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Purification and function of EPA and DHA in tuna fish oil

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Tuna is deep sea fish, fish oil rich in omega-3 polyunsaturated fatty acids, especially in rich of docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA) with high biological activity, and DHA is called of "brain gold". The tuna crude fish oil is full of impurities, deep colour and high degree of oxidation in traditional extract methods. Besides, the post-processing technology was complicated, and it`s not only pollutely but destroy unsaturated double bond by using of strong acid and alkali. In china, tuna oil products market started relatively late, and product is poor of quality, so it`s market potential is large. Tuna production runs huge every year, the process of production and processing will produce a large number of scraps. In order to improve the efficiency of the use of fish oil, this research is selection of tuna crude fish oil as raw material, the result is as follows: Firstly, the tuna raw fish oil fatty acid composition and content are analyzed; the physicochemical property, protein content and heavy metal content are measured. The results show that tuna oil is rich of DHA(23.89%) and EPA(5.11%), Polyunsaturated fatty acid is content of 42.99%. Moisture and volatile matter content in the raw fish oils are very low, which is 0.78% and 1.12%, and the acid value and peroxide value is high, which is 18.41mg/g and 15.36mg/g. Raw fish oils is without detection of mercury, arsenic, lead and other heavy metals. Secondly, in order to explore effective ways to refine fish oil and establish rapid detection technology, supercritical CO2 extraction was used to refine raw fish oil. Rely on the existing evaluation indexes of oil oxidation degree, electronic nose and headspace-solid phase micro-extraction (HS-SPME) coupled with gas chromatography-mass spectrometry (GC-MS) was used to analyze the volatiles of tuna fish oil which was extracted differently. The results show that the AV and POV of the products of fish oil meet the requirements of industry standard, and the AV is the lowest by 32^{0}C, 20MPa, the POV is the lowest by 32^{0}C, 30MPa as well as by 40^{0}C, 20MPa and electronic nose can be sensitive to detect the volatiles` change of fish oil. The volatiles of crude fish oil, and which were tested by 32^{0}C, 20MPa, 32^{0}C, 30 MPa and 40°C 20MPa were significantly different by PCA and LDA methods. Thirdly, the technology of enrichment of ω-3 fatty acids from fish oil with molecular distillation was studied. The total content of ω-3 fatty acids of the product and the product yield of heavy separator is 70.78% and 10.1%, respectively, processing with three stage molecular distillation. It is not obvious the oxidation degree of monounsaturated fatty acid influenced by reaction time in the reaction of ethyl ester of fish oil. But which can improve the oxidation degree of polyunsaturated fatty acids. Lastly, enrichment of molecular distillation and purification of fish oil ethyl ester in vitro culture of human colon cancer cells HT-29 was studied. After 24 hours, the inhibition rate of HT-29 cells increased significantly with the increase of the fish oil concentration. When the fish oil concentration is 150 μg/mL, the apoptosis rate of cell is 21.49%, and it blocks the cell cycle in G0/G1 phase.

Biography

Su Xiurong graduated from Northeast Normal University bachelor's degree in biology, in 2008, graduated from Nanjing Agricultural College of Food Science and Engineering obtained doctorate degree. 2004 at the University of San Francisco and the University of Eastern New Mexico, in 2013 at Cornell University senior visiting scholar.

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