EXTRACTION METHODOLOGIES TO MICROPOLLUTANS ADSORB ON MICROPLASTICS

Pacheco-Juárez, Javier*, Guedes-Alonso, Rayco, Montesdeoca-Esponda, Sarah, Santana-Viera, Sergio, Santana-Rodríguez, Torres-Padrón, María Esther, José Juan and Sosa-Ferrera, Zoraida

Instituto Universitario de Estudios Ambientales y Recursos Naturales (i-UNAT), Universidad de Las Palmas de Gran Canaria, 35017 Las Palmas de Gran Canaria, Spain
javier.pacheco@ulpgc.es, rayco.guedes@ulpgc.es, sarah.montesdeoca@ulpgc.es, sergio.viera@ulpgc.es, josejuan.santana@ulpgc.es, zoraida.sosa@ulpgc.es, miriam.torres@ulpgc.es

Microplastics are ubiquitous in the marine environment and can cause negative effects on organisms. In addition, they can also adsorb a variety of pollutants and can act as pollutant carriers.
In the IMPLAMAC project, different analytical methodologies are developed to determine different types of organic pollutant, such as UV filters and stabilisers (Montesdeoca-Esponda *et al*., 2021), hormones (Guedes-Alonso *et al*., 2021) and drugs (Santana-Viera *et al*., 2020), whose presence in the environment is booming with the increase in population. Extractions were carried out by ultrasound-assisted extraction (UAE) and the determination by ultrahigh-performance liquid chromatography with tandem mass spectrometry detection (UHPLC-MS/MS). 300 mg of pellets and microplastic fragments were used to obtain the best extraction condition for the different targeted micropollutants.
The method for UVFs and UVSs displayed values lower than 22% and 28% for intraday precision and interday precision, and limits of detection (LODs) were obtained from 0.01 to 0.69 $ng \cdot g^{-1}$ and limits of quantification (LOQs) were from 0.02 to 2.29 $ng \cdot g^{-1}$.
Regarding the analytical method for hormones, it showed intraday and interday precisions below 20% for most compounds, with LODs between 0.07 and 27.5 $ng \cdot g^{-1}$ and LOQs ranging from 0.23 to 91.7 $ng \cdot g^{-1}$.
Respecting drugs method, relative standard deviations lower than 15% were obtained for intraday and interday precisions in most cases. LODs ranged from 0.25 to 15.8 $ng \cdot g^{-1}$ and LOQs were between 0.82 and 52.7 $ng \cdot g^{-1}$.

Key words: UV filters, hormones, drugs, ultrasound-assisted extraction

Acknowledgments: Both funds and samples were provided by Project MAC 2/1.1ª/265 (IMPLAMAC) Cooperation Programme INTERREG MAC 2014-20.

References:

Guedes-Alonso, R., Sosa-Ferrera, Z. and Santana-Rodríguez, J.J. (2021). Analysis of microplastics-sorbed endocrine-disrupting compounds in pellets and microplastic fragments from beaches. Michrochemical Journal, 171, 106834.

Montesdeoca-Esponda, S., Santana-Viera, S., Sosa-Ferrera, Z., and Santana-Rodríguez, J. J. (2021). UV filters and UV stabilisers adsorbed in microplastic debris from beach sand. Marine Pollution Bulletin, *168, 112434*.

Santana-Viera, S., Montesdeoca-Esponda, S., Torres-Padrón, M.E., Sosa-Ferrera, Z., Santana-Rodríguez, J.J. (2020). An assessment of the concentration of pharmaceuticals adsorbed on microplastics. Chemosphere, 266, 129007.