

Abstract

The growth characteristics and nutrient removal from synthetic wastewater by *Rhodospira rubra*, *Chlorella sorokiniana* and *Spirulina platensis* were investigated under aerobic dark (heterotrophic) and aerobic light (photoheterotrophic) conditions. Both in terms of economy and efficiency, aerobic dark conditions were the best for wastewater treatment using *R. rubra* and *C. sorokiniana*, but light was necessary with *S. platensis*. Neither growth nor nutrient removal characteristics of the cells were affected in synthetic wastewater with as high as 10 000 ppm acetate, 1000 ppm propionate, 700 ppm nitrate and 100 ppm phosphate. Although *R. rubra* and *C. sorokiniana* showed good growth in synthetic wastewater containing 400 ppm of ammonia, *S. platensis* was completely inhibited. When grown as a monoculture, none of the strains could simultaneously remove acetate, propionate, ammonia, nitrate and phosphate from the wastewater. *R. rubra* could remove all the above nutrients except nitrate, but the rate of removal was relatively low. The rate of nutrient removal by *C. sorokiniana* was higher, but the organism could not remove propionate; *S. platensis* could efficiently remove nitrate, ammonia and phosphate, but none of the organic acids. A mixed culture of *R. rubra* and *C. sorokiniana* was therefore used for simultaneous removal of organic acids, nitrate, ammonia and phosphate. The optimum ratio of the cells depended on the composition of the wastewater.

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