

Effect of Tetrakis (Hydromethyl) Phosphonium Chloride (THPC) on Zebrafish (*Danio rerio*)

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Abstract. Tetrakis (hydromethyl) phosphonium chloride (THPC) is a tetrakis (hydromethyl) phosphonium salt commonly used in commercial flame retardants. Mainly used by the textile industry, THPC is polymerized onto cotton fabrics to provide a flame-retardant finish. Traces of THPC were found in the Ogeechee River, a 294 mile-long black river in Georgia, and could have been a toxin contributing to the mass killing of aquatic animals in May 2011. Currently, there are no studies being conducted investigating how this chemical impacts water quality and the toxic effects THPC can have aquatic organisms following exposure. In this study, we used zebrafish (*Danio rerio*) embryos as a model to study the developmental and stressor effects THPC has on these fish. Zebrafish serve as excellent models because of their ease of manipulation, sensitivity to environmental stress, transparent embryos, and low cost of maintenance. Briefly, we exposed zebrafish embryos to varying concentrations of THPC for 5 continuous days. The embryos were observed everyday for critical endpoints such as development, hatching, mortality, morphology, heart rate etc. After 5 days, total RNA was extracted from the larvae and specific biomarker gene expressions were analyzed using Quantitative PCR. We have identified a Lethal Dose 50 for THPC that kills 50% of the exposed zebrafish embryos in one day. Further, we have identified that acute exposure of THPC results in severe retardation of zebrafish development producing developmental defects such as stunted growth, impaired vascular and neural development. We are currently evaluating the biomarker expression for resulting underlying molecular toxicity. Thus, zebrafish embryo is a valuable tool to evaluate the toxicity of commercially used chemicals in various local industries.