

NanoFATE Deliverable 2.5

Research report on per capita effluent discharge for nano ZnO and Ag

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Research Report Summary

The total influx of chemical to sewage treatment plants is of primary importance when modelling predicted environmental concentrations for soils and freshwater and quantifying potential risk to the environment from a given chemical. This report aimed at providing the most appropriate estimate of per capita daily effluent loads for silver (Ag) and zinc-oxide (ZnO) engineered nanoparticles (ENPs).

Estimates of per capita daily consumption of the nanoparticles were derived from the production use and combined with UN population estimates. The most rigorous values now come from work published in 2012 and correspond to a recent US study. These new production values are a factor of 3-5 less than that assumed previously. When combined with assumed removal rates in sewage treatment they suggest effluent concentrations of 170 ng/L for nano Ag and 600 ng/L for nano ZnO. For modelling purposes, the recommended per capita discharge values for STPs for nano - ZnO is 99 µg/cap/day, and 28 µg/cap/day for nano Ag.

It is highly likely that not all production for these nanoparticles are discharged down the drain, thus, these values are probably overestimates. Field measurements of nano-sized Zn in the river Thames in the UK provides relatively high values compared to the predictions. This is believed to be due to the popularity of colloidal sized ZnO particles (not engineered nano) in a range of products including paint pigments.

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