

New methodologies to characterize ZnO nanoparticles in cosmetic samples

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In recent years, based on their good properties as solar radiation filters and antibacterial agent, the use of zinc nanoparticles (ZnO NPs) in cosmetic industry has been increased. According to the literature, the potential toxicity of these NPs could be size-dependent and also by the amount of solubilized metal from the NPs in solution. This work investigates new reliable and straightforward methodologies that enables the determination of ZnO NPs, discriminating them from ionic zinc in cosmetic samples. Two different strategies of analysis have been applied in this study: solid sampling high-resolution continuum source electrothermal atomic absorption spectrometry (SS-HR-CS-GFAAS), and “single particle” inductively coupled plasma mass spectrometry (sp-ICP-MS). Triton X-100 has been used as a surfactant, for the formation of homogeneous and stable slurries, which allowed the determination of the concentration and sizes of ZnO NPs in baby creams and eyeshadows. To achieve stable suspensions of the samples, two compound central design experiments (CCD) were performed to optimize the concentration of Triton X-100 and sonication time. The concentration of each sample in the slurry was adjusted considering the customer % ZnO content. The results of Zn²⁺ and ZnO NPs contents achieved by the two techniques were compared, and the total Zn content was analyzed by acid digestion of the samples. A size comparison was also carried out with the data obtained with transmission electron microscopy (TEM).

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