

Emulsifier/Sugar esters

RYOTO™ SUGAR ESTER

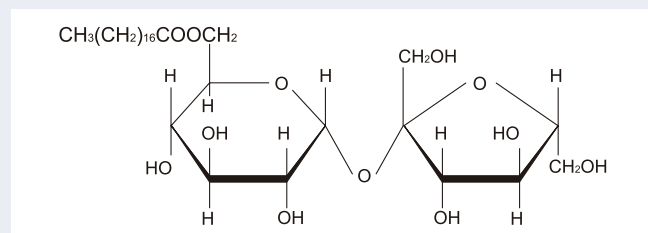


MITSUBISHI CHEMICAL CORPORATION
Food & Healthcare Department

Ryoto Sugar Ester is the trade name of sucrose fatty acid esters manufactured and distributed by Mitsubishi Chemical Corporation.

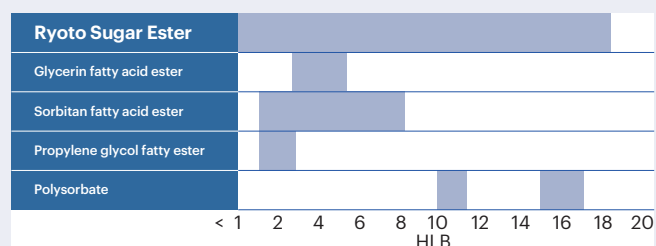
The sucrose molecule has eight hydroxyl groups, and so sucrose fatty acid esters from mono- to Octa- can be produced.

Chemical Structure of Sucrose Monostearate



Ryoto Sugar Esters are available with a wide range of HLB values (hydrophilic-lipophilic balance), controlled by the degree of esterification and the type of fatty acid used. Ryoto Sugar Esters offer a much wider range of functional properties than other emulsifiers.

HLB Values of Typical Food Additive Emulsifiers



Features of Ryoto Sugar Esters

Being tasteless, odorless and nontoxic, they are the best suited emulsifier for foods.

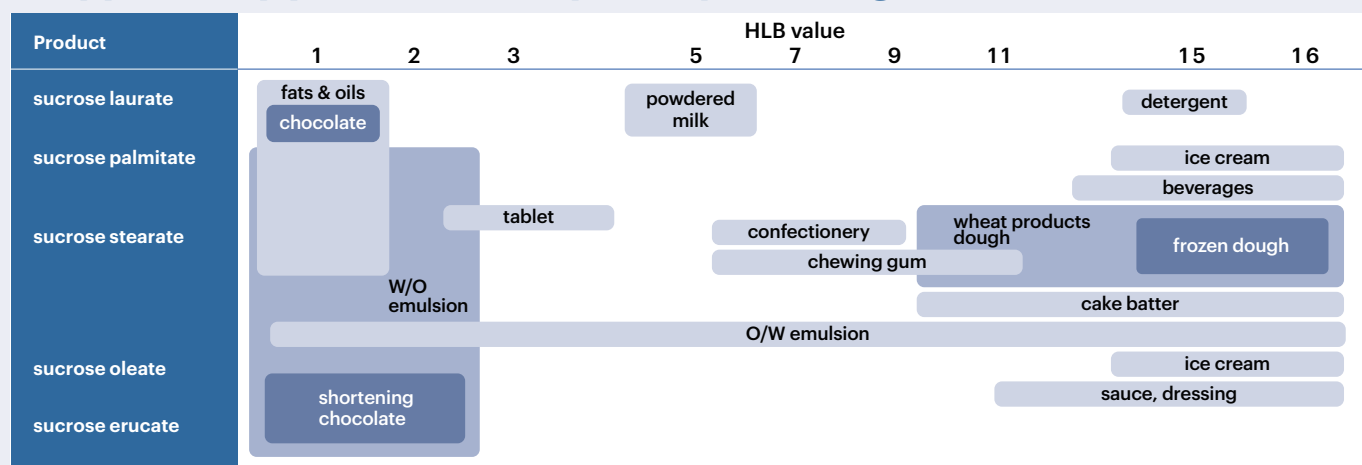
Sucrose esters offer a full range of HLB values from 1 to 16, and in use all grades display exceptionally good surfactant functionality.

Melting point

Type	melting point °C		
	starting point	peak point	ending point
B-370	48	79	83
S-170	58	66	69
S-370	49	53, 66	70
S-470	45	50, 66	69
S-570	36	51, 65	68
S-770	35	52, 65	68
S-1170	35	53	57
S-1670	38	53	58
P-1570	33	47	51

DSC method, heating rate 10°C/min

Typical Application Map of Ryoto Sugar Esters



Applications of Ryoto sugar Esters in Foods

Application	Ryoto Sugar Ester		Effect
	Type	Dosage	
(1) Wheat products			
Bread Muffin Doughnut	S-1170~S-1670 P-1570, P-1670	0.1~1.0% by weight of flour	Strengthens dough and increases mechanical resistance. Increases water absorption capacity at the kneading stage. Increases volume after baking, softens crumb, makes uniform cavities.
Frozen dough			Maintains softness of crumb after baking and lengthens the shelf life. Maintains the volume after baking and improves the textures, which are short soft, and melty.
Sponge cake	S-570~S-1670	0.3~1.0%	Prevents spoiling during refrigeration and improves the crumb after thawing and baking to make bread voluminous and soft.
Chinese dumpling Won ton	S-1170~S-1670	0.1~1.0%	Makes good cake volume with a uniform soft texture.
Biscuit Cracker Cookie	S-470~S-1670	0.1~1.0% by weight of flour	Reduces stickiness to the machine during manufacturing. Increases water content and yield. Makes easier handling by preventing dumplings from sticking to each other. Provides whiteness of skin.
Batter Breeding	S-570, S-1170~S-1670	0.2~1.0%	Makes stable emulsion of fatty materials and prevents stickiness to the machine. Prevents blooming even in high-fat biscuit products. Increases volume after baking and improves the grain and shortness.
Noodles	S-1170~S-1670 P-1570, P-1670	0.1~1.0%	Improves texture of strong crispness and voluminous appearance of fried products. Prevents denaturation of starches and proteins during refrigeration, and keeps fresh texture by inhibiting water migration.
Instant noodle			Prevents dough from sticking to the machine and noodles to each other. Increases water content and yield by decreasing the elution of starch into boiling water. Prevents retrogradation of boiled noodles during storage.
Pasta products			Prevents noodles from adhering with each other and produces α-starch uniformly. Shortens the time for noodles to soften and loosen in hot water.
Custard cream Flour paste	S-770~S-1670 S-270~S-570	0.1~1.0%	Works as dough conditioner, and prevents adhesion on cooking.
(2) Dairy products and substitutes			
Ice cream	S-770~S-1670 P-1570~P-1670	0.1~0.3%	Makes starch paste with a smooth and creamy texture, and prevents dehydration. Makes stable emulsion of fatty materials.
Coffee whitener	S-570~S-1670 S-070, S-170 P-170	0.2~1.0%	Controls fat demulsification on freezing, and so gives very good creamy and smooth eating texture; the best performing co-emulsifier with monoglyceride.
Whipping cream	All types	0.1~0.5%	Stabilizes emulsification to prevent feathering and separation of fats and oils. Prevents water release and improves dispersion in coffee. Prevents coarsening of fat crystals during storage at low temperatures and provides freeze/thaw stability.

Application	Ryoto Sugar Ester		Effect
	Type	Dosage	
(3) Processed fats and oils			
Fats and oils	S-070~S-270 P-170, L-195 B-370, POS-135	0.1~0.5%	Favourable influence on crystallization behaviour of solid fats: Controlled rate of crystallization produces a fine, smooth texture, which is well maintained during long storage. Also prevents separation of liquid oil phase from solid fats.
Shortening	S-070~S-270 O-170, POS-135 ER-290	0.1~10.0%	Highly functional emulsifier which gives improved creaming of the fat phase and better water holding capacity.
Margarine W/O emulsified fat	S-070~S-270 P-170,O-170 L-195,ER-290	0.1~0.5%	Very powerful for W/O emulsification. Can produce W/O emulsion with low fat content.
Chocolate	S-170~S-770 POS-135 ER-290 L-195, O-170	0.2~0.5%	Fat bloom retardation. Ganache quality improvement. Controls rate of crystallization. Viscosity control for suitable coating property. Improves snapping property and gloss. Increases heat resistance. prevents sugar blooming. prevents thickening.
O/W emulsified fat	S-170~S-1670	0.5~2.0%	Excellent O/W emulsifying capacity, readily forms a very finely dispersed oil phase and a stable emulsion over a wide range of O/W ratios.
(4) Other multiple foods			
Packed beverage	S-570~S-1670 P-1670	0.03~0.5%	Improves emulsion stability. Prevents the formation of rings, etc. Improves the quality of various canned beverages (coffee, chocolate, etc.) Protects beverages with dairy ingredients against protein denaturation and separation of fat phase.
Caramel Candy Nougat	S-470~S-1670	0.1~0.5%	Improves emulsification of molten sugar and oil, and prevents separation (blooming) of oil. Prevents adherence to the teeth, machine or wrapping paper. Gives crispness to those of hard type.
Chewing gum	S-570~S-1170	0.3~0.5%	Makes mixing of gum base easy. Increase chewing gum plasticity, softness and chewiness, and prevents adherence to the teeth during chewing. Improves emulsification and dispersion of flavors and increases the flavor insulating properties.
Tablet candy	S-370F, S-370FU, S-470F ,B-370F	0.5~1.5%	Increases fluidity of raw materials and efficiency of filling in the tableting machine. Makes separation of tablets easy and increases the yield. Makes products brighter.
Retort foods	All types	0.1~1.0%	Gives stable emulsion in retort sterilization and prevents oil separation. Reduces sterilization conditions. Prevents precipitation of contents and browning.
Spices Powered seasoning	S-270~S-370F B-370	0.5~2.0%	Prevents caking of hygroscopic powdered foods and improves fluidity. Makes dispersion to food easier.
Processed meats Surimi products	S-570~S-1670	0.3~1.0%	Improves water holding capacity of sausages and pressed ham and prevents separation of oil phase of such products as liver pastes and bolognus. Effective in improving water holding capacity and elasticity of fish pastes.

Types of Ryoto Sugar Ester

Product	Type	HLB value	Monoester Content	Form	Package
Sucrose stearate	S-070	Not more than 1	0%	Powder	20kg, Carton Box
	S-170	1	1%	Powder	20kg, Carton Box
	S-270	2	10%	Powder	20kg, Carton Box
	S-370	3	20%	Powder	10kg, Carton Box
	S-370F ¹⁾	3	20%	Ultrafine powder	10kg, Carton Box
	S-370FU ¹⁾	3	20%	Ultrafine powder	10kg, Carton Box
	S-470	4	25%	Powder	10kg, Carton Box
	S-470F ¹⁾	4	25%	Ultrafine powder	10kg, Carton Box
	S-570	5	30%	Powder	10kg, Carton Box
	S-770	7	40%	Powder	10kg, Carton Box
	S-970	9	50%	Powder	10kg, Carton Box
	S-1170	11	55%	Powder	10kg, Carton Box
	S-1570	15	70%	Powder	10kg, Carton Box
	S-1670	16	75%	Powder	10kg, Carton Box
Sucrose palmitate	P-170	1	1%	Powder	20kg, Carton Box
	P-1570	15	70%	Powder	10kg, Carton Box
	P-1670	16	80%	Powder	10kg, Carton Box
Sucrose myristate	M-1695	16	80%	Powder	1kg×5, Can
Sucrose laurate	L-195	1	1%	Waxy	16kg, Can
	L-1695	16	80%	Powder	5kg, Can
Sucrose behenate	B-370	3	20%	Powder	10kg, Carton Box
	B-370F ¹⁾	3	20%	Ultrafine powder	10kg, Carton Box
Sucrose oleate	O-170	1	1%	Liquid	16kg, Can
	O-1570	15	70%	Powder	5kg, Can
Sucrose erucate	ER-290 ²⁾	2	2%	Liquid	16kg, Can
Sucrose ester of mixed fatty acid	POS-135 ^{2,3)}	1	0%	Waxy	16kg, Can

1) S-370F, S-370FU, B-370F and S-470F are ultrafine powdered products of S-370, B-370, and S-470 respectively.

2) O-170, ER-290 and POS-135 contain small amount of tocopherol to prevent oxidation.

3) Fatty acid composing POS-135 contains palmitic acid:30%, oleic acid:40% and stearic acid:30%.

■ Sucrose Esters and the Requirements of Food Legislation

The use of sucrose fatty acid esters as food additives is governed by legislation in many countries of the world.

Sucrose esters are a very safe and harmless form of emulsifier, but customers must check the exact position carefully according to food product type and the requirements of local legislation before going ahead with any proposed application.

In the EU, only hydrophilic sucrose esters are approved as Sucrose Esters of Fatty Acids (E473).

In the USA, hydrophilic ones are approved as Sucrose fatty acid esters (CFR 172.859) and lipophilic sucrose esters are approved as Sucrose oligoesters (CFR 172.869).

In Japan, China, South Korea and Taiwan, all types of sucrose esters are approved.

Our Ryoto Sugar Ester products are mostly Halal and Kosher certified.

Mitsubishi Chemical Corporation will be glad to assist customers with enquiries about sucrose esters and food legislation.



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