Abstract

Removal of micropollutants from water with NF/RO membranes has received much attention in recent years. However, because of especially diffusion through the polyamide layer, NF/RO membranes never achieve complete removal, which may be a problem given the possibility of micropollutants causing adverse effects in even very low concentrations. In this paper, we have investigated a strategy of implementing adsorbents into the support layer of a NF membrane to increase the overall removal of three selected pesticides by combining membrane rejection and adsorption into one unit operation. The objective of the study was to act as proof of concept for the scheme, as well as to gain insights into how adsorbents may be inserted into the membrane support, and how they affect the membrane performance. The results showed that the addition of the adsorbents to the membrane increased the adsorption capacity of the membrane, and that the adsorbents could be embedded in the membrane without affecting the flux and rejection behaviour. This however depended very much on the specific manufacturing method. Furthermore, the adsorption capacity was found to vary significantly for the three pesticides, indicating a need for adsorbents designed to specifically target a given micropollutant. Overall, the concept of a complete removal membrane is realisable, but several challenges remain to be solved