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The Ability of Oxygen Scavenging Packaging to Inhibit Vitamin Degradation and Lipid Oxidation in Fish Oil-in-Water Emulsions

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Abstract

The impact of commercial oxygen scavenging packaging on lipid oxidation in fish oil-in-water (O/W) emulsions and vitamin degradation was determined. Oxygen scavenging packaging effectively reduced dissolved oxygen concentration in buffer (pH 3, 5, and7) by greater than 95% as measured by an oxygen fluorometer over 3 days at 32°C. Lipid oxidation in emulsions, as measured by lipid hydroperoxides and thiobarbituric acid reactive substances (TBARS), was effectively inhibited by oxygen scavenging packaging regardless of pH (3 and 7), fat concentration (1 and 20%), or in the presence of sodium chloride (0 and 250 mM). Analysis of ascorbic acid and α-tocopherol degradation demonstrated that the oxygen scavenging packaging was able to protect both water and fat-soluble vitamins. This work suggests that active packaging can sufficiently reduce oxygen levels in O/W emulsions to greatly extend the oxidative stability without the addition of exogenous antioxidants.

Industrial Significance

Increased pressure by consumers to remove food additives requires innovative solutions to maintain the shelf life of foods and minimize food waste. Active packaging that reduces