

Acute toxicity and accumulation of ZnO NPs in *Ceriodaphnia dubia*: relative contributions of dissolved ions and particles

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Although the ecotoxicological effects of various metal oxide nanoparticles on aquatic organisms is being actively studied, the contributions of particle and dissolved ions towards toxicity are still not well understood. Aquatic crustaceans are common experimental organisms for the assessment of nanoparticle toxicity, due to their filter-feeding behaviour, ability to accumulate metals and sensitivity to environmental pollutants. The current study aims to assess the contribution of ZnO NP_(particle) and ZnO NP_(ion) to the overall toxicity and accumulation of ZnO NP_(total) in *Ceriodaphnia dubia*. The 48 h LC₅₀ of ZnO NP_(total) was found to be 0.431, 0.605 and 0.701 mg/L for 50, 100 nm and bulk particles exposure. However LC₅₀ of Zn_(ion) was found to be 1.048, 1.343 and 2.046 mg/L for dissolved ions from different sizes (50 nm, 100 nm, and bulk) of ZnO particles. At LC₅₀ concentration, the accumulation of 90-95% was noted for the NP_(particles) across the sizes employed, while only about 4-5% contribution was from the NP_(ion) to the overall accumulation NP_(total). The accumulation of ZnO NPs also revealed, ZnO NP_(particles) were predominately accumulated into daphnids gut than that of ZnO NP_(ion). The relative contribution of ZnO NP_(ion) to overall toxicity and accumulation was found to be lesser than that of ZnO NP_(particles) across the sizes used in the study.

