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Highly sensitive and simple liquid chromatography assay with ion-pairing extraction and visible detection for quantification of gold from nanoparticles

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Abstract

A simple isocratic HPLC method using visible detection was developed and validated for the quantification of gold in nanoparticles (AuNP). After a first step of oxidation of nanoparticles, an ion-pair between tetrachloroaurate anion and the cationic dye Rhodamine B was formed and extracted from the aqueous media with the help of an organic solvent. The corresponding Rhodamine B was finally quantified by reversed phase liquid chromatography using a Nucleosil C18 (150 mm × 4.6 mm, 3 μm) column and with a mobile phase containing acetonitrile and 0.1 % trifluoroacetic acid aqueous solution (25/75, V/V) at 1.0 mL.min⁻¹ and at a wavelength of 555 nm. The method was validated using methodology described by the International Conference on Harmonization and was shown to be specific, precise (RSD < 11 %), accurate and linear in the range of 0.1 – 30.0 μM with a lower limit of quantification (LLOQ) of 0.1 μM. This method was in a first time applied to AuNP quality control after their synthesis. In a second time, the absence of gold leakage (either as AuNP or gold salt form) from nanostructured multilayered polyelectrolyte films under shear stress was assessed.

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