

ABSTRACT:

Different classes of synthetic chemicals are being applied to textile and leather related consumer articles. Most of them are regulated but they don't have certified testing methods that is why their presence cannot be measured on consumer articles. Therefore, new methods for testing of toxic substances were developed for leather, textile, foam, and plastic samples. Toxic substances were extracted with toluene, tetrahydrofuran, methanol, n-Hexane or ethyl acetate using a variety of experiments as an ultrasonic-assisted thermal extraction or water bath with a shaker. Chemical toxicants were estimated using different techniques such as chromatography mass spectrometry (GC-MS) or ultra-fast liquid chromatography (UFLC). Pre-treatment limits were organized, including extractant type, method of extraction and time of extraction. Under prepared conditions, targeted compound retrieval was calculated. These proposed methods were successfully used for the determination of actual test specimens.

Recently regulated flame retardants, phthalates, biocide contents (MIT, CIT, OIT and Triclosan), Ortho-phenylphenols, DMFu and azo dyes (aromatic amines) don't have certified testing methods, therefore, their existence can't be measured in consumer products. Hence sensitive, reliable and fast methods were designed to classify and analyze the values of these controlled toxicants from textile, foam, leather and plastic samples. Subjected test specimens were extracted by selecting an appropriate organic solvent, temperature 60 °C, 60 min of sonication time and purified by utilizing centrifugation and filtration techniques. Toxic substances were examined either on GC / MS using a DB-5MS column and helium gas under Sim / Scan mode or on UFLC. Pre-treatment factors such as extraction solvent, extraction method, dilution ratio, extraction time were optimized. Under the optimized conditions, the targets had good linearity ($r^2 \geq 0.9995$). The findings were between 100 mg L⁻¹ ± 15% for the subjected target analyte substances. The quantification limit (LOQs) were in the range of 0.02 - 0.2 mg L⁻¹. These proposed extraction and analytical methods were successfully applied on the real experimental species. The toxic substances found were in the range as 1.36 mg L⁻¹ - 1798.14 mg L⁻¹.