High Temperature Gas Chromatographic Analysis of Chlorella Vulgaris

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Abstract and Objectives
The objective of this study was to assess the potential for algae of the variety *Chlorella Vulgaris* to be made into a jet fuel. This was be done by measuring the amount and type of acylglyceride molecules in a sample of algae oil using a gas chromatograph (GC). The chromatograph separated the samples based on volatility (e.g., boiling point) of the species present. This data, when compared to known materials run on the gas chromatograph, provides information as to the composition of components which can be used as fuel. In addition, the acylglycerides underwent a transesterification process to further analyze fatty acid chain length and structure. The fatty acid methyl esters (FAMEs) created were analyzed using a gas chromatograph with a mass spectrometer (GC-MS).

GC FID Acylglyceride Analysis
• Attempt to quantify the mono-, di-, and triglyceride content of algae oil sample
• Ran standards to determine regions of volatization for mono-, di-, and triglycerides
• Use GC equipped with flame ionization detector (FID) to determine mass flow out of the column
• Found area under curve which corresponds to mass
• Able to roughly determine mono-, di-, and triglyceride content
• Oil content changes over growth cycle

Glyceride Content

Conclusions
• Mono-, di-, and triglyceride content of an algae oil sample can be determined through a high temperature gas chromatographic method with an FID
• The composition of the oil varies greatly over the course of the algae’s life cycle with most triglycerides on the last day
• The fatty acid chains of acylglycerides can be converted to FAMEs and examined using a GC-MS
• Results indicate that omega-3 oils are abundant in algae oils