



ASSESSING DENSITY SEPARATION AND FTIR-BASED TECHNIQUES FOR MICROPLASTIC ANALYSIS IN FRESHWATER SAMPLES

Thaiane Cantarino Costa¹, Beatriz Corrêa Thomé de Deus^{1,2}, Gabriela Lima Façanha^{1,2},
Diego Alberto Tavares², Bianca do Amaral², Keyller Bastos Borges³, Jussara Elias de
Souza², Simone Jaqueline Cardoso¹

¹ Laboratório de Ecologia do Plâncton - UFJF, Juiz de Fora, Brasil

² Itaipu Parquetec, Tecnologias Socioambientais, Foz do Iguaçu, Brasil

³ Universidade Federal de São João del Rei, São João del Rei, Brasil

⁴ Itaipu Binacional, Foz do Iguaçu, Brasil

E-mail: thaianecantarino@gmail.com

Microplastics (< 5 mm) are widely distributed in aquatic ecosystems and are recognized as emerging contaminants. Despite advances in research in this field, there are still gaps regarding the standardization of protocols for the collection, separation, and identification of these particles, especially considering their morphological variability. Thus, this study aimed to evaluate methodologies applied to the separation and chemical identification of microplastics in freshwater. The samples were collected at five sites along the Ocoí River, a tributary of the Paraná Basin, located in Itaipulândia, PR, during the spring/summer season. To assess freshwater methodologies for the separation and chemical identification of microplastics, we compared the density separation step and spectroscopic techniques for polymer identification. In the first seasonal sampling, density separation using a NaCl solution was applied, whereas in the second campaign this step was omitted, allowing the efficiency of particle recovery to be evaluated. Subsequently, samples were filtered and subjected to morphological analysis under a stereomicroscope and to chemical identification of polymers. FTIR was used in the first sampling and micro-FTIR in the second, enabling comparison of the performance of spectroscopic techniques in identifying particles of different sizes. A predominance of light fibers was observed in the analyzed samples. In this context, NaCl density separation did not lead to differences in particle recovery, indicating a low contribution of this step for samples with low sediment content and predominance of fibers. Regarding chemical identification, FTIR-ATR showed limitations in the analysis of particles < 0.3 mm, hindering the acquisition of reliable spectra, whereas micro-FTIR proved more efficient for polymer identification, especially for smaller particles. These results indicate that particle morphology and size directly influence the performance of the methodologies employed, highlighting the importance of selecting analytical protocols compatible with sample characteristics.

Keywords: NaCl; density separation; micro-FTIR; FTIR-ATR; environmental monitoring.

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