

Study on Ammonium Removal and Carotenoids Production by Isolated Photosynthetic Bacteria

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ABSTRACT

Direct ammonium removal by isolated photosynthetic bacteria (PSB) which were isolation from lake in Changhua, it ' s important for the industrial application of PSB wastewater treatment. Medium composition and environmental factors are the most important parameters in PSB growth. In this study was carried out the PSB ammonium removal and carotenoids production under different medium composition and environmental factors (carbon sources, nitrogen concentration, metal ion, initial pH value, temperature, light sources and aeration rate). The results showed that under different medium composition and environmental factors, PSB biomass and carotenoids content reached 8 g/L and 5 mg/g-dried cell weight. Under the aeration condition, the ammonium utilization rate (25 mg/L/h) and ammonium removal efficiency (100%) of immobilized system in medium was highest at 4 vvm of aeration. This could be attributed to higher dissolved oxygen levels, provided adequate aeration, cell growth, ammonium removal efficiency and utilization rate increased with increasing aeration. PSB growing as immobilized and free cells were compared to test its ability to remove $\text{NH}_4\text{-N}$ in continuous stirred tank reactor (CSTR). The experimental results showed that immobilized cell system got a higher $\text{NH}_4\text{-N}$ removal efficiency (100%). In additionally, one of the carotenoids in PSB is lutein, that was investigated by fourier transform infrared spectrometry (FTIR) and high-performance liquid chromatography (HPLC).

Keywords : Photosynthetic bacteria, Ammonium utilization rate, Ammonium removal efficiency, Carotenoids, Lutein.

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