Simultaneous Determination of Size and Quantification of Silica Nanoparticles by Asymmetric Flow Field-Flow Fractionation Coupled to ICPMS Using Silica Nanoparticles Standards

Francisco Barahona, Otmar Geiss, Patricia Urbán, Isaac Ojea-Jimenez, Douglas Gilliland, Josefa Barrero-Moreno

European Commission, Joint Research Centre, Institute for Health and Consumer Protection, Via E. Fermi 2749, 21027 Ispra, VA, Italy.

Abstract

In the present Supporting Information, the measured concentrations of the SiO_2-NPs suspensions are reported in table S-1. Figure S-1 illustrates the efficiency of the ionisation of the different sized SiO_2-NPs by comparing the signal intensity of digested and undigested suspensions. Figures S-2-4 show eluting profiles of the mixtures of SiO_2-NPs standards obtained under different separation conditions of carrier composition, ionic strength and cross-flow rate.

Table of contents:

Table S-1. Concentration of SiO_2 in the SiO_2-NPs suspensions standards obtained by ICPMS analysis and external calibration using ionic silicon (n=3).

Sample	Concentration	
	(mg L^{-1}) 10^{-3}	RSD %
20 nm	6.6	5.2
40 nm	50	1
60 nm	39.2	2.3
80 nm	14.8	3.3
100 nm	29.1	1.6
150 nm	91.7	4.1

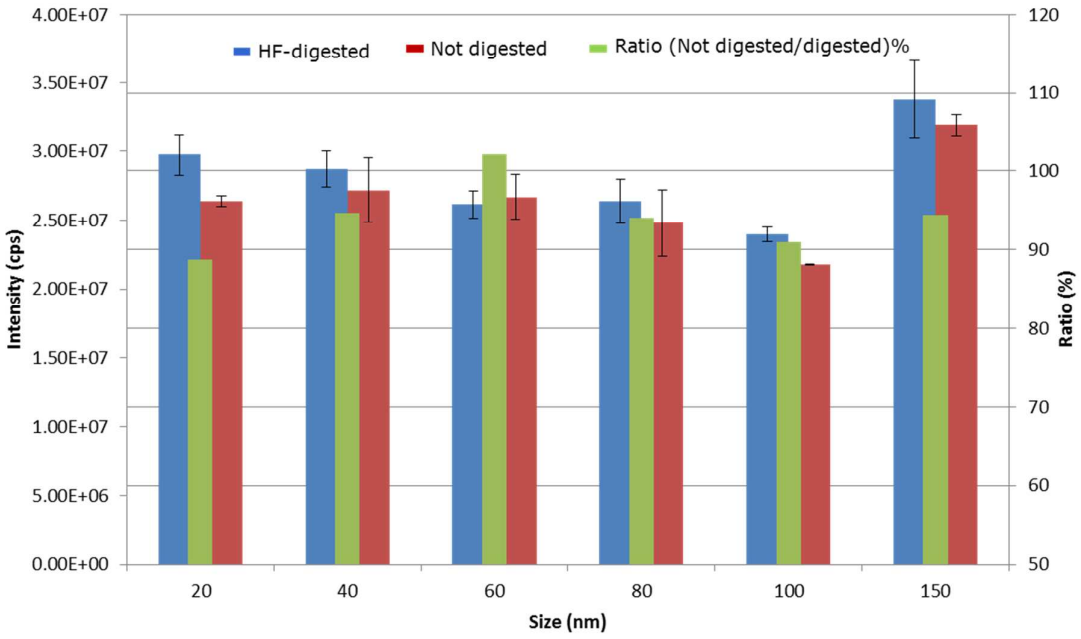

Figure S-1. Comparison of the ICPMS signal intensity of undigested and digested 10 mg L^{-1} SiO_2-NPs with HF.

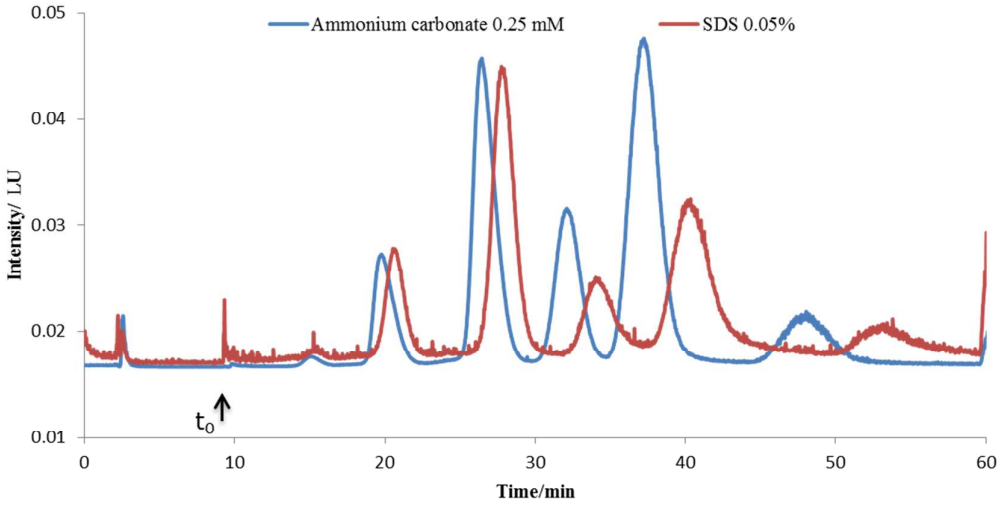

Figure S-2. Representative fractograms obtained after the injection of a mixture of SiO_2-NPs with different size (concentrations between 10 µg mL^{-1} and 1.0 µg mL^{-1}, for smaller and bigger particles, respectively) in the AF4-MALS system, using ammonium carbonate 0.25 mM and SDS 0.05% as carrier, respectively. Peaks in every fractogram correspond to 20, 40, 60, 80, 100 and 150 nm SiO_2-NPs, in order of elution.

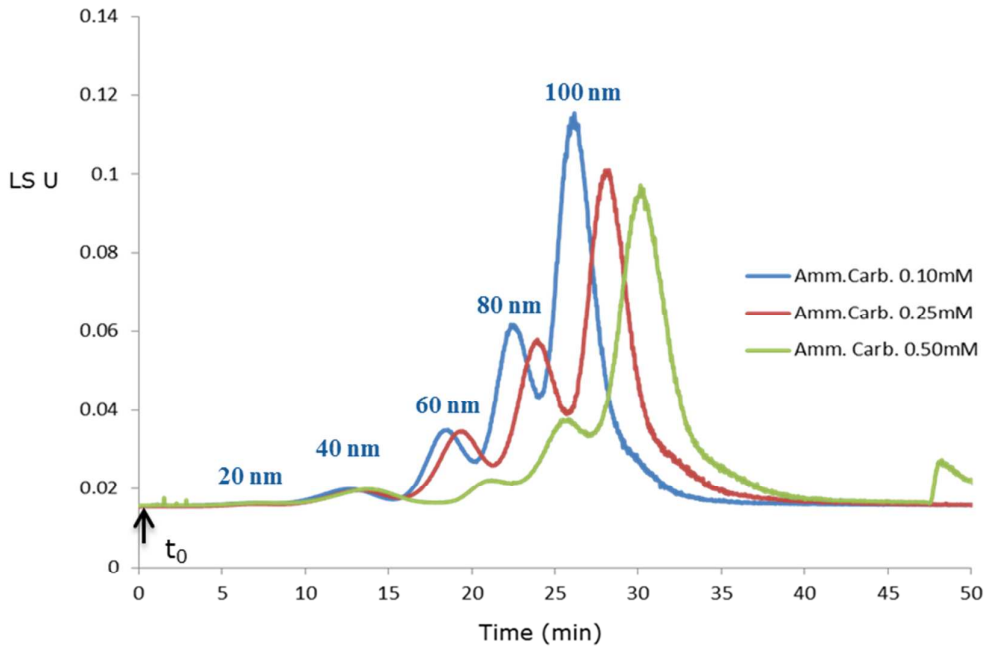

Figure S-3. Representative fractograms obtained after the injection of 50 µL of 2 µg mL^{-1} suspension of each 20, 40, 60, 80 and 100 nm polystyrene size standards (in order of elution, using different ammonium carbonate based buffers as AF4 carrier.

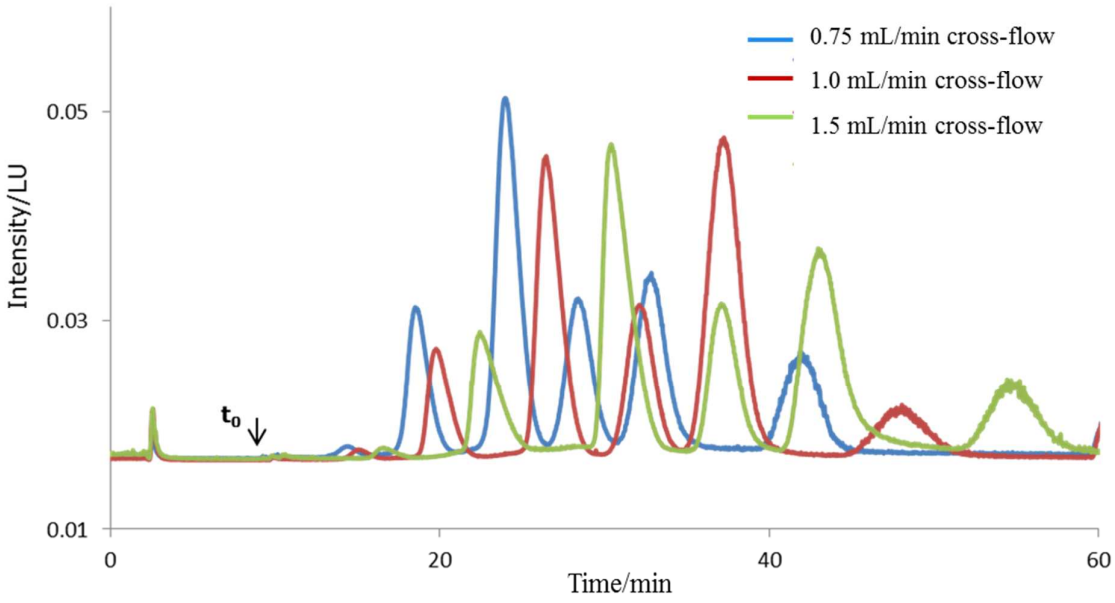

Figure S-4. Representative fractograms obtained after the injection of a mixture of SiO_2-NPs standards with different sizes (concentrations between 10 µg mL^{-1} and 1.0 µg mL^{-1}, for smaller and bigger particles, respectively) in the AF4-MALS system, under different cross-flow rate settings using ammonium carbonate 0.25 mM as carrier. Peaks in every fractogram correspond to 20, 40, 60, 80, 100 and 150 nm SiO_2-NPs , in order of elution.