Poster

Revalorization of tidal waste as sustainable flocculants through clean technologies

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ABSTRACT

The current trend towards seeking renewable resources, as a consequence of the environmental impact triggered by the use of polluting raw materials, has led to an increase in research on cellulose. This natural polymer accounts for around 1.5×1012 tons of the total annual biomass production and is considered a virtually inexhaustible source of raw material for the growing demand for environmentally friendly products [1]. However, the cellulose industry relies heavily on lignocellulosic biomass such as wood, cotton, flax, hemp, etc., materials in which lignin removal poses a major challenge due to the harsh chemical treatment required, resulting in partial cellulose degradation and the production of highly polluting effluents. For this reason, readily accessible biomass with lower lignin content, such as seaweeds and marine phanerogams, represents a sustainable alternative source of cellulose [2]. Among the various industrial applications of this polymer, the production of flocculants has recently gained popularity for wastewater treatment, due to their non-toxicity and biodegradability compared to chemical flocculants derived from materials like petroleum [3].

Therefore, this study examined the production capacity of flocculants using cellulose extracted from tidal waste (seaweeds and marine phanerogams) collected on a beach in Nerja (Malaga, Andalusia, Mediterranean Sea) aiming to revalue beach wrack that accumulate on the coasts causing environmental and economic damage, thus contributing to the framework of the circular economy. To achieve this, 28 experiments were designed with different cooking conditions using the "soda-anthraquinone" process for cellulose extraction. Lignin removal was performed with hydrogen peroxide and the morphological characterization of the product was carried out using the Morfi Lab equipment (Techpap) [4]. The results obtained revealed key properties in our cellulose fibers through statistical parameters, allowing the selection of the most interesting samples for satisfactory flocculation, highlighting the use of tidal waste as a sustainable alternative to traditionally used chemical flocculants.

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