Conversion of microalgae to biofuel

Abstract

This paper primarily presents an overall review of the use of microalgae as a biofuel feedstock. Among the microalgae that have potential as biofuel feedstock, Chlorella, specifically, was thoroughly discussed because of its ability to adapt both to heterotrophic and phototrophic culture conditions. The lipid content and biomass productivity of microalgae can be up to 80% and 7.3 g/l/d based on the dried weight of biomass, respectively, making microalgae an ideal candidate as a biofuel feedstock. The set-up of the system and the biomass productivity of microalgae cultivated in an open pond and a photobioreactor were also compared in this work. The effect of the culture condition is discussed based on the two-stage culture period. The issues that were discussed include the light condition and the CO 2, DO and N supply. The microalgal productivities under heterotrophic and phototrophic culture conditions were also compared and highlighted in this work. The harvesting process and type of flocculants used to aid the harvesting were highlighted by considering the final yield of biomass. A new idea regarding how to harvest microalgae based on positive and negative charges was also proposed in this work. The extraction methods and solvents discussed were primarily for the conventional and newly invented techniques. Conversion processes such as transesterification and thermochemical processes were discussed, sketched in figures and summarized in tables. The cost-benefit analysis of heterotrophic culture and the cultivation system was highlighted at the end of this work. Other benefits of microalgae are also mentioned in this work to give further support for the use of microalgae as a feedstock for biofuel production.