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Oil Extraction from Microalgae Dunalliela sp. by Polar and Non-Polar Solvents

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Abstract : Microalgae are tiny photosynthetic plants. Nowadays, microalgae are being used as nutrient-dense foods and sources of fine chemicals. They have significant amounts of lipid, carotenoids, vitamins, protein, minerals, chlorophyll, and pigments. Oil extraction from algae is a hotly debated topic currently because introducing an efficient method could decrease the process cost. This can determine the sustainability of algae-based foods. Scientific research works show that solvent extraction using chloroform/methanol (2:1) mixture is one of the efficient methods for oil extraction from algal cells, but both methanol and chloroform are toxic solvents, and therefore, the extracted oil will not be suitable for food application. In this paper, the effect of two food grade solvents (hexane and hexane/ isopropanol) on oil extraction yield from microalgae Dunaliella sp. was investigated and the results were compared with chloroform/methanol (2:1) extraction yield. It was observed that the oil extraction yield using hexane, hexane/isopropanol (3:2) and chloroform/methanol (2:1) mixture were 5.4, 13.93, and 17.5 (% w/w, dry basis), respectively. The fatty acid profile derived from GC illustrated that the palmitic (36.62%), oleic (18.62%), and stearic acids (19.08%) form the main portion of fatty acid composition of microalgae Dunalliela sp. oil. It was concluded that, the addition of isopropanol as polar solvent could increase the extraction yield significantly. Isopropanol solves cell wall phospholipids and enhances the release of intercellular lipids, which improves accessing of hexane to fatty acids.

Keywords : fatty acid profile, microalgae, oil extraction, polar solvent
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