VAMAS

Nanoparticle Populations

Technical Work Area 34

Project 11

Static Multiple Light Scattering Interlaboratory Study - mean particle size evaluation

Objectives

The purpose of this study is to validate the performance of a protocol for Static Multiple Light Scattering (SMLS) to analyse mean particle size of a concentrated dispersion of particles in liquid. Development of a Technical Specification for SMLS requires that the protocol for the key measurand be evaluated for usability and reproducibility across a pool of laboratories. Test samples in this activity will be dispersion of nanoscale SiO_2 particles at 0.011 and 0.25 volume fraction with different mean particle sizes. Materials will be measured and the mean particle size reported.

Background and Standardization Needs

Mean particle size characterization in high concentration dispersions is a metrological need for industry such that “as supplied” samples can be evaluated during product manufacturing, storage, and processing without using tests requiring sample dilution or extensive preparation. SMLS is a technique based on the Mie theory of light scattering applicable to much higher concentration dispersions than alternative techniques such as dynamic light scattering (DLS), particle tracking analysis (PTA) or other common optical techniques. Unlike methods that use collections of individual scattering events to characterise particles in the dispersion, SMLS uses the optical signals (transmitted and reflected intensities) that result from multiple scattering events. Mie theory dictates that for a given wavelength, particle number concentration, particle refractive index and size, that the transmitted and reflected intensity can be deterministically utilized to calculate the mean (volume-weighted) particle size.

Work Programme

The interlaboratory study (ILS) will consist of measurements using the test procedure on two different samples representative of materials that are relevant for SMLS. Samples will be supplied by the project management, and will be Silica particles with nominal average sizes of 140 nm and 20 nm in suspension at 1.1 % volume fraction and 25 % volume percent respectively. Two vials of each sample will be supplied for each sample to evaluate variance.

Evaluation and reporting procedures will be specified, and standard statistical techniques will be used for data evaluation. ISO 5725 will be used for data analysis and representation.

A step-by-step protocol will be given to all testing participants to avoid unnecessary variations in the results, and will not require preparation beyond the measurement protocol. Excepting specific request, samples will also be provided sealed in a Formulaction instrument measurement cell. Detailed protocols will be provided to all participants of the study for commentry prior to measurement initiation.

Deliverables and Dissemination

The main aims of the ILC are to test the protocol developed for mean particle size measurement using SMLS and to evaluate trueness and uncertainty in this process. The results of the study will be published in a peer reviewed journal of high standing. The protocol and calibration routines tested in the study will be used for the development of ISO TS 21357.

Funding

Participants fund their own involvement in the project.

CALL FOR PARTICIPATION

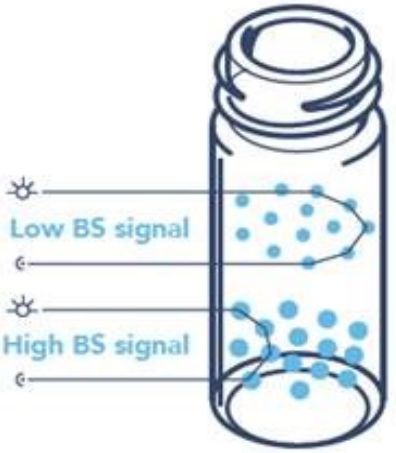

Image courtesy of Formulaction

Status

The project is due to start in February 2018. Samples will be provided in Feb/ March 2018. Results should be reported within a month of receiving the samples.

For more information:

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