{rokbox title=|Graphical abstract :: Image: Authors| thumb=|images/stories/ieo/imagenespublicaciones/centro-oceanografico-baleares-ieo-csic-screening-organic-chemicals-associated-virgin-polyethylene-microplastic-pellets-mediterranean-lopez-vazquez-et-al-2024-thumb.jpg|}images/stories/ieo/imagenespublicaciones/centro-oceanografico-baleares-ieo-csic-screening-organic-chemicals-associated-virgin-polyethylene-microplastic-pellets-mediterranean-lopez-vazquez-et-al-2024.jpg{/rokbox}

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Screening of organic chemicals associated to virgin low-density polyethylene microplastic pellets exposed to the Mediterranean Sea environment by combining gas chromatography and liquid chromatography coupled to quadrupole-time-of-flight mass spectrometry

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Abstract: In this work, organic chemicals associated with microplastics (MPs) exposed to a coastal anthropogenized environment for up to eight weeks have been screened for, in order to discern the (de)sorption dynamics of chemicals in the marine ecosystem. Low-density polyethylene (LDPE) pellets were studied since they represent primary MPs used by the plastic industry and a relevant input of MPs into the oceans. To maximize the coverage of chemicals that could be detected, both liquid and gas chromatography coupled to quadrupole-time-of-flight (GC-QTOF and LC-QTOF, respectively) were used. In the case of LC-QTOF, an electrospray ionization source was employed, and the compounds were investigated by combining suspect and non-target screening workflows. The GC-QTOF was equipped with an electron ionization source and compounds were screened in raw and derivatized (silylated) extracts by deconvolution and contrast to high- and low-resolution libraries. A total of 50 compounds of multifarious classes were tentatively identified. Among them, melamine and 2-ethylhexyl salicylate (EHS) were detected in the original MPs but were rapidly desorbed. Melamine was completely released into the marine environment, while EHS was partly released but a portion remained bound to the MPs. On the other hand, many other chemicals of both anthropogenic (e.g. phenanthrene or benzophenone) and natural origin (e.g. betaine and several fatty acids) accumulated onto MPs over time. Quantification of 12 unequivocally identified chemicals resulted into a total concentration of 810 µg/kg after MPs exposure for 8 weeks.

Keywords: Plasticizers, Plastic-borne contaminants, High-resolution mass spectrometry (HRMS), Bisphenol A, Marine pollution