

Separation of Chlorinated Plastics and Immobilization of Heavy Metals in Hazardous Automotive Shredder Residue

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Abstract : In the present study, feasibility of the selective surface hydrophilization of polyvinyl chloride (PVC) by microwave treatment was evaluated to facilitate the separation from automotive shredder residue (ASR), by the froth flotation. The combination of 60 sec microwave treatment with PAC, a sharp and significant decrease about 16.5° contact angle of PVC was observed in ASR plastic compared with other plastics. The microwave treatment with the addition of PAC resulted in a synergetic effect for the froth flotation, which may be a result of the 90% selective separation of PVC from ASR plastics, with 82% purity. While, simple mixing with a nanometallic Ca/CaO/PO₄ dispersion mixture immobilized 95-100% of heavy metals in ASR soil/residues. The quantity of heavy metals leached from thermal residues after treatment by nanometallic Ca/CaO/PO₄ was lower than the Korean standard regulatory limit for hazardous waste landfills. Microwave treatment can be a simple and effective method for PVC separation from ASR plastics.

Keywords : automotive shredder residue, chlorinated plastics, hazardous waste, heavy metals, immobilization, separation

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