



## Effect of different spiking procedures on the distribution and toxicity of ZnO nanoparticles in soil

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### Abstract

Due to the difficulty in dispersing some engineered nanomaterials in exposure media, realizing homogeneous distributions of nanoparticles (NP) in soil may pose major challenges. The present study investigated the distribution of zinc oxide (ZnO) NP (30 nm) and non-nano ZnO (200 nm) in natural soil using two different spiking procedures, i.e. as dry powder and as suspension in soil extract. Both spiking procedures showed a good recovery ([85 %) of zinc and based on total zinc concentrations no difference was found between the two spiking methods. Both spiking procedures resulted in a fairly homogeneous distribution of the ZnO particles in soil, as evidenced by the low variation in total zinc concentration between replicate samples (\12 % in most cases). Survival of *Folsomia candida* in soil spiked at concentrations up to 6,400 mg Zn kg<sup>-1</sup> d.w. was not affected for both compounds. Reproduction was reduced in a concentration dependent manner with EC50 values of 3,159 and 2,914 mg Zn kg<sup>-1</sup> d.w. for 30 and 200 nm ZnO spiked as dry powder and 3,593 and 5,633 mg Zn kg<sup>-1</sup> d.w. introduced as suspension. Toxicity of ZnO at 30 and 200 nm did not differ. We conclude that the ZnO particle toxicity is not size related and that the spiking of the soil with ZnO as dry powder or as a suspension in soil extract does not affect its toxicity to *F. candida*.

### Reference

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