



## Influence of soil pH on the toxicity of Zinc Oxide nanoparticles to the terrestrial isopod *Porcellionides pruinosus*.

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### Abstract

The effects of soil pH on the toxicity of ZnO nanoparticles (NPs) to the terrestrial isopod *Porcellionides pruinosus* were evaluated. Isopods were exposed to a natural soil amended with CaCO<sub>3</sub> to reach three different pH<sub>CaCl2</sub> levels (4.5, 6.2 and 7.3) and standard Lufa 2.2 soil (pH 5.5) spiked with ZnO NPs (30 nm), non-nano ZnO (200 nm) and ionic Zn as ZnCl<sub>2</sub>. Toxicity was expressed based on total Zn concentration in soil, and total Zn and free Zn<sup>2+</sup> ion concentrations in pore water. Compared to ZnO spiked soils, the ZnCl<sub>2</sub> spiked soils had lower pH and higher porewater Ca<sup>2+</sup> and Zn levels. Isopod survival did not differ between Zn forms and soils, but survival was higher for isopods exposed to ZnO NPs at pH 4.5. Median effect concentrations (EC<sub>50</sub>) for biomass change showed similar trend for all Zn forms in all soils, with higher values at intermediate pH. LC/EC<sub>50</sub> values based on porewater Zn or free Zn ion concentrations were much lower for ZnO than for ionic zinc. Zn body concentrations dose-related increased, but no effect of soil pH was found. It is suggested that not only dissolved or free Zn in pore water contributed to uptake and toxicity, but that oral uptake (i.e. ingestion of soil particles) could be an important additional route of exposure.

### Reference

Tourinho, P.S., van Gestel, C.A.M., Lofts, S., Soares, A.M.V.M. & Loureiro, S. (2013). Influence of soil pH on the toxicity of Zinc Oxide nanoparticles to the terrestrial isopod *Porcellionides pruinosus*. *Environmental Toxicology and Chemistry*, doi: [10.1002/etc.2369](https://doi.org/10.1002/etc.2369).

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