INFLUENCE OF Sb, Pb and Fe OXIDES ON THERMAL DEGRADATION OF TETRABROMOBISPEHNOL A (TBBPA). THERMOGRAVIMETRIC STUDIES ON RECOVERY OF THE METAL BROMIDES.

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Abstract

TBBPA-containing waste is mainly treated thermally (e.g. pyrolysis, incineration or co-combustion), and the mechanism of thermal decomposition of TBBPA is well recognized. Its decomposition is initiated at temperatures above 200 °C by the tautomerization of TBBPA to the keto-enol form. Because of release of highly reactive bromine radicals followed by abstraction of hydrogen atoms, the thermal decomposition of TBBPA is accompanied by generation of large amounts of gaseous HBr. The highly reactive HBr can be used for recovery of critical elements (i.e. Sb) or heavy metals (i.e. Pb, Fe) in form of volatile metallic bromides during thermal treatment of brominated flame retardants-containing waste or their mixture with the other wastes (e.g. electric arc furnace dust), respectively.

In the present study, we focused on investigation of the reactivity of Sb_2O_3, PbO and Fe_2O_3 with gaseous HBr originating from thermal decomposition of TBBPA with various thermal methods, including differential scanning calorimetry (DSC), thermogravimetry (TG), and thermogravimetry-mass spectrometry (TG-MS). The investigations were performed in inert and oxidative atmospheres, and both the bromination process and vaporization of the formed bromides were investigated. The influence of each metal oxide on debromination of TBBPA was evaluated under inert conditions.

Keywords: Tetrabromobisphenol A decomposition, metal oxides bromination, metals recovery, thermal analysis.