

## A COMPARISON OF DEVELOPMENTAL TOXICITY OF BROMINATED AND HALOGEN-FREE FLAME RETARDANT ON ZEBRAFISH

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### Abstract

Brominated diphenyl ethers (BDEs) are halogenated flame retardants. Several concerns related to persistence and toxicity of BDEs have been resulted in a growing need of BDEs replacement. The use of halogen-free flame retardants (HFFR) has increased as a safer alternative, but little information is available on their toxic potential for environmental health and for developing organisms. Therefore, the aim of this study was to evaluate and compare the toxicity of three congeners of BDEs (BDE-47, BDE-99 and BDE-154) with an HFFR (aluminum diethylphosphinate, ALPI) on zebrafish (*Danio rerio*) embryos by assessing endpoints of lethality, sub-lethality and teratogenicity at the earlier stages of development. To evaluate this endpoints we proceed a Fish Embryo Acute Toxicity (FET) Test guideline of the OECD (2013) and Nagel (2002). For each tested chemical, 60 eggs were used per treatment, divided into three independent replicates. The eggs were evaluated every 24h, finishing at 96 hours post fertilization (hpf) for ALPI and 144 hpf for BDE 47, BDE-99 and BDE-154. The highest tested concentration of BDE-47 (12.1 mg/L) induced pericardium and yolk sac edemas that first appeared at 48 h post-fertilization (hpf) and then were mostly reabsorbed until 144 hpf. BDE-47 and BDE-99 also showed a slight but non-significant tendency to affect swim bladder inflation. The rate of edemas increased in a concentration-dependent manner after exposure to BDE-99, but there were no significant differences. Regarding BDE-154 exposure, the rate of edemas and swim bladder inflation were not affected. Finally, in all ALPI exposure concentrations (0.003 up to 30 mg/L), no sub-lethal or teratogenic effects were observed on developing organisms until 96 hpf. Although further studies are needed, our results demonstrate that when comparing the developmental toxicity induced by flame retardants in zebrafish, the HFFR ALPI may be considered a more suitable alternative to BDE- 47.