Title: Organic micropollutant removal in marine and brackish waters

Keywords: Micropollutants, Analyses, Salinity, Adsorption, Solar and UV photolysis

Elements of context
Due to the pollution generated by human activities and soil leaching, coastal seawater is subject to an increase of the concentrations of nutrients and micropollutants. This evolution of the seawater quality can disrupt the marine environment but also impact aquaculture (oyster, shellfish, and mussel farming ...). In order to minimize the impact of these undesirable compounds on aquaculture activities, it is necessary to identify and quantify the target pollutants present in seawater or estuarine waters. Similarly, to use water without sanitary risk in aquaculture farms or reject these waters in the natural environment, it is necessary to remove these deleterious micropollutants. Few studies dealt with saline waters, for which the high ionic strength can affect the operating conditions and performance of treatment processes.

Objectives
The objective of this study is to identify and quantify trace micropollutants in seawater released in aquaculture and to study the performances of treatment processes against these target pollutants.

Program
The research program is divided into three phases:
- Develop a non-targeted screening approach with chromatographic (liquid or gas) and high-resolution mass spectrometry techniques to identify/quantify trace organic micropollutants in coastal seawater. This analysis strategy may be extended by the implementation of passive samplers to obtain a representative analysis despite the risks of significant temporal variations.
- Perform mass balances in incoming water flows and discharges of micropollutants present in the water in the specific case of a littoral zone used for oyster farming. Samples will be taken at the Ifremer research center in Bouin (Vendée, France).
- Define the performances and the operating conditions for a specific treatment of these organic micropollutants. Two processes will be specifically studied: i) - adsorption on porous carbon materials and ii) - solar or UV photolysis. In both cases, the mechanisms of mass transfer and / or oxidation will be studied. Models will be applied to simulate or design the processes studied.

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