Abstract

As an oil refinery, a biorefinery uses all biomass components for obtaining high value usable products. Besides lipids, microalgae biomass contains significant amounts of proteins, carbohydrates and other metabolic products. In the present study, the authors define routes to obtain monosaccharides and lipids from microalgae biomass of Amphipora sp. and Navicula sp., through the implementation of acidic cellular disruption procedures, Soxhlet extraction, Organosolv pretreatment, in situ transesterification and the dinitrosalicylic acid method (DNS). The routes were defined and compared based on the percentage of lipids and monosaccharides obtained. For acid hydrolysis – Soxhlet extraction route several times of acid hydrolysis and extraction were evaluated, the best results for this route were obtained using times of 120 and 960 min, respectively. By Organosolv - extraction Soxhlet route, the best lipid efficiency obtained was 48% and in situ transesterification the highest percentage of total reducing sugars was 1.67%wt. Furthermore, kinetic parameters were determined related to the system of cell lysis and in situ transesterification for Navicula sp., getting constants K=0.0003 min⁻¹ for reducing sugars and K=0.02 min⁻¹ for degradation products. Using infrared spectroscopy compared the absorption peak of carbonyl group characteristic of biodiesel over time. Among Organosolv - Soxhlet extraction routes and in situ transesterification - Soxhlet extraction showed higher production of lipids and monosaccharides, respectively.

Keywords

Pretreatment, extraction, process integration, reducing sugars.