Oxidative Kinetics of Salmon Oil in Nanoemulsion

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Polyunsaturated fatty acids of omega-3 series (n-3 PUFA), especially long chain eicosapentaenoic (C20:5 n-3, EPA) and docosahexaenoic (C22:6, DHA) fatty acids, exert strong positive influence on human health. At present, fish oil is the major source of omega-3. PUFA are highly susceptible towards oxidative deterioration because of their degree of unsaturation. Lipid oxidation is a highly deteriorative process in foods, as it leads to unacceptable properties for the customers and a loss in nutritional value. Since antioxidants, protect PUFA from oxidation damage.

Objective of this study is to prepare and characterize the different formulation of salmon oil and nanoemulsion composed of salmon oil and marine lecithin with or without antioxidant.

We prepared the different formulations of nanoemulsion with or without antioxidants (α-tocopherol and quercetin) by high-pressure homogenization (1700 bars). Different methods used for the assessment of lipid oxidation measure the different nanoemulsions like as conjugated diene, polyene index and infrared spectroscopy. The oxidative stability of nanoemulsion was compared with different formulations of salmon oil used as control. The particle sizes of different nanoemulsions stabilized by salmon lecithin were measured by dynamic light scattering using a Malvern Zetasizer Nano ZS.

The results showed that crude salmon oil was better protected by their natural antioxidants (α-tocopherol and astaxanthin). In addition, we observed that α- tocopherol react as a prooxidant at 0.2% and quercetin was the most efficient antioxidant in salmon oil bulk. The use of marine phospholipids as emulsifiant in nanoemulsions preparation increases remarkably the stability of salmon oil against oxidation with an increase of LC-PUFA availability especially the DHA. The particle size of nanoemulsion varied between 160-207 nm according to nanoemulsion formulation. We observed that all nanoemulsions stored at 20°C remains more or less stable throughout 30 days. At 30°C, droplet si zes increase rapidly from 9_{th} day except for emulsion composed with marine lecithin which remains stable throughout 30 days.