

## **Proposing an Economical and Effective Treatment Process for Reverse Osmosis Concentrate in Brackish Water Desalination Using *Chlorella sp.***

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Currently, brackish water desalination is practiced through reverse osmosis technology as it utilizes lower energy for high and stable quality water products. Though it produces high-quality water, around 15-35% of raw water is discharged as a waste concentrate which is problematic in terms of environmental and economic aspects. This study is to propose a cost-effective as well as efficient method to treat Brackish Water Reverse Osmosis (BWRO) concentrate through exploiting *Chlorella sp.* Isolated *Chlorella sp.* was grown in photobioreactor where sunlight was used as a light source and concentrate was used as an inorganic carbon source. *Chlorella sp.* were inoculated at 15% (v: v) in 250 mL Erlenmeyer flasks and kept in rotation at 250 rpm without aeration. Algae were grown in three different concentrates separately in the batch model. The retention time of the batch model was 9 days in which on the last day maximal of 1.16 g L<sup>-1</sup> of biomass was produced. Total dissolved solids, electrical conductivity, alkalinity, total hardness, nitrate, and phosphate were able to remove with efficiencies up to 63.07, 63.42, 80.39, 74.36, 88.28, and 88.79% respectively. 1 m<sup>3</sup> of concentrate was effectively treated in a surface area of 0.12 m<sup>2</sup> of the photobioreactor. Due to the lack of discharge standards for reverse osmosis concentrate, the treated water quality of concentrate was compared with its feed water to check whether discharging in to surface water bodies and recycling is possible. The comparison studies showed that concentrate with high salinity, hardness, and alkalinity approximately met its feed water quality after batch model treatment which is harmless on discharge.

*Keywords:* *Chlorella sp.*, Brackish water reverse osmosis concentrate, Inorganic ion removal, Nutrient removal