The research underlying this thesis focused on the leaching and transformation of certain flame retardants and plasticizers under landfill conditions. In particular, the mid-scale (3-litre) Modular Environmental Test System (METS) was developed to study commercial products containing chemical additives in that context. The results showed that landfill degradation phases and temperature had a marked effect on the leaching and degradation of phthalates used as plasticizers in the investigated products. The degradation phases also affected the release of some of the flame retardants investigated. Moreover, it was found that the leaching/transformation processes were correlated to the laundry durability of the nitrogen and phosphorus-based flame retardants in the manufactured items than by whether those compounds were used in additive or reactive applications (i.e., merely blended in or chemically bonded).

A small-scale (50-ml) ISO standard method was used to study the most widespread flame retardant tetrabromobisphenol A (TBBPA) and some of its ether derivatives solely under methanogenic conditions. Complete disappearance of TBBPA was observed within the time frame of the study, and it was confirmed that neither dehalogenation to the estrogenic bisphenol A (BPA) nor transformation to dimethyl ether (TBBPA-DMe) had occurred. A slower but gradual loss of TBBPA-DMe was also noted, and neither TBBPA nor BPA was found as a transformation product.

It was also necessary to develop analytical protocols for some of the TBBPA derivatives. The lowest recoveries were found for methoxy derivatives, regardless of the procedure or solvents used for extraction.
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A small-scale (50-ml) ISO standard method was used to study the most widespread flame retardant tetrabromo-bisphenol A (TBBPA) and some of its ether derivatives solely under methanogenic conditions. Complete disappearance of TBBPA was observed within the time frame of the study, and it was confirmed that neither dehalogenation to the estrogenic bisphenol A (BPA) nor transformation to dimethyl ether (TBBPA-DMe) had occurred. A slower but gradual loss of TBBPA-DMe was also noted, and neither TBBPA nor BPA was found as a transformation product.

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