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Removal of freshwater microalgae by a magnetic separation method

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Some species of microalgae, with high growth rate and high lipid content, appear to be attractive alternatives as a feedstock for biodiesel production. The high-energy input for harvesting biomass and removing the water from the algae makes current commercial microalgal biodiesel production cost expensive. The major techniques currently employed in microalgae harvesting and recovery include centrifugation, coagulation-flocculation, bio-flocculation, filtration and screening, gravity sedimentation, and flotation. The purpose of this study was to investigate the harvesting of microalgae cells by coagulation using magnetic activated carbon, magnetite (FeO_4) nanoparticles, and common chemical coagulants. *Scenedesmus rubescens* was selected and cultivated in 10 L flasks under continuous artificial light. Samples were taken at different operation intervals. Jar tests were conducted to investigate the effect of adsorption of microalgae on the magnetic material. The removal efficiency of microalgae was affected by the coagulants dose, stirring time and speed, and the initial microalgae concentration. The recovery of microalgae was greater in cultures with high initial microalgae concentration compared to cultures with low microalgae concentrations.