

LECITHIN OVERVIEW

MULTIFUNCTIONAL, EFFECTIVE EMULSIFIERS, INSTANTIZERS, RELEASE AGENTS

Looking for nutritious ingredients that are versatile enough to function in a variety of formulations and applications? Look no further than ADM's comprehensive line of lecithins.

Put them to work as emulsifiers to promote even blending and mixing, as release agents to ensure clean separation, and as instantizers to help proteins and other materials disperse in aqueous systems.

Whatever your application or formulation needs, ADM has a lecithin for you.

EMULSIFYING

Lecithin is used in foods as a viscosity modifier, dispersant, and lubricant.

Typically, an emulsion is a suspension of small droplets of one liquid in another liquid with which it is incapable of mixing. Oil in water and water in oil are the two primary types of emulsions.

Lecithin's structure makes it an effective emulsifier for the interaction of water and oil. Phospholipids, the major component of lecithin, are partly hydrophilic (attracted to water) and partly hydrophobic (repelled by water). Lecithin's ability to simultaneously interact with oil and water makes it an effective emulsifier.

KEY BENEFITS

- Simultaneously interacts with oil and water to help form a stable emulsion
- Promotes even blending and mixing
- Facilitates even ingredient distribution

When introduced into a food system, an emulsifier such as lecithin helps maintain a stable emulsion between two unmixable liquids. It decreases the surface tension between the two liquids and allows them to mix and form a stable, heterogeneous dispersion.

CONFECTIONERY

- Promotes even blending of all ingredients
- Increases softness and decreases tackiness in chewing gum
- Prevents sticking

BAKED GOODS

- Ensures even mixing
- Facilitates moisture retention
- Egg yolk sparing agent
- Improves crumb texture in cakes

REDUCED-FAT BAKED GOODS

- Improves moisture retention
- Increases shortening effect
- Decreases stickiness of doughs

DAIRY PRODUCTS

- Enhances structure and firmness of whipped products
- Improves dispersibility in coffee whiteners

SNACK FOODS

- Facilitates even distribution of ingredients
- Improves texture and mouthfeel

CANNED FOODS

- Reduces fat cap during retort process
- Helps bind fat and keep it in suspension

INSTANT FOODS

- Improves dispersal of high-fat powders
- Enhances hydration of high-protein ingredients



For customers around the world, ADM draws on its resources—its people, products, and market perspective—to help them meet today's consumer demands and envision tomorrow's needs.

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RECOMMENDED ADM LECITHINS

Yelkin® lecithin: A series of standardized lecithins that helps retain moisture and emulsify.

Ultralec® lecithin: ADM's exclusive, ultrafiltered, deoiled lecithin is used in hydrophilic instantizing applications, and it provides excellent emulsification properties in reduced-fat and flavor-sensitive applications.

Beakin™ lecithin: A series of complexed lecithin products with low viscosity, sprayable at ambient temperature and used in lipophilic instantizing applications.

Performix™: blends are excellent oil in water emulsifiers with a high HLB. Performix E is an ideal product for applications that include instantizing fatty powders, such as milk powders and calf milk replacers.

EMULSIFYING METHODS

- Mechanical mixing with a high-shear mixer
- High-pressure homogenization
- Sonic vibration
- Static mixing
- Colloid milling



HLB Table for ADM Lecithin

Water in Oil (1-6)			Water in Oil or Oil in Water (6-8)				Oil in Water (8-12)				
1	2	3	4	5	6	7	8	9	10	11	12
Favors Water-in-Oil Emulsions								Favors Oil-in-Water Emulsions			
	BEAKIN LV3	BEAKIN LV1 LV1.5	YELKIN T TS SS DS GOLD			THERMOLEC 57 200		THERMOLEC WFC		YELKIN 1018	PERFORMIX E PERFORMIX PS
			PERFORMIX A CAPSULEC SERIES BEAKIN LV30 PERFORMIX CC			ULTRALEC F P G					
Reference Emulsifiers											
MONODIGLYCERIDES							SORBITAN ESTERS		ETHOXYLATED MONODIGLYCERIDES		
				POLYGLYCEROL ESTERS SUCROSE ESTERS							

HYDROPHILIC-LIPOPHILIC BALANCE

The hydrophilic-lipophilic balance (HLB) chart illustrates the approximate hydrophilic (water loving)-lipophilic (oil loving) balance value of our lecithin products in relation to other commonly available emulsifiers. HLB is an index of the predicted preference of an emulsifier for oil or water—the higher the HLB, the more hydrophilic the molecule; the lower the HLB, the more hydrophobic the molecule.

The values expressed in the table can serve as a useful guideline in helping you select the most appropriate ADM lecithin for your emulsification purposes.

DETERMINING THE PROPER USAGE LEVEL

Typical usage levels of lecithin in an emulsion system are:

1-5% of the fat for water in oil (W/O)

5-10% of the fat for oil in water (O/W)

The amount of lecithin used is dependent upon factors such as the pH, the inclusion of proteins and gums, and the salt concentration.



RELEASE

In food applications, release agents are most often used to ensure the separation of a cooked product from the cooking surface. Lecithin is an all-natural, label-friendly ingredient that enhances any foodgrade release agent, improving separation and lowering costs.

Lecithin has a simultaneous affinity for both oils and water, which makes it an effective ingredient in pan releases and other lubricants.

KEY BENEFITS

- Improves separation
- Reduces surface tension
- Creates thin, even barrier
- Lowers costs

When mixed with vegetable oils or other fats (the bases of most release formulations), lecithin acts as a surfactant. This reduces surface tension and creates a thin, even release barrier not achieved by oil alone. The result is a more effective and efficient release agent that will improve your results while saving you money.



ADM LECITHIN IN RELEASE APPLICATIONS

Lecithin is an excellent release agent in food applications, including pan release, belt release, and product release.

PAN RELEASE

- Form fluid lipid barriers
- Ensure quick, clean separation
- Available for spray or brush applications
- Aerosol pan release
- Bread pan formulas
- Cakes, cookies, and other high-moisture specialty product formulas

BELT RELEASE

- Useful in continuous cooking and baking processes using belts or conveyors
- Typically included in oil or melted shortening
- Water-dispersible lecithin for use in dip tank
- Water-dispersible product provides release and assists in cleanup

PRODUCT SEPARATION

- Prevents sticking in finished food products
- Allows for separation of slices of high-moisture pasteurized cheese

HEAT-RESISTANT APPLICATIONS

- For use during prolonged heating periods
- Modified lecithin resists darkening and build-up
- Mold release, pan sprays, griddle and frying operations

RECOMMENDED ADM LECITHINS

Beakin™ lecithin: Low-viscosity, complexed lecithins specifically designed for spray applications.

Performix™ blends are excellent oil in water emulsifiers with a high HLB. Performix E is an ideal product for applications that include instantizing fatty powders, such as milk powders and calf milk replacers.

Thermolec®. Standardized, enzymatically modified. These products exhibit the properties of being not only water-dispersible, but also heat resistant (up to 350°F).

INSTANTIZING

Formulators of instant foods face a unique paradox: incorporating difficult-to-disperse materials (proteins, fibers, vitamins, and minerals) into a product that can be readily dissolved in cold water, milk, or other such aqueous solutions.

High-fat powders are difficult to wet and disperse because they are hydrophobic (repel water). High-protein ingredients are hydrophilic (attracted to water) and can hydrate too quickly, forming clumps that do not hydrate internally. These instantizing problems can be solved with lecithin from ADM.



KEY BENEFITS

- Enables difficult-to-disperse materials to dissolve in aqueous solutions
- Excellent for instantizing powders
- Maintains integrity of instant food products

INSTANT FOOD APPLICATIONS

- Beverage powders
- Meal replacement shakes
- Soups
- Gravy mixes
- Powdered dairy products

INSTANTIZING

Instantizing with lecithin is usually accomplished by spray coating the lecithin onto a powder's surface. ADM offers a number of liquid lecithins for this purpose, in particular the Beakin™ series of complexed lecithins.

ADM also produces Ultralec® ultrafiltered, deoiled lecithin. Ultralec is the product of an exclusive ultrafiltration process that removes triglycerides from lecithin, leaving it dry and easy to mix. Its outstanding quality and purity has no off-flavors or odors, so it maintains the integrity of instant food products. Ultralec is available in powdered, granular, or fine granular forms.



Advantages of liquid- and semisolid-filled hard gelatin capsules include:

- Improved bioavailability,
- Improved content uniformity of low-dose active substances,
- Reduced dust for handling potent compounds,
- Enhanced stability,
- Sustained release.

RECOMMENDED ADM LECITHINS

Beakin lecithin: A series of complexed lecithin products with low viscosity, sprayable at ambient temperature and used in lipophilic instantizing applications.

Performix™: blends are excellent oil in water emulsifiers with a high HLB. Performix E is an ideal product for applications that include instantizing fatty powders, such as milk powders and calf milk replacers.

Thermolec®: Standardized, enzymatically modified. These products exhibit the properties of being not only water-dispersible, but also heat resistant (up to 350°F).

Ultralec lecithin: ADM's exclusive, ultrafiltered, deoiled lecithin is used in hydrophilic instantizing applications, and it provides excellent emulsification properties in reduced-fat and flavor-sensitive applications.



Lecithin Applications

Application	Suggested Products	Usage
<i>Aqueous release</i>	Yelkin 1018, Performix E/PS, Ultralec P/F	10-15% of water
<i>Baked Goods</i>	Ultralec P/F, Thermolec WFC, Yelkin series	0.2-1% flour basis
<i>Belt release</i>	Beakin Series, Thermolec Series, Performix CC, Yelkin series	3-7% in oil
<i>Bread/yeast raised products</i>	Ultralec P/F, Thermolec WFC, Yelkin series	0.5-1% flour basis
<i>Cake & donuts</i>	Ultralec P/F, Yelkin 1018, Thermolec WFC, Yelkin series	0.2-0.5% formula basis or 1-3% fat basis
<i>Carmel corn</i>	Beakin LV1 and LV3	5-10% in coating oil
<i>Chocolate & compound coatings</i>	Ultralec P/F, Yelkin series	0.2-0.7% formula basis
<i>Cocoa powder</i>	Beakin series, Yelkin 1018, Yelkin series	1-3% spray coating by weight
<i>Colors & flavors</i>	Ultralec P/F, Yelkin 1018, Thermolec WFC	0.5-2% formula basis
<i>Cookies & crackers</i>	Ultralec P/F, Thermolec WFC, Yelkin series	1-3% flour basis
<i>Dry bakery mixes</i>	Ultralec P/F, Thermolec WFC, Yelkin series	0.5-1% flour basis
<i>Ice cream (waffle) cones</i>	Beakin LV1, Beakin LV30, Yelkin series	0.2-0.7% formula basis
<i>Icings & fillings</i>	Ultralec P/F, Yelkin 1018, Thermolec WFC, Yelkin series	0.2-1% formula basis
<i>Lo-fat cookies/crackers</i>	Ultralec P/F, Thermolec WFC	0.5-1% flour basis
<i>Margarine</i>	Ultralec P/F, Yelkin series	0.3-1% formula basis
<i>Milk powders</i>	Yelkin 1018, Performix E/PS, Ultralec P/F	0.5-1% spray coating by weight
<i>Noodles</i>	Ultralec P/F, Yelkin series	0.2-0.5% flour basis
<i>Pie crust</i>	Ultralec P/F, Yelkin series	0.5-1% flour basis
<i>Pizza crust</i>	Ultralec P/F, Yelkin series	0.2-0.5% flour basis
<i>Release</i>	Beakin series, Thermolec series, Performix CC	5-15% oil basis
<i>Tortillas & flat breads</i>	Ultralec P/F, Yelkin series	0.5-2% formula basis
<i>Waffles & pancakes</i>	Yelkin 1018	0.5-2% formula basis

Lecithin Usage

	Adds Lubricity	Dough Conditioner	Mixing Aid	OW Emulsifier	WO Emulsifier	Release Agent	Viscosity Modifier	Wetting Agent	Shelf-life Enhancement	Nutritional Supplements
<i>Beakin</i>										
<i>LV1</i>	•		•		•	•	•	•		
<i>LV30</i>			•	•		•		•		
<i>LV3</i>	•		•		•	•		•		
<i>Yelkin T</i>	•				•					
<i>Yelkin TS</i>	•		•		•	•				
<i>Yelkin DS</i>	•		•		•	•				
<i>Yelkin SS</i>	•		•		•	•				
<i>Yelkin 1018</i>				•		•		•	•	
<i>Yelkin Gold</i>	•		•		•	•		•		
<i>Performix A</i>				•	•					
<i>Performix E</i>		•		•		•		•		
<i>Performix PS</i>				•		•		•		
<i>Capsulec Series</i>			•		•		•			•
<i>Ultralec F</i>	•	•		•	•		•	•	•	•
<i>Ultralec P</i>	•	•		•	•		•	•	•	•
<i>Ultralec G</i>										•
<i>Thermolec 57</i>				•		•		•		
<i>Thermolec 200</i>				•		•		•		
<i>Thermolec WFC</i>				•		•		•	•	

FLUID LECITHINS			
Product	Typical Analyses		Applications
STANDARD LECITHINS			
Yelkin® T	AI, % 65 min. H2O, % 1.0 max. HI, % 0.05 max.	Color: 17 max. AV: 30 max. Form: Opaque plastic	Viscosity: N/A
Yelkin TS	AI, % 62 min. H2O, % 1.0 max. HI, % 0.05 max.	Color: 17 max. AV: 30 max. Form: Translucent fluid	Viscosity: 100 max. (Stokes, 25°C)
Yelkin SS	AI, % 62 min. H2O, % 1.0 max. HI, % 0.05 max.	Color: 14 max. AV: 30 max. Form: Translucent fluid	Viscosity: 100 max. (Stokes, 25°C)
Yelkin DS	AI, % 62 min. H2O, % 1.0 max. HI, % 0.05 max.	Color: 12 max. AV: 30 max. Form: Translucent fluid	Viscosity: 100 max. (Stokes, 25°C)
PURIFIED LECITHIN			
Yelkin Gold	AI, % 62 min. H2O, % 0.5 max. HI, % 0.05 max.	Color: 14 max. AV: 30 max. Form: Translucent fluid	Viscosity: 100 max. (Stokes, 25°C)
COMPLEXED LECITHINS			
Beakin® LV1	AI, % 50 min. H2O, % 0.8 max. HI, % 0.05 max.	Color: 14 max. AV: 25 max. Form: Translucent fluid	Viscosity: 20 max. (Stokes, 25°C)
Beakin LV3	AI, % 32 min. H2O, % 0.8 max. HI, % 0.05 max.	Color: 14 max. AV: 25 max. Form: Translucent fluid	Viscosity: 10 max. (Stokes, 25°C)
Beakin LV30	AI, % 32 min. H2O, % 0.8 max. HI, % 0.05 max.	Color: 14 max. AV: 25 max. Form: Translucent fluid	Viscosity: 10 max. (Stokes, 25°C)
Performix™ E	AI, % 50 min. H2O, % 0.8 max. HI, % 0.05 max.	Color: 14 max. AV: 26 max. Form: Translucent fluid	Viscosity: 30 max. (Stokes, 25°C)
Performix PS	AI, % 50 min. H2O, % 0.8 max. HI, % 0.05 max.	Color: 14 max. AV: 26 max. Form: Translucent fluid	Viscosity: 65 max. (Stokes, 25°C)
MODIFIED LECITHINS			
Yelkin 1018	AI, % 58 min. H2O, % 1.0 max. HI, % 0.05 max.	Color: 17 max. AV: 38 max. Form: Opaque fluid	Viscosity: 250 max. (Stokes, 25°C)
Thermolec® 57	AI, % 56 min. H2O, % 0.8 max. HI, % 0.05 max.	Color: 14 max. AV: 28 max. Form: Translucent fluid	Viscosity: 30 max. (Stokes, 25°C)
Thermolec 200	AI, % 62 min. H2O, % 0.8 max. HI, % 0.05 max.	Color: 14 max. AV: 30 max. Form: Translucent fluid	Viscosity: 75 max. (Stokes, 25°C)
Thermolec WFC	AI, % 60 min. H2O, % 1.0 max. HI, % 0.05 max.	Color: 13 max. AV: 30 max. Form: Translucent fluid	Viscosity: 100 max. (Stokes, 25°C)
DEOILED LECITHINS			
Product	Typical Analyses		Applications
ULTRA-FILTERED DEOILED LECITHINS			
Ultralec® P	AI, % 97 min. H2O, % 1.5 max.	Color: Light gold Form: Powder	Viscosity: N/A
Ultralec F	AI, % 97 min. H2O, % 1.5 max.	Color: Light Gold Form: Fine granules	Viscosity: N/A
Ultralec G	AI, % 97 min. H2O, % 1.5 max.	Color: Light gold Form: Granules	Viscosity: N/A

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