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Abstract

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Lipid valorization from liquid fish-cannery by-products

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Fish-canning industry generates large amounts of by-products, both solids and liquids, which may generate a serious environmental problem, due to their rich organic content. Solid by-products can represent between 40-70% of the animal and are usually sold to feed producers, whereas liquid by-products are discarded.

Therefore, there is a growing need for efficient treatment methods for the liquid by-products generated, so that they can be securely released in the environment. Additionally, such treatment processes may also target the recovery of specific valuable products (e.g. lipids rich in ω -3 fatty acids), thus becoming a relevant source of revenue to the companies, since these components are important functional ingredients for food industry.

This research was born from the growing interest in obtaining new sources of ω -3 lipids, combined with environmental concerns related to the large generation of liquid by-products from the fish canning industries, rich in these compounds. The goal is to evaluate methodologies for the environmental and economically sustainable extraction of ω -3 lipids from those liquid by-products, targeting the obtainment of new functional ingredients for food industry.

Physic-chemical extraction methods were selected, as they link the reduced utilization of organic solvents with temperature and/or pressure, in an improved and more environmentally friendly solution. In this study lipids were extracted by processes combining physical (temperature and pressure) and chemical (food grade solvents) parameters, as well as with a process with a previous enzymatic extraction step. Economic and environmental evaluations were also applied through Life cycle assessment (LCA), used to evaluate the environmental performance and costs indicators for each process. Results indicated extraction with high hydrostatic pressure as the most suitable for lipid recovery, as it presents the lowest impact per kg of lipids obtained. Results obtained for the economic analysis were similar to the environmental evaluation.

Keywords: fish by-products, lipids, green extraction, ω -3 polyunsaturated fatty acids