

Prova de Proficiência de Inglês

A technical evaluation of biodiesel from vegetable oils vs. algae. Will algae-derived biodiesel perform?

Green Chem., 2011, 13, 3048, Gerhard Knothe

Biodiesel, one of the most prominent renewable alternative fuels, can be derived from a variety of sources including vegetable oils, animal fats and used cooking oils, as well as alternative sources such as algae. While issues such as land-use change, food vs. fuel, feedstock availability, and production potential have influenced the search for the “best” feedstocks, an issue that will ultimately determine the usability of any biodiesel fuel is that of fuel properties. Issues such as cold flow and oxidative stability have been problematic for biodiesel. The fatty acid profile of a biodiesel fuel is largely identical to that of the feedstock and significantly influences these properties. This article compares biodiesel derived from vegetable oils and biodiesel obtained from algae in light of fuel properties. While the properties of biodiesel fuels derived from vegetable oils are well-known, the properties of biodiesel obtained from algal oils have usually not been reported. The fatty acid profiles of many algal oils possess high amounts of saturated and polyunsaturated fatty acids. Thus, biodiesel fuels derived from algae in many cases likely possess poor fuel properties, i.e., both poor cold flow and low oxidative stability simultaneously. This observation shows that production potential alone does not suffice to judge the suitability of a feedstock for biodiesel use. The combination of these issues is strongly affected by the observation that algae growth and production depend on factors such as temperature, light intensity and nutrients (which includes CO₂). Algae with the most favorable FA profiles, like all other algae, are therefore likely sensitive to these conditions and minor deviations from these conditions may lead to an ultimately less favorable product. Therefore, it appears that production conditions would need to be tightly controlled in order to obtain a product with more favorable properties. This aspect also raises the issue of the more advantageous production system, photobioreactors vs. open ponds. It appears that control of production conditions would most likely be easier to achieve in closed systems, photobioreactors, rather than open ponds, which appear more susceptible to variations of the ambient conditions, for example, temperature. Tightly controlling the conditions of algal growth in open ponds is likely difficult to accomplish. On the other hand, closed systems, photobioreactors, entail considerably higher production costs, overall, rendering biodiesel from algal oils economically less competitive. Another issue is that little to no information is available on the content of algal oils and the biodiesel fuels derived from them regarding the heteroelements sulfur, phosphorus, calcium, magnesium, sodium, and potassium. These six elements are limited in biodiesel standards due to their detrimental effect on combustion and exhaust emissions control technologies besides possible effects on storage stability. Therefore, information on this issue is also crucial if algal biodiesel fuels are to become commercially viable.

- 1) Quais são as principais questões que devem ser levados em conta na produção de biodiesel?

As principais questões na produção de biodiesel é a mudança do uso da terra, alimento versus combustível, disponibilidade de matéria-prima, potencial de produção e as propriedades do combustível.

- 2) Descreva as desvantagens quanto às propriedades de biodieseis produzidos a partir de algas.

Os biodieseis derivados de alga possuem mal fluxo à frio e baixa estabilidade oxidativa simultaneamente.

- 3) Quais fatores devem ser controlados na produção de biodiesel a partir de algas para obtenção de produtos com propriedades adequadas?

A produção de algas depende de fatores como temperatura, intensidade de luz e nutrientes, os quais incluem o CO₂. Pequenos desvios destas condições podem levar a produtos menos favoráveis.

- 4) Quais as vantagens e desvantagens dos sistemas de produção de biodiesel a partir de algas em fotobioreatores?

O controle das condições de produção são mais facilmente conseguido em fotobioreatores do que em lagoas abertas. Por outro lado, sistemas fechados, como fotobioreatores, implicam em maiores custos de produção, em geral, tornando o custo de biocombustível derivado de algas menos competitivo economicamente.

- 5) Quais heteroelementos podem estar na composição de biodiesel de algas e que problemas são associados à presença dos mesmos?

Os heteroelementos que podem estar na composição de biodiesel de algas são enxofre, fósforo, cálcio, magnésio, sódio e potássio. Estes elementos podem ter efeito nocivo na combustão e em tecnologias de controle de emissão além de possíveis efeitos na estabilidade de armazenamento.