

ORGANOGELEATION – A NEWER TECHNOLOGY TO DEVELOP DESIGNER ICE CREAM

S. Banupriya, A. Elango N. Karthikeyan and C. Kathirvelan*

Department of Livestock Product Technology

Veterinary College and Research Institute

Namakkal- 637 002

E-mail: kadhirc@gmail.com (**Corresponding Author*)

Abstract: Organogelators have been of great interest to food, drug, cosmetics and petrochemical industries because of their particular ability to structure oils. Oleogel technology is a technique that has recently been successfully applied for saturated fatty acid replacement by polyunsaturated ones. In the food industry, waxes have been used as release agents in bakery and confectionery, coating for fruits, vegetables and cheese and in the formulation of chewing gums, defoaming agents and microcapsule for flavours. Rice bran wax has been shown to have a potential for application in the food industry as an oil structuring material. Ice cream is usually high in fat content (10-14 per cent) and hence formulating low fat dietetic versions will help in restricting the fat intake and make it healthier.

Keywords: Organogels, Rice bran wax, Ice cream, Food Industry.

Introduction

Organogels are solid-like materials with features and rheological properties of a solid but with a greater part of its composition being a liquid (98 per cent). Organogels not only differ in the type of structurant but also in the general structuring concept that will control the solvent gelation. Edible oil is an example of an organic solvent that can be gelled with relatively low concentration of organogelators. Organogelators have been of great interest to food, drug, cosmetics and petrochemical industries because of their particular ability to structure oils.

Several reviews have described the different types of organogelators to structure lipid materials that are suitable for food application. Among them are fatty acids, fatty alcohols, wax esters, monoacylglycerols, phospholipids, sorbitan esters, phytosterols and more recently ceramides.

Oleogel technology (for example, use of organogelating agents to provide liquid edible oils with solid-like properties) is a technique that has recently been successfully applied for

*Received March 31, 2016 * Published June 2, 2016 * www.ijset.net*

saturated fatty acid replacement by polyunsaturated ones. According to Daniele *et al.* (2013b), rice bran wax (RBW) oleogels were effectively emulsified into ice cream mixes, promoting the formation of small gelled fat droplets, as well as showing sufficient protein absorption on oil-water interfaces and successive displacement by competitive surface-active agents. In addition, RBW oleogels enhanced air incorporation and structure formation upon freezing, behaving more like crystallized than liquid lipids.

Applications

Organogelators have been of great interest to food, drug, cosmetics and petrochemical industries because of their particular ability to structure oils, different food grade organogelators have been identified and studied. Rogers (2008) has suggested the potential use of organogel to prevent oil migration in fat based foods.

Waxes have been extensively used in many industrial sectors due to distinct properties such as hygroscopicity, slipperiness, polishing properties, transparency, adhesiveness, gelling and many others. In the food industry, waxes have been used as release agents in bakery and confectionery, coating for fruits, vegetables and cheese and in the formulation of chewing gums, defoaming agents and microcapsule for flavours. The waxes listed in the food additive status list by Food and Drug administration are: beeswax, borax, candelilla wax, carnauba wax, petroleum wax, paraffin wax and rice bran wax.

Rice bran wax

Rice bran wax is a natural wax found in crude rice oil. With the increased consumption of rice bran oil due to its health benefits there is also an increase in interest in production of RBW as a by-product from rice oil. RBW has been shown to have a potential for application in the food industry as an oil structuring material.

Ice cream

Ice cream is one of the favoured desserts in Indian palate and it is a delicious, wholesome nutritious frozen dairy product, which is relished by all age groups. Ice cream is a rich source of energy and provides about 180-250 kcal/100g. Further, milk fat is composed of saturated fats and cholesterol to complicate the matters for health conscious consumers and people suffering from coronary heart diseases and/or diabetes. Ice cream is usually high in fat content (10-14 per cent) and hence formulating low fat dietetic versions will help in restricting the fat intake and make it healthier.

Low saturated fat ice cream

Flaxseed oil contains mostly of omega-3 (ALA) and partly of omega-6 (LA) fatty acids. Consumption of omega-3 fatty acid is proven to decrease the incidence of cardiovascular disease, reduce inflammation and prevent certain chronic diseases such as diabetes, hypertension, cancer, autoimmune diseases and arthritis.

Braun and Cohen (2007) reported that the metabolic actions of omega-3 fatty acids may be helpful in inhibiting various medical complications from deterioration and for treatment. Omega-3 fatty acids have anti-atherogenic of coronary artery, anti-proliferative of tumor, lipid lowering and other health beneficial effects. For hyperlipidemia patients, omega-3 fatty acids could reduce their low-density lipoprotein (LDL). However, for healthy individuals and hyper triglyceridemia patients, omega-3 fatty acids lower serum triglycerides and may slightly increase high-density lipoprotein (HDL).

Flaxseed oil which is rich in nutraceutical omega-3 fatty acid has been reported to be a beneficial substitute for milk fat in ice cream. Furthermore, the low temperature storage condition of ice cream is ideal for flaxseed oil incorporation as it stabilises the oil and preserves its original goodness. Lowering fat content in ice cream is achieved by using less of the original fat level or substituting fat with fat mimetics. In low-fat and fat-free ice creams, milk fat is replaced by fat mimetics, which cause changes in texture and affect perceptibility parameters.

Low-fat ice cream usually tends to have a lower flavour impact because fat is not available to promote the flavour and both stabilizers and fat mimetics used could bind elements of the flavorings making them unavailable to the palate. In other words, ice cream technologists may need to increase sweeteners and flavour levels to overcome the problem in many low-fat systems.

References

- [1] Braun, L and Cohen, M. 2007. Herbs and Natural Supplements: An Evidence-Based Guide. Elsevier Australia, pp. 316-318.
- [2] Daniele, C, A.G. Marangoni, A, Smith A.K and H.D. Goff. 2013b. Development of formulations and processes to incorporate wax oleogels in ice cream. *J. Food Sci.*, **78**:1845–1851
- [3] Dzisiak, D. 2004. New oils reduce saturated and *trans* fats in processed foods. *Cereal Foods World.*, **49(6)**: 331-333

- [4] Goff, H.D. 2006. Ice Cream: Advanced Dairy Chemistry, Lipids. 3rd ed. Springer: New York (NY). pp. 341- 350.
- [5] Rogers, M.A. 2008. Nanostructuring fiber morphology in organogels and the development of a food grade organogelator. Ph D. Thesis. University of Guelph.