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 **Tailoring hybrid membrane processes for sustainable water production: first adsorption studies**

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**Abstract:** HyMemb LIFE project involves a 2-years field test of a hybrid adsorption/microfiltration (MF) prototype in Alcantarilha Water Treatment Plant (Algarve, Portugal). Powdered activated carbon (PAC) and low pressure ceramic membranes will be used to demonstrate the process effectiveness, reliability and efficiency on the removal of representative emerging contaminants. This work introduces the project and presents the first adsorption results regarding three key factors for optimal PAC/MF performance: PAC dosing mode, effective contact time and mixing speed. Results highlight the importance of ensuring an effective contact time between PAC and the contaminants (>30 min, preferentially) and a minimum gradient speed (220 s-1) to maximise the contaminants’ removal. Results also suggest that a combined optimisation of PAC residence time and hydraulic retention time is crucial to maximise the effective time for adsorption.

**Keywords:** adsorption; emerging contaminants; hybrid membrane processes