Detection of Cr (VI) in Leather: A Review of Established Techniques, and Development of New Methods

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Content

The topic of chromium (VI) (Cr(VI)) in leather has been deliberated by the whole supply chain for years. However, its significance has recently been raised due to proposed European legislation against skin sensitising substances suggesting acceptable Cr (VI) concentrations in leather goods should be lowered from 3 ppm to 1 ppm. Analysis of Cr (VI) in leather materials presents unique challenges other industries are exempt, in particular: complete extraction from a porous matrix, and reliable differentiation and detection in the presence of 20,000 – 40,000 ppm of Cr(III). The proposition of a stricter limit and current analytical difficulties advocate the need for a review of current standards.

Recent research by the Institute for Creative Leather Technologies (ICLT) has investigated both the colorimetric (part 1) and chromatographic (part 2) methods under BS EN ISO 17075. The focus of the study was to identify: possible sources of interference leading to false results, and the limit of quantification with respect to the proposed new compliance limit.

Studies into the colorimetric method have shown the presence of Cr (III), dyes and proteins can be significant interferences becoming critical at low Cr (VI) concentrations. Filters and solid phase extraction (SPE) have been shown to be retentive of Cr (VI). Dilution factors lead to a detection of 0.01 ppm in solution (at 3 ppm in leather), whereas, 0.003 ppm in solution (at 1 ppm in leather). BS EN ISO 17075 part 1 was concluded to be not capable of resolving to 3 ppm or 1 ppm in leather. Part 2 remedies many of these problems, however, despite greater analytical sensitivity, interlaboratory data suggests 3 or 1 ppm are not reliably detectable in leather. Possible improvements to test methods will be discussed although these will still not allow a 1 ppm detection.

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