

Scientific Paper:

Journal of Hazardous Materials (2022) 424, 127623

Toxicological effects of 6PPD and 6PPD quinone in zebrafish larvae

Shubham Varshney, Adnan H. Gora, Praghugouda Siriyappagouder, Viswanath Kiron, Pål A. Olsvik
Faculty of Biosciences and Aquaculture, Nord University, Bodø, Norway

Abstract:

N-(1,3-dimethylbutyl)-N'-phenyl-p-phenylenediamine (6PPD) is the most widely used antioxidant in automobile tyres and many rubber products. We investigated the impact of 6PPD and 6PPD quinone on acute toxicity, morphology, swimming behaviour, heart rate, and oxygen consumption in zebrafish larvae. Zebrafish embryos were exposed to 6PPD and 6PPD quinone at concentrations of 1, 10, and 25 µg/L during the development period of 1–96 hpf. In the present study, 6PPD quinone was found to be toxic to zebrafish larvae with a 24 h LC50 of 308.67 µg/L. No significant mortality was observed at any of the tested concentrations. A dose-dependent reduction in swimming performance was observed in the exposed larvae at 116 hpf for both toxicants. Overall, our study shows that exposure of zebrafish embryos to 6PPD and 6PPD quinone at environmentally relevant concentrations (1 µg/L) does not affect its behaviour. However, exposure to higher but still sublethal concentrations of 6PPD and 6PPD quinone (10 and 25 µg/L) can affect behavioural endpoints. These findings reveal the toxicity of 6PPD and 6PPD quinone to early life stages of fish.

Keywords: tyre wear particles, zebrafish larvae, behavioural and morphological endpoints, DanioVision system