Using air, soil and vegetation to assess the environmental behaviour of siloxanes

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Abstract This study aimed to contribute to the enhancement of the knowledge of levels, trends and behaviour of eight siloxanes (four linear and four cyclic) in the environment. Adding to the prioritised scrutiny of the incidence in the atmosphere through passive samplers (sorbent-impregnated polyurethane foam disks—SIPs), the sampling of pine needles and soil was also performed, thus closing the circle of atmospheric exposure in the areas of study. Two sampling campaigns (one in summer and one in winter) were done in a total of eight sampling points in the Portuguese territory, which covered a wide range of human presence and land uses (urban, industrial, remote and beach areas). By adopting a “green” approach in terms of analytical methods, namely reducing the clean-up steps for the passive air samples and using the quick, easy, cheap, effective, rugged and safe (QuEChERS) technology for soils and pine needles, the results showed total concentration of siloxanes between 5 and 70 ng g⁻¹ (dry

weight) for soils and from 2 to 118 ng g⁻¹ (dry weight (dw)) for pine needles, with no clear seasonal trend. For SIPs, the levels varied from 0.6 to 7.8 ng m⁻³ and were higher in summer than in winter in all sites. Overall, the cyclic siloxanes were found in much higher concentrations, with D5 and D6 being the most predominant in a great majority of cases. Also, the urban and industrial areas had the highest incidence, suggesting a strong anthropogenic fingerprint, in line with their main uses.

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