**Biomimetic aquaporin forward osmosis membrane for removal of frequently found pesticides from danish groundwater network**

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**Abstract**

Forward osmosis (FO) process has gained a critical attention in recent years due to its decreased energy requirements as well as less fouling risks. However, the challenge has been to find an FO membrane offering sufficient rejection of uncharged micropollutants while maintaining a reasonable water flux. Among FO membranes, by incorporating aquaporin proteins in the membrane selective layer, aquaporin membrane offers the possibility of having a high rejection without compromising water flux resulting in a higher permeability compared to the other traditional FO membranes. However, their potential for removal of micropollutant is not widely studied. In this study, the performance of the membrane was for the first time investigated in a conventional FO setup for removal of three frequently detected pesticides in groundwater wells in Denmark; 2-6 dichloro-benzamide (BAM), 2-methyl-4-chlorophenoxyaceticacid (MCPA), and methylchlorophenoxypropionic acid (MCPP).

The aquaporin FO membrane was found to reject all targeted pesticides at initial levels over 93% for BAM and up to 97% for MCPP. The rejection of pesticides increased up to approximately 99% by the time. The permeate flux, in addition, was observed to be 15 LMH at the beginning and dropped down to around 13 LMH over time probably due to adsorption of solutes on the membrane. This can be stated by comparing the permeate flux for feed water (spiked with pesticides) with pure water in which permeate flux was observed to remain almost constant around 15 LMH.

This finding is indicating the promising ability of recently developed aquaporin membrane for removal of these pesticides from Danish groundwater network without compromising the water flux.

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