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Simultaneous on-line detection of Si, Ti and Al-containing particles in toothpaste by asymmetric flow field-flow fractionation coupled with ICP-QQQ-MS

Toothpaste is a complex mixture of chemicals and includes surfactants, whiteners and abrasives based on nano or micrometer sized SiO_2 , TiO_2 and Al_2O_3 . A fraction of toothpaste may be swallowed during its normal use and individuals may therefore be exposed to these metal oxides. The size of the particles is a determining factor for their biological fate and the possible intestinal uptake of these particles. Therefore, in order to characterize these nano or microparticles, a method development project was initiated aiming at simultaneous size separation of all three types of particles by asymmetric flow field-flow fractionation (AF^4). Multi angle light scattering was used for on-line size determination of the eluting particles, and ICP-QQQ-MS was invaluable for selective, simultaneous detection of all three elements under a fixed set of instrumental conditions. In this lecture, results on the AF^4 and the ICP-QQQ-MS optimization work will be presented along with fractograms of real toothpaste samples using the coupled AF^4 -ICP-QQQ-MS system.