

ECOTOXICITY TEST OF ZINC OXIDE NANOPARTICLES PERFORMED IN HIGHLY VISCOUS ENVIRONMENT

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Abstract

Results of toxicity and ecotoxicity studies tend to be significantly affected by behavior of nanoparticles in physiological fluids or environmental media. The effort was focused on development of testing procedure applicable in common laboratory practice providing data, which are not distorted due to hardly controllable processes occurring during the experiment. The agarose gel was therefore employed as an exposure medium, which should supposedly suppress the rate of agglomeration and ensure homogeneous distribution of tested nanoparticles in the whole medium volume. Ecotoxicity of zinc oxide nanoparticle (ZnO-NPs) powder with the mean particle size diameter of 10 nm to the annelid *Enchytraeus crypticus* was tested in agarose gel. Two methods of ZnO-NPs powder introduction into exposure media were used. Within the first one, the nano-powder was initially cryogenically ground with the dry agar and then the water was added. The second procedure started with the re-suspension of nanoparticles in distilled water with the addition of dispersant (sodium pyrophosphate decahydrate). Obtained colloid was subsequently mixed with hot agar gel. Relative mortalities observed after 96h exposure of worms in cryogenically ground medium with 50, 100, 200, 500 and 1000 mg ZnO-NPs/kg agar ranged between 28.9 and 34.4 % and did not exhibit any concentration dependence. When the second exposure media preparation method was applied, the relative mortality ranged from 0 to 66.6 % at the same concentration region and showed concentration dependence. The results of particle size and amount of released zinc cation analysis showed, that observed ecotoxicity was obviously driven by size of ZnO-NPs agglomerates influenced by applied technique of exposure media preparation.

Keywords: Ecotoxicity, zinc oxide nanoparticles, enchytraeid, agar

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