

# A stabilising influence

Traditionally, the addition of emulsifiers to improve the texture of ice cream has been to the detriment of taste. Abbot Chong at Riken examines the introduction of new mixes that have been created to enhance ice cream formulas, while retaining the anticipated taste.

**E**mulsifiers are surface-active agents that function at the interface between fat and plasma to reduce surface tension. In ice cream, emulsifying agents play a critical role in improving the whipping quality of the mix. This improves the freezing ability of the product and gives a smoother texture to the palate.

Common ice cream ingredients, such as milk and egg, contain natural emulsifiers. However, by adding additional amounts the product is enhanced with properties such as dryness during extrusion and better shape retention.

## Smooth operator

Stabilisers are normally added to ice cream to manage the aqueous phase of the ice cream mix. They function by binding with water to form a gel. The primary purpose of stabilisers is to produce smoothness in the body and texture of ice cream, to retard ice crystal growth during storage and to provide uniformity of product and resistance to melting. A wide range of stabiliser substances are being used in ice cream such as agar, sodium alginate, gelatin, guar gum, carrageenan and CMC. The usual dosage of stabiliser in ice cream is 0.2 to 0.3 per cent.

A combination of stabilisers and emulsifiers has traditionally been used in ice cream manufacturing to impart functional qualities to the finished product such as getting the desired overrun, dryer extrusion products, a smoother texture, better heat resistance and slower melt-down. The right combination of stabilisers and emulsifiers is usually more effective than a single stabiliser material used alone. It is thought that the combination brings about enhanced functionality through synergism. The use level of stabiliser-emulsifier mixes is relatively small (usually 0.4 to 0.6 per cent). It performs a critical function for manufacturing, storage and distribution as well as the quality of the ice cream.

## A matter of taste

The modern consumer considers the taste of ice cream to be the chief priority when choosing a product. Many consumers treat ice cream as an indulgent item. There was brief spate of popularity for low-calorie, low-fat ice cream, but this has recently been on

### The RIPLEX Series

The RIPLEX series is a series of EDPS ice cream stabiliser-emulsifier mixes produced by the Riken group, using the unique particle building technology of EDPS. This type of mix has excellent dispersibility and will readily hydrate in ice cream. The powder is non-dusty, non-caking and non-hygroscopic, so particle segregation during transport and storage is not a problem.

- ❖ RIPLEX IF-22 is the stabiliser-emulsifier mix of choice for use in standard ice cream using vegetable fat, milk fat or a mixture of both. It gives good extrusion properties, excellent shape retention and heat shock protection.
- ❖ RIPLEX IS-10 is recommended for premium grade ice cream, where good flavour release and smoothness of texture is a top priority.
- ❖ RIPLEX SF-36 is specially formulated for sorbets and sherbets.

All products in the RIPLEX series are certified kosher, halal, label-friendly and are made in an ISO 9000 quality system certified plant.

the wane. Ice cream manufacturers are increasingly demanding that stabiliser-emulsifier mixes are user friendly, high performance, low cost and have good technical support.

The choice of stabiliser-emulsifier mix depends on a number of factors. The desired powder characteristics are that they are free-flowing and non-hygroscopic. During ice cream production the powder should be non-dusty and easily dispersed into ice cream mix. The effect of a powder on the mix viscosity can be a major concern in some production set-ups. The effect of overrun during freezing and the quality of the body and texture are key to determining the performance levels of ice cream. The product needs to have storage stability or heat-shock resistance. Characteristics such as good shape retention and resistance to melting are especially sought after in many markets. The rheological traits and dryness of ice cream are critical during the moulding and packaging stages. Extruded ice cream needs to be sufficiently dry and firm prior to packing.

The price of a stabiliser-emulsifier mix is of major concern to most ice cream manufacturers. If products are sold at a low price, without a sufficient profit margin, they will not have a long life in the market. Likewise, an over-priced product will force the customer to look for alternatives.

Comparisons of different stabiliser-emulsifier types

POWDER CHARACTERISTICS	STABILISER-EMULSIFIER TYPE		
	DRY BLENDED	SPRAY-COOLED	EDPS
Dispersibility	Poor	Good	Excellent
Emulsifier-stabiliser ratio	No limitation	30% or less stabiliser	No limitation
Lumpiness	Frequent	Seldom	Seldom
Dustiness	Yes	No	No
Small-scale production	Possible	Difficult	Possible
Production cost	Low	High	Moderate

**Make do and blend**

Ice cream manufacturers have the choice of whether to blend their own mix of stabilisers and emulsifiers, or to buy a ready blend. To create a mix in-house means having to invest in blend formulation research. A greater volume of material and machinery has to be purchased, resulting in higher overheads for storage and factory space. The weighing of ingredients, especially the smaller ones, during production is prone to error. Also, the self-blended stabiliser-emulsifier mix often disperses poorly in the ice cream mix, which might result in longer processing times and higher material wastage.

Purchasing an integrated stabiliser-emulsifier mix means not having to invest in blend formulation research. It also means buying and stocking a single product, with lower stock holding costs.

Weighing a single ingredient during production minimises error, and the dispersion of a well-researched specialist product is usually better than one created in-house.

There are two common types of ice cream stabiliser-emulsifier mix that are commonly available to ice cream manufacturers: dry-blended or spray-cooled.

❖ **Dry-blended**

This is the most primitive type of mix, where stabilisers and emulsifiers are simply blended together in a mixer. The resulting blend is a loosely mixed powder. The advantage of the dry-blended mix is that it can be economically produced in relatively small batch sizes with simple blending equipment.

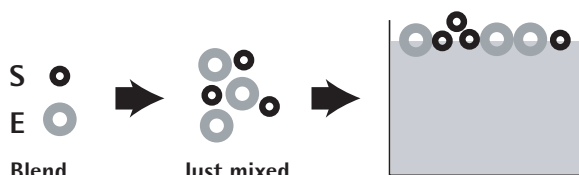
❖ **Spray-cooled**

During the manufacture of the spray-cooled blend, the stabiliser and emulsifier are mixed and spray cooled in a cooling tower.

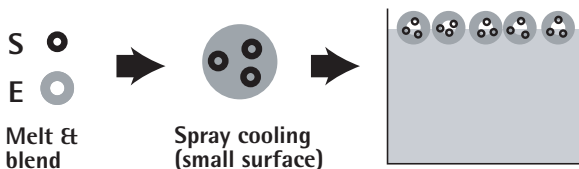
One of the key disadvantages of the spray-cooled type of integrated stabiliser-emulsifier mix is the limitation of the emulsifier-stabiliser ratio. The emulsifier needs to make up 70 per cent or more of the mix in order to fully enclose the stabiliser, so that spray-cooling becomes feasible.

There is now a new stabiliser-emulsifier mix called the Easily Dispersible Powder System (EDPS). Every powder particle of the EDPS stabiliser-emulsifier is of a uniform blend. When added to water or ice cream mix, each particle quickly absorbs water, resulting in rapid dispersion and hydration without lumping.

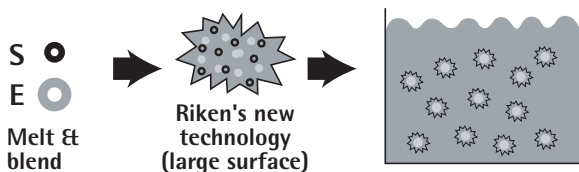
As with the dry-blended mix, it is economically feasible to produce a much smaller batch size. Customisation is possible, should a customer need a specialised stabiliser-emulsifier for their newly developed ice cream. This results in a stabiliser that is easily dispersible, with an optimum stabiliser-emulsifier ratio and economic production rates. EDPS provides ice cream manufacturers with a user-friendly, highly functional and low-cost mix, and consumers with a refined taste and smoothness of texture in the final product. ●



Creating a dry-blended mix



Creating a spray-cooled mix



Creating an EDPS mix