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Conversion and recovery of saponifiable lipids from microalgae using a nonpolar solvent via lipase-assisted extraction

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Abstract

A single-step method for transesterifying and recovering lipids in concentrated slurries (ca 20% w/w solids) of ruptured microalgae is presented. A soluble *Rhizomucor miehei* lipase (RML) was used to directly transesterify the lipids in the marine microalgae *Nannochloropsis salina*. This allowed both triglycerides (TAG) and polar saponifiable lipids to be recovered as fatty acid methyl esters (FAME) using a nonpolar solvent (hexane). Up to 90 wt.% of the total saponifiable lipids (SL) were converted to FAME within 24 h, approximately 75% of which was recovered in the hexane by centrifugation. Two pathways for the conversion and recovery of polar lipids were identified. The water in the slurry buffered against potential lipase inhibition by methanol, but necessitated a high methanol dose for maximal FAME conversion. Nonetheless the method enables the recovery of polar lipids as FAME while avoiding the need for both drying of the biomass and a downstream transesterification step.

Key words

Lipase; transesterification; microalgae; wet lipid extraction; EPA

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