wistar rats and compared to the dose-response activities of 2,3,7,8-TCDD. The *in vivo* responses which were measured included hepatic microsomal AHH and EROD

*To whom all correspondence and reprint requests should be addressed.

Abbreviations: AHH, Aryl hydrocarbon hydroxylase; DD, dibenzo-*p*-dioxin; DF, dibenzofuran; EROD, ethoxyresorufin *O*-deethylase; PBDD, polybrominated dibenzo-*p*-dioxin; PCDD, polychlorinated dibenzo-*p*-dioxin; PCDF, polychlorinated dibenzofuran; TBDF, tetrabromodibenzofuran; TCDD, tetrachlorodibenzo-*p*-dioxin.