

Analytical chemistry of engineered nanomaterials: Part 2. analysis in complex samples (IUPAC Technical Report)

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Recently, the scope, regulation, legislation, and metrology of the analytical chemistry of engineered nanomaterials (ENMs) have been reviewed in the Part 1 of the IUPAC Technical Report (PAC vol. 95, no. 2, 2023, pp. 133-163). Chemical analysis of nanomaterials in complex sample matrices presents a substantial challenge for analytical science and regulatory agencies. The purpose of the present Part 2 is to discuss the detection, characterization, and quantification of nanomaterials in samples of complex matrices including methods for sample preparation and fitness for purpose. Analytical methods applied to analysis in matrices of environmental samples, food, cosmetics, and biological samples as well as those used to monitor the fate of ENMs in the environment and biological systems are reported. Tables of numerous recently published works on analyses of typical ENMs with detailed protocols and conclusive comments are presented. There is a rapid development in the field mostly in the stage of accumulation of factual material. The single-particle inductively coupled plasma mass spectrometry is already widely used at the chemical analysis of metal-containing nanoparticles.

<https://iupac.org/project/2017-005-3-500/>

IUPAC/CITAC Guide: Evaluation of risks of false decisions in conformity assessment of a substance or material with a mass balance constraint (IUPAC Technical Report)

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A Bayesian multivariate approach to the evaluation of risks of false decisions on conformity of chemical composition of a substance or material due to measurement uncertainty is adapted to cases for which the composition is subject to a mass balance constraint. The constraint means that sum of the actual ("true") values of the composition component contents under conformity assessment is equal to 1 (or 100 %) or another positive value less than 1 (less than 100 %). As a consequence, the actual values of the component contents are intrinsically correlated. Corresponding measured values of the component contents are correlated also. Any correlation can influence evaluation of risks of false decisions in conformity assessment of the substance or material chemical composition. A technique for appropriate evaluation of the relevant risks, including evaluation of the conformance probability of a subject or material composition, is discussed for different scenarios of the data modeling, taking into account all observed correlations. A Monte Carlo method is applied in the R programming language for the necessary calculations. Examples of evaluation of the risks are provided for conformity assessment of chemical composition of a platinum-rhodium alloy, pure potassium triiodide, a sausage, and synthetic air.

<https://iupac.org/project/2019-012-1-500/>