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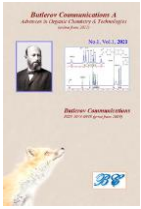

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# Hydrolytic extraction of squalene from amaranth oil

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## Abstract

Recently, the need for wide use of squalene both in functional foods and in medicine for the prevention and treatment of many diseases, such as osteoporosis and cancer, has been realised. The direction of developing vaccines, in particular from COVID-19, in which squalene is used as an adjuvant and immunotropic reagent, seems promising. An alternative source of squalene, as opposed to deep sea shark liver, is amaranth oil, one of the oldest food crops. This paper describes an attempt to accelerate the hydrolytic extraction of squalene from amaranth oil by using a homogeneous reaction mixture based on alcohol, a non-polar solvent such as hexane and water in various ratios. It is shown that homogenization of the reaction mixture, in contrast to the established concepts of chemistry and chemical technology based on the law of mass action, does not lead to acceleration of the hydrolysis process. Complete consumption of alkali occurs within three hours as in the case of heterogeneous processes. An analysis of the composition of the extract was carried out. It was determined that the average concentration of squalene in the extract during alkaline hydrolysis in a homogeneous medium is 30-50% depending on the solvent ratio, the yield is 40-60%, which is comparable to the results of molecular oil distillation coupled with superfluid extraction, but technologically easier. Factors influencing the process of hydrolytic extraction of squalene from the mixture used for homogenization are considered, among which it is necessary to highlight the parallel flowing transetherification of fatty acids and the formation of nanoparticles of complex structure, micelle-type, subject to distribution in hydrophilic and hydrophobic environments.

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