

STANDARD REFERENCE MATERIAL 2569 LEAD IN PAINT FOR CONSUMER PRODUCTS

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The Consumer Product Safety Improvement Act of 2008 reduced the allowable amount of lead (Pb) in paint and surface coatings of certain products as regulated by the Consumer Product Safety Commission under the “Ban of Lead-Containing Paint and Certain Consumer Products Bearing Lead-Containing Paint,” 16 C.F.R. 1303. The limit on Pb content for coatings now stands at 90 mg/kg total Pb. Because paints and other coatings are typically applied at thicknesses in the range of < 10 μm to 50 μm , measurement of Pb in paint near this limit by X-ray fluorescence (XRF) is challenging for certain designs of spectrometers. Another challenging aspect of XRF measurements in support of the regulation is the requirement of mass fraction units for expression of the amount of Pb. Thin film XRF methods are set up routinely in units of mass per unit area, e.g. $\mu\text{g}/\text{cm}^2$. Based on the thickness and concentration range described above and typical densities observed for paint, the regulation creates the need for analyses in an approximate range from 0.1 $\mu\text{g}/\text{cm}^2$ to 3 $\mu\text{g}/\text{cm}^2$. Comparing this to the range of 0.3 mg/cm² to 6 mg/cm² Pb in Standard Reference Materials (SRMs) 2570 through 2579a developed for Pb in paint in buildings, which were certified 13 years ago, reveals a decrease of about a factor of 1000 for this application.

Development and validation of test methods for consumer products has been underway for several years through ASTM International and the International Electrotechnical Commission. Concurrently, the National Institute of Standards and Technology and the Consumer Product Safety Commission have been developing a paint films SRM that will be issued as SRM 2569 in mid-2011. SRM 2569 is a set of three films, deposited on polyester, having compositions of 300 mg/kg at 45 μm thick, 90 mg/kg Pb at 20 μm thick, and blank at 45 μm thick. The paint is a lacquer containing a soluble Pb compound and a green, chlorinated dye. The certificate for SRM 2569 contains values for mass fraction total Pb, mass Pb per unit area, thickness, and density of paint. These values are necessary to enable successful use of the SRM with methods based on either mass fraction Pb or mass Pb per unit area. Manufacturing processes and characterization processes are described, including pitfalls encountered. Test methods included WDXRF, microXRF, multiple monochromatic beam EDXRF, secondary target EDXRF, handheld XRF, isotope dilution ICPMS, ICPOES, ultrasound thickness measurement, UV-VIS absorption thickness measurement, and density by Archimedes’ Principle.

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