
Characterization of Atmospheric Microplastics in a Sub-urban area of northwest of Spain

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Abstract

The number of studies dealing with microplastics pollution in the atmosphere is increasing. But sampling methods and sample treatment protocols are not standardized yet and, so, comparison of results is hardly possible. Some kind of general-use methodology would be welcome, mostly to monitor what is going on with the atmosphere at different places of the World. On the other hand, a relatively novel instrumental technique based on the use of Quantum Cascade Lasers in the IR spectral region (LDIR) offers nice possibilities to perform monitoring although some parameters need further optimization.

In the present work 2 different passive sampling methods were tested: a commercial system known as Depobulk (with a 22 cm diameter aperture) and another home-made one (with a 11 cm diameter aperture) to evaluate their collection capabilities. Also, 3 digestion methods (two alkaline-oxidative and an oxidative one) were assessed, with good results, both, but with important operational differences.

In addition, we have optimised some parameters of the LDIR measurement: 1) we propose an automatic classification system for fibres and particles with a hit rate higher than 93%; 2) to be stricter to get positive matches between the spectra of the unknowns and the databases in order to avoid false positives (which have been found in different polymers).

Finally, we studied the atmospheric deposition of MPs (dry and wet) in a sub-urban area NW of Spain, classified in different particle size ranges. The results showed a mean value of 500 MP/day/m² with a relevant number of MPs in the smaller 50-20 μ m fraction (400 MP/day/m²), especially polyurethane, polyethylene and polypropylene.

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