

Preparation of Polystyrene Microsphere-Templated Porous Monolith for Wastewater Filtration

ABSTRACT

Porous monoliths prepared using templates are highly sought after for filtration applications due to their good mass transport properties and high permeability. Current templates, however, often lead to the formation of dead-end pores and irregular pore distributions, which reduce the efficiency of the substrate flow across the monolith column. This study focused on the preparation of a microsphere-templated porous monolith for wastewater filtration. The optimal template/monomer ratio (50:50, 60:40, 70:30) was determined, and appropriate template removal techniques were assessed for the formation of homogenous pores. The physicochemical characteristics and pore homogeneity of the monoliths were examined. The 60:40 ratio was determined to result in monoliths with homogeneous pore distributions ranging from 1.9 μm to 2.3 μm . SEM and FTIR investigations revealed that solvent treatment was effective for removing templates from the resulting solid monolith. The water quality assessments revealed reductions in the turbidity and the total number of suspended particles in the tested wastewater of up to 96–99%. The findings of this study provide insightful knowledge regarding the fabrication of monoliths with homogenous pores that are beneficial for wastewater treatment.