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Top-down evaluation of matrix effects uncertainty

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Abstract

Many measurements in chemistry are affected by matrix effects responsible for larger deviation between results from the analysis of various matrices than observed from the replicate analysis of the same matrix. The identification of cases where matrix effects are relevant is useful to know if measurement robustness to matrix effects can significantly reduce the measurement uncertainty, e.g. by performing time-consuming standard addition calibrations or additional matrix clean-up. This work presents a methodology to estimate the percentage contribution of matrix effects to the measurement uncertainty by comparing the intermediate precision estimated from the analysis of a sample with the dispersion of analyte recovery observed form the analyses of samples with different matrices. The measurement model was divide in two intervals of the studied quantity: Interval I between the limit of detection and two times the limit of quantification, where the absolute measurement uncertainty is constant, and Interval II above or equal to two times the limit of quantification where the relative measurement uncertainty is constant. The division of measurements scope in these intervals allowed the comparison of information collected at different values of the studied quantity. The developed methodology