

NORMAN Collaborative Trial

Extraction of engineered nanomaterials from complex matrices - an interlaboratory comparison study

Background

Engineered nanoparticles (ENP) are used nowadays in many consumer products and can reach the environment via different pathways. Although analytical methods to quantify ENPs in simple matrices have been developed over the last decade, e.g. deionized water, or particle free solutions of low ionic strength, adequate sample preparation protocols, including extraction procedures, for complex matrices are still lagging behind. ENP released from consumer products and transferred to different environmental compartments can still not be detected reliably. To evaluate and to increase reliability of NP analysis in environmental matrices data based on harmonized protocols is urgently needed.

Objective

We perform an interlaboratory comparison of the analytical workflow for NP analysis in complex environmental matrices. The overall aim is to evaluate the reliability of analytical methods regarding determination of particle size and concentration based on a data set from several laboratories. We intend to prepare a joint publication based on this data set.

Set up

Sewage sludge, soil and street runoff were selected as environmental matrices for our study. All matrices are spiked with Au NP. First, total Au concentrations and other elements in the samples shall be determined after acid digestion of the matrix and the Au NP. Second, based on analytical protocols, Au NP shall be extracted from each matrix and characterized regarding particle size and particle concentration. Samples will be provided by the organizers together with sample preparation protocols and analytical protocols. Further, all participants will be trained on the sample preparation methods during a two-day workshop prior to sample analysis in their laboratories.

Samples: a soil sample, a sewage sludge sample and road runoff sample each spiked with Au NP will be provided by the organizer. Further, reference Au NP and blank matrix samples will be provided.

Sample preparation & analytical technique:

- (i) Determination of total elemental content incl. Au according to provided analytical protocol: a mill for sample homogenization, lab-equipment for chemical digestion including microwave and an ICP MS for element quantification in the digested samples
- (ii) NP characterization according to provided analytical protocol: A centrifuge, a water bath, a fume hood, a vortex device, an ultrasound bath are required to extract NP from the matrix. Extracted suspensions shall be analysed by each laboratory at least with single particle inductively coupled plasma mass spectrometry (sp-ICP-MS). These are minimum requirements.

Timing

31 August 2018

Deadline for registration

21. - 22. September 2018

Workshop on sample preparation methods at the Helmholtz-Centre for Environmental Research, Leipzig, Germany

November 2018

Sample distribution and analysis in each laboratory

31 March 2019

latest reporting of results.

We will provide more detailed information on the agenda and study design to registered laboratories soon. In case you have any question please contact us.

Participation and registration

Now, we invite laboratories to contribute to our study which have the required analytical equipment at their disposal. For registration please fill the registration form and send it to the following email address: stephan.wagner@ufz.de

Maximum number of participants: 10 laboratories (as soon as we will have reached the maximum number, the registration will be closed)