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Popular Article

Oleogels, Potential Application in food and dairy Industry.

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Abstract

Oils and fats are frequently employed in food formulations to enhance the nutritional value and several other aspects of food product quality. For these purposes, solid fats derived from oils by procedures including hydrogenation, esterification, and fractionation are frequently utilized in a variety of meals. There is an increased consumer awareness towards the risk of saturated and trans fat and hence the oleogels are formed in which it's a class of gel made of a liquid organic phase (edible oil) immobilized by a 3-D network formed by an oleogelator. Oleogelators are now widely used in food and dairy industry for the substitution of replacement of solid fat.

Key words: Oleogels, dairy products, fats

Introduction

Fats and oils are irreplaceable component our diet because of several reasons like they serve as a source of energy, a vehicle for some essential nutrients (such as vitamins and vitamin precursors, bioactive chemicals, and a flavor carrier. Fat is important in giving mouthfeel, aroma, taste and flavor to a food or dairy product. The other methods for the production of solid fat results in saturated and trans fat which are not easily acceptable to consumers who are health conscious. Consumption of higher amount of saturated fatty acids increases the risk of cardiovascular diseases, obesity and diabetes (Muguerza *et al*., 2002). Long-term efforts have been made in the food business to reduce the level of saturated and trans fatty acids due to their harmful effects. So, evolution of novel technologies for the lipid structuring results in the formation of oleogels.

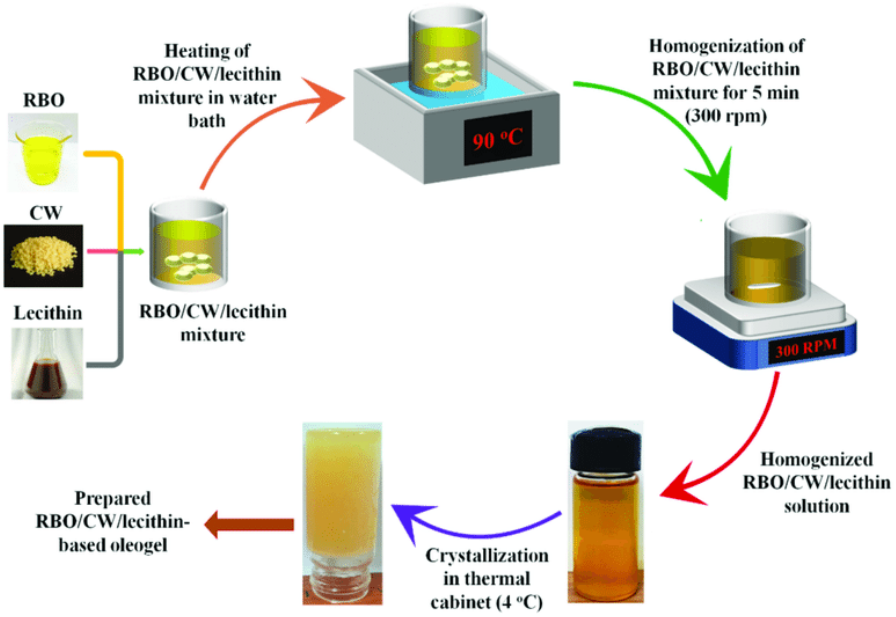
Oleogels are structured oils made by oleogelating liquid oil using oleogelators like vegetable waxes, monodiglycerides, alcohols or esters of fatty acids, phospholipids, and phytosterols (Pérez-Monterroza *et al*., 2014). Oleogel can be used to improve product quality by preventing or significantly reducing fat migration that contributes to fat bloom, raising the melting point of chocolate or products derived from chocolate, and lowering the saturated fatty acid content of the corresponding products. Oleogels appear to be a promising element with potential industrial applications when taking into account those favourable effects on the quality of food products.

What are oleogels?

The process of turning liquid oils into a gel-like structure is termed as organogelation or oleogelation. Oleogels are complex microstructured systems that trap an organic liquid inside of a thermo-reversible, three-dimensional gel network (Hinze *et al*., 1996). New techniques for structuring vegetable oil were therefore necessary. Oleogelation has become more significant as a result of these procedures since it transforms liquid oil into a gel-like structure without altering the chemical qualities of vegetable oil. Simply, oleogels means the product formed by converting a liquid oil in to a gel like product.

Production method of oleogels

General method of production of oleogel includes melting oleogelators, heating oils to oleogelators' melting temperatures, combining oleogelators and oils, and cooling the gels that are created. Method of production of Rice bran oil/Candelilla Wax/lecithine based oleogel is depicted in figure 1 (Sahu *et al*., 2021).



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Applications of oleogel in food and dairy industry.

The primary goal of employing oleogels in the food industry is to reduce saturated fatty acid content because excessive consumption of these fats has been linked to a number of health issues, including obesity, cardiovascular disease, metabolic syndrome, and diabetes. Oleogels are used as a fat substitute in food products like cake, biscuit etc and they help in preventing oil migration from food. Other food and dairy applications are given in table 2.

Table 2- Food and dairy applications of oleogels

Food	Oleogelator used	Oil	Concentration of oleogelator	Substituted food component, SFC (ratio of oleogel:SFC)	References
Cookies	Candelilla wax	Canola oil	3.0% and 6.0% of oil (w/w)	Shortenings (30:70, 60:40)	Mert & Demirkesen (2016a)
Chocolate paste	Shellac wax	Rapeseed oil	1.5% of chocolate paste (w/w)	as oil binder (27:73)	Patel *et al.* (2014a)
Cakes	Methyl cellulose, Xanthan gum	Sunflower oil	0.67% and 1.33% of oil (w/w), 1.0% of oil (w/w)	Shortening (100:0)	Patel *et al.* (2014b)
Spreads (Breakfast, margarine)	Carnuaba wax	olive oil	3.0%, 7.0% and 10.0% of oil (w/w)	-	Ogutcu & Yilmaz (2014)
Ice cream	Rice bran wax	High oleic sunflower oil	10.0% of oil	Butter (100:0)	Zulim Botega *et al*. (2013a)
Cream cheese	Rice bran wax, Ethylcellulo se	Soybean oil High oleic soybea n oil	10.0% of oil	Milk fat (100:0)	Bemer *et al.* (2016)

Conclusion

An oleogel is a class of gel made of a liquid organic phase immobilized by a three-dimensional network formed by an oleogelator. The commonly used oleogelators are Tri acyl glycerides, Diacyl glycerides, Monoacylglycerides, fatty acids, fatty alcohols, waxes, wax esters and sorbitan monostearate. Oleogels in foods helps in Replacing trans fats without increasing the amount of saturated fats in it. Oleogels are the new trend in food and dairy industry.

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