
Quantification and characterization of microplastics on the coast of Rio Grande do Sul

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Abstract

The contamination of the environment by plastic waste is one of the main environmental problems today. During their permanence in the environment, plastics are susceptible to different forms of degradation, which can lead to the generation of microplastics. In the environment, these particles can be involuntarily ingested by organisms and can cause several effects. In this context, the goal of this work was to quantify and characterize the microplastics present on a beach on the coast of Rio Grande do Sul/Brazil to understand the dimension of plastic contamination. The sampling was carried out on a beach in the city of Torres. There, sand was collected in 10 sampling sites and was sent to the laboratory for the separation of the microplastics from the sediments. This step consisted of preparing a saturated saline solution by dissolving table salt in distilled water. With the addition of the sand samples, the solution was mechanically stirred and then rested. Subsequently, the solution supernatant was filtered and the content present in the filters was subjected to the chemical digestion. The process used to digest the organic contaminants was the Fenton reaction. After the reaction, the filtered particles were analyzed on a stereoscope, where some microplastics were identified and by μ Raman analysis, where it was possible to identify the types of polymers. The filter residue was exposed to the Nile Red fluorophore and analyzed by fluorescence microscopy for the quantification of microplastics. Among the sand samples collected on the beach, an average of 51.2 microplastics were quantified in each sample, representing a contamination of more than 500 microplastics for every kilogram of sand. The main polymers identified were: polyethylene (25%), polypropylene (15%) and polyamide (10%).

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