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## A New Film-Based Passive Sampler for Moderately Hydrophobic Organic Compounds

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### ABSTRACT

Passive samplers for moderately hydrophobic organic compounds (MHOCs) (i.e.,  $\log K_{ow}$  ranging from 2 to 5) are under-developed compared to those that target polar or strongly hydrophobic compounds. The goal of this study was to identify a suitable polymer and develop a robust and sensitive film-based passive sampler for MHOCs in aquatic systems. Poly(methyl methacrylate) (PMMA) exhibited the highest affinity for fipronil and its three metabolites (i.e., fipronils) ( $\log K_{ow}$  2.4 – 4.8) as model MHOCs compared with polyethylene and nylon films. In addition, a 30 – 60 min treatment of PMMA in ethyl ether was found to increase its sorption capacity by a factor of 10. Fipronils and 108 additional compounds ( $\log K_{ow}$  2.4 – 8.5) reached equilibrium on solvent-treated PMMA within 120 h under mixing conditions and their uptake closely followed first-order kinetics. PMMA-water partition coefficients and  $K_{ow}$  revealed an inverse parabolic relationship, with vertex at  $\log K_{ow}$  of  $4.21 \pm 0.19$ , suggesting that PMMA was ideal for MHOCs. The PMMA sampler was tested in an urban surface stream, and in spiked sediment. The results demonstrated that PMMA film, after a simple solvent swelling treatment, may be used as an effective passive sampler for determining  $C_{free}$  of MHOCs in aquatic environments.

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