



MICROMATTER TECHNOLOGIES INC.

#1-8333 130th Street, Surrey, B.C. V3W 7X4, Canada
Phone: +1.604.594.9720 or 1.866.966.2286
Fax: +1.604.594.9726
info@micromatter.com www.micromatter.com

Technical Note 2017-02

Loading of XRF Standards: Area Weight ($\mu\text{g}/\text{cm}^2$) vs. Parts per Million (ppm)

March 24, 2017

Micromatter has manufactured XRF calibration standards and reference samples for several decades. Highest quality materials, such as ultra-pure metals or stable inorganic compounds, are deposited onto polyester or track-etched polycarbonate by evaporation methods and characterized by precision weighing and XRF spectroscopy.

Understanding Units for XRF Calibration Standard Loadings

Over the years, Micromatter has received numerous inquiries about the quantity of materials deposited on Mylar® or Nuclepore® backings, and how these could be expressed in parts per million (ppm). Such inquiries reflect a fundamental misunderstanding of commonly used concepts for units and specifications.

Micromatter thin film standards contain minute quantities of *pure* materials, which are always characterized in units of area weight, i.e. $\mu\text{g}/\text{cm}^2$ (micrograms per square centimeter). While not of practical interest, the total quantity deposited on a film or membrane backed standard can be calculated by multiplying the given area weight of the element or compound with the total area of the filter.

Concentrations vs. Weights

Concentrations of components in solutions are often expressed in percent or, if the concentration is very low, in parts per million (ppm). For example, dissolving 25 parts of a compound in 1 million parts of solvent results in a concentration of 25 ppm. It should be pointed out that the term 'ppm' by definition is not a unit but a simplified notation of a factor of 10^{-6} .

Can $\mu\text{g}/\text{cm}^2$ be converted to parts per million?

No. Filter loadings cannot be converted to concentrations as both measures describe a different specification.

Micromatter standards do not contain a matrix, or filler material, in which the respective element or compound could be 'dissolved'. The use of ppm measures to describe Micromatter standards is hence meaningless.

Micromatter will continue to certify its standards in area weight units, as it is custom in the coating industry and in environmental monitoring.