

Treating oil produced water effluent using microalgal based system

The oil industry can generate a high volume of wastewater associated with oil extraction activities. This effluent is known as produced water (PW) and is characterized by a complex composition of petroleum components and salts. This effluent must be treated before being discharged or used in other industrial processes. The objective of this study is to identify the best condition for treating PW by means of using algae cultivating system. The PW is known for containing nutrients that favors the cultivation of microalgae and its reuse is an economically interesting strategy (upcycling). However, the used PW shows significant concentration of salts that can hinder algal growth. *Dunaliella salina* was grown in different concentrations of PW amended with the Conway synthetic medium inorganics. In addition, the inoculums were pre-adapted (acclimated) on PW before the experiments. The results showed that the culture medium prepared with PW can generate algal biomass and lipid close to what was observed with the control medium (Conway). The process of acclimating the microalgae to saline PW showed a positive result. Biomass productivity increased from 45 to 48 mg L d⁻¹. The adaptation processes have also reduced the cultivation period from 15 to 7 days. Algal cultivation significantly increased the removal of inorganics (N and P) and organics (COD) at ratios above 85%. Therefore, algal based system can significantly contribute for treating PW. This research also identifies that the best saline concentration range for the cultivation of *Dunaliella salina* in PW is between 45-50 gSDT / L. This data can be used for standardization of PW when used in large-scale systems. Furthermore, such high saline levels will also prevent future problems with system contamination during culturing in open bioreactors.

Keywords: *Dunaliella salina*, produced water, hypersaline, microalgae, oil and gas.