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Extraction of Polystyrene Nano- and Microplastics from Biosolids and Soil

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Extraction and quantification of nano- and microplastics from sediments and soils is challenging. Flotation is commonly used to separate plastic from mineral material. Here, we tested the efficiency of flotation for the extraction of nano- and microplastics from biosolids and soil. Biosolids and soil samples were spiked with polystyrene nano- and microbeads (diameter 0.05, 1.0, 2.6, 4.8, and 100 μm). Different extraction methods were tested, and after extraction, plastic beads were separated from mineral particles by flotation in a $ZnCl_2$ solution. Large beads (100μm) could be quantitatively extracted ($\sim$100%) from both biosolids and soils, but smaller beads had low extraction efficiencies (ranging from 5 to 80%, with an average of 20%). The challenge is to quantitatively extract nano- and microbeads from a biosolids or soil matrix. Samples high in organic matter content require removal of the organic matter, but the common method of H_2O_2 oxidation leads to poor extraction efficiencies for nano- and microbeads.