

# **Bio-chemical treatment of saline domestic wastewater using RBCs.**

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## **Abstract**

A bench scale laboratory RBC Unit consisting of three stages followed by a chemical flocculator and a clarifier was operated for six months without recycle to provide the bio-chemical treatment to the domestic saline wastewater. The process was operated at three feed rates of degrittied wastewater, collected daily from ARAMCO's South Sewage Treatment Plant, resulting in hydraulic loading of 0.038, 0.076 and 0.114 m<sup>3</sup>/m<sup>2</sup>. day and total hydraulic detention time in the RBC Unit of 4.5, 2.25 and 1.5 hours respectively. At each hydraulic loading, system was tested without chemical addition and with two lime dosages giving the Ph of 9.5 - 10.3 and 10.5 - 11.3 in the flocculator. Organics, phosphorus, nitrogen and hardness removals were evaluated.

The results show as high as 98% BOD<sub>5</sub> and 94% COD removal can be obtained at hydraulic loading of .038 and .076 m<sup>3</sup>/m<sup>2</sup>. day, respectively with the pH of 10.5 - 11.3 in the flocculator. The phosphorus removal varied with pH condition. Upto 100% orthophosphate and 97% total phosphate was removed at pH 10.5 -11.3. An improved removal of organic was also observed at this pH. This was caused by 96% precipitation of Mg<sup>++</sup> in the form of Mg (OH)<sub>2</sub>. Maximum Ammonia-N removal of 98% was observed at hydraulic loading of 0.038 m<sup>3</sup>/m<sup>2</sup>. day while maximum nitrification of 94% was also obtained at this hydraulic loading. Ammonia-N removal and nitrification rate both were found decreasing linearly with the increase of hydraulic loading or Ammonia-N loading. During operation, no biological solids were wasted. Combining both RBC and chemical treatment with one clarifier only, provides effective tertiary treatment and should be considered as a better alternative to existing and future treatment plants.