

A Rapid and simple thermal desorption-GC/MS method for the determination of phthalates in plastic children's toys

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Phthalates are widely used in commercial products as plasticizers, because they give “hard” plastics the desired flexibility and durability. However, it has been demonstrated that some of the phthalates constitute a risk to human health and environmental quality; consequently, phthalates are regulated on a global scale. In 2008, the Consumer Product Safety Improvement Act (CPSIA) was enacted in the US. It set limits on six phthalates in many children's products. Several analytical regimes are being considered; all but one are based on solvent extraction, concentration and filtration. The extracts are usually analyzed using chromatographic or spectroscopic methods; however, solvent-based sample preparation is time consuming, requires extensive clean-up of the glassware, large volumes of solvents, and often yields poor quality data.

The most efficient method of sample preparation is thermal desorption (TD). The sample is heated and volatile compounds are “extracted”; the vapor phase extract is analyzed directly using GC/MS. This work focuses on the factors influencing the precise and accurate determination of phthalates in polystyrene and polypropylene using TD. A special capillary column will be described which reduces the elution temperature and hence the elution time of the phthalates of interest. Quantitation is performed using an ISTD which is compatible with a sample cup based sampler.

The TD-GC/MS method can be used as a sensitive analytical method to evaluate phthalate concentration in polymeric material or as a very fast, cost effective sample screening method.