



## Effect of Tween 20 and linear alkylbenzene sulfonate on microplastic coagulation

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### ABSTRACT

Microplastics have surfactant adsorption capability on their surface. As a result, its physical–chemical properties can be affected, leading to a decreased efficiency of microplastic removal by the coagulation process. Based on this, this research aims to verify the effect of the surfactant Tween 20 and linear alkylbenzene sulfonate on the chemical coagulation of polyethylene and expanded polystyrene microplastics. The coagulation/flocculation technique was applied, using turbidity analysis as a measure for the removal efficiency of microplastics. With the use of complete factorial planning at 2 levels, it was possible to find ideal conditions for microplastic coagulation and, therefore, to study the influence of surfactants through ZP, scanning electron microscopy and Fourier-transform infrared spectroscopy analyses. From this, electrostatic repulsion was observed in the polyethylene (PE) and expanded polystyrene (SPE) systems in the presence of linear alkylbenzene sulfonate, and in the presence of Tween 20, the formation of a protective layer in the molecular structure of microplastics prevented their aggregation. Therefore, it is necessary to consolidate methodologies when seeking to remove microplastics by coagulation because surfactants, in addition to changing the surfaces and morphology of microplastics, lead to a decrease in the removal of PE and SPE by the coagulation and flocculation process.

*Keywords:* Microplastic; Coagulation; Environment; Surfactants; Adsorption

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