

EKÖMUL KREM 300 SERIES

LIQUID MILK TEXTURISING SYSTEMS

Co-Blended & Integrated Emulsifier/Stabiliser Solutions

Introducing **Ekömul KREM 300 series** texturising systems to meet your liquid milk formulation challenges. Select from a range of emulsifier/stabiliser solutions in a variety of milk formats including UHT, Pasteurised and Sterilised milk.



Product Range & Recommended Dosages

FUTURA OFFERINGS	COMPOSITION	DOSAGE (%)	TARGET APPLICATIONS
Ekömul KREM 301 SE	E471, E412, E407	0.20 – 0.30%	Plain and Flavoured Milk Filling temperature < 25°C No suspension ability required
Ekömul KREM 303 SE	E471, E401, E407, E412	0.20 – 0.30%	
Ekömul KREM 302 SE	E471, E407, E412	0.20 – 0.30%	Chocolate milk Filling temperature <25°C
Ekömul KREM 304 SEC	E460(i), E466, E471, E407	0.30 – 0.35%	Diluted Milk Chocolate Milk Fortified Milk Filling temperature > 25°C Suspension eg. cocoa powder, insoluble calcium is required
Ekömul KREM 306 SEC	E460(i), E466, E407	0.15 – 0.25%	
Ekömul KREM 309 SE	E471, E418, E407	0.10 – 0.20%	

***Composition :**
 E471 – Mono- and diglycerides
 E401 – Sodium Alginate

E418 – Gellan Gum
 E407 – Carrageenan
 E412 – Guar Gum

E 460(i) – Microcrystalline cellulose
 E 466 – Sodium carboxymethylcellulose

Kindly contact us for more details on product selection, specifications and other technical inquiries.

LIQUID MILK APPLICATIONS

- Pasteurised
- Sterilised
- UHT
- Reconstituted Milk
- Fresh Milk
- Plain Milk
- Flavoured Milk
- Chocolate Milk
- Fortified Milk



Winner of
 Frost & Sullivan's
 2016 Best Practices Award
 Entrepreneurial Company
 of the Year



Winner of
 Frost & Sullivan's
 2018 Best Practices Award
 Food Ingredients
 Company of the Year

Why Futura Ingredients' KREM Texturising Systems?

Ingredient Integration

1. Integration into key raw materials enables us to bring cost effective solutions
2. Open dialogue to develop customised solutions in a timely manner
3. Product and application knowledge and supported with the latest application pilot facilities
4. Small batches for co-blended products lets us work

Application & Formulation Expertise

5. Integrated products can be produced in large quantities in a single batch with supply chain effectiveness
6. Production flexibility and proximity to the key consumer markets in Asia

Processing Competencies

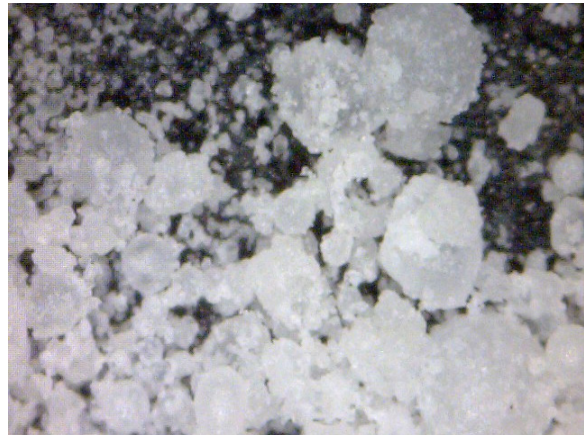
Integrated vs Dry Blended Texturising Systems

Ekömul KREM 300 series integrated texturising systems are manufactured by dispersing stabilisers within molten emulsifiers creating a uniform suspension prior to the

spray cooling process. This enables the formation of homogenous particles which ensures uniformity of product and prevents product deblending.



Stabilisers are encapsulated by emulsifiers. Product is in bead form. Particle size is generally larger compared to typical emulsifiers.



Dinolite Magnification 200x

Emulsifiers and stabilisers are blended physically. Particle size is uneven – emulsifier is in bead form, while stabilisers in powdery form.

Key benefits of **Ekömul KREM 300 series** integrated texturising systems :

- Reduced risk of product agglomerates/lump formation
- No pre-blending step required in production
- Better free flowing properties
- Dispersible at low temperature allowing addition at any stage of the mixing process

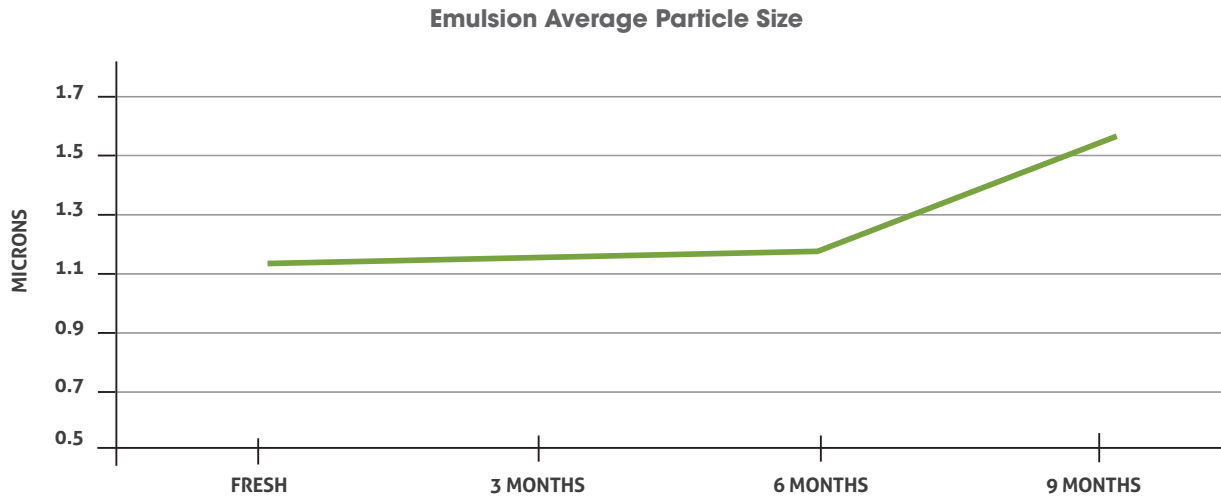
Ensuring that stabilisers within the texturising system hydrate at the optimal stage in the mixing process for a gradual build of viscosity

Emulsion Stability - A Critical Parameter of Product Quality

O/W emulsions are thermodynamically unstable. Over time, emulsions will separate into two distinct phases. In liquid Milk this is referred to as creaming off. The increase in average fat globule size over the product shelf life is

due to fat globule agglomeration and coalescence. This is indicative of emulsion destabilisation leading to creaming off in liquid milk products.

Particle Size Analysis of Commercial UHT Plain Milk Over Shelf Life



Note: Particle size measured on Mastersizer Laser Diffraction Particle Size Analyser on commercial milk samples at various stages of shelf life

Creaming Off - A Defect in Milk Product

Creaming off or fat separation reduces shelf-life of milk products, especially UHT milk. This is accelerated when milk is stored at >20°C. Once the layer of fat is formed it is

difficult to be dispersed. Therefore prevention of creaming off is essential to increase the availability and shelf life of milk products.

UHT Plain Milk without Texturing Systems



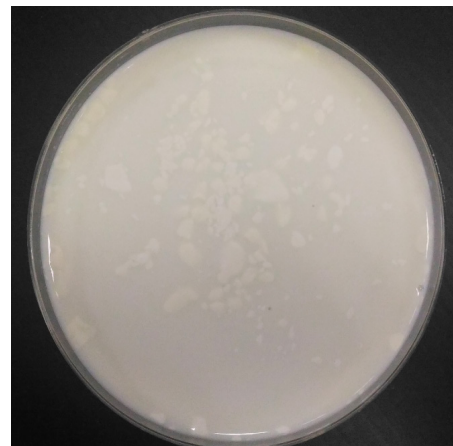
Formation of thick fat layer

UHT Plain Milk with Ekömul KREM 301 SE



Very thin layer of fat observed

The sample of UHT Plain Milk without Texturing Systems was vigorously shaken

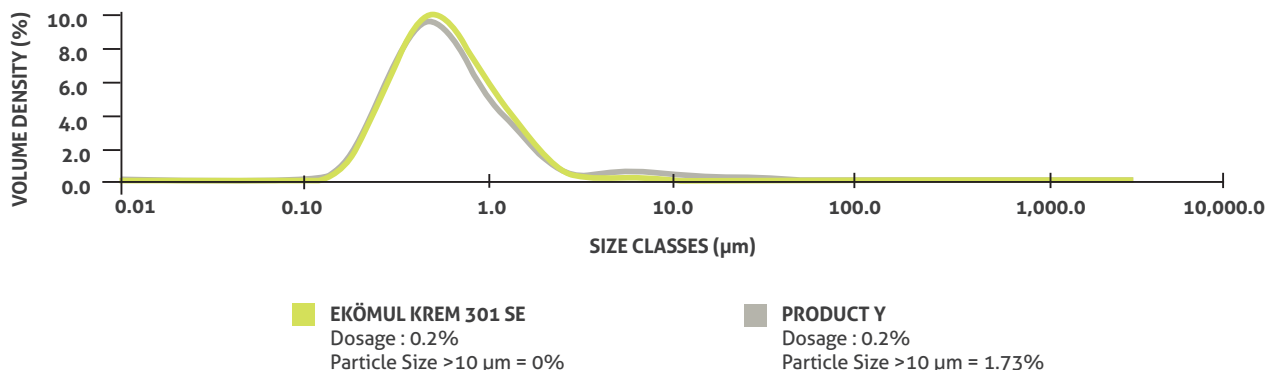


Layer of fat formed is difficult to be dispersed even after vigorously shaken

Note: Test conducted with basic UHT Plain Milk formulation added with 0.2% texturing systems

Ekömul KREM 301 SE imparts improved Emulsion Stability

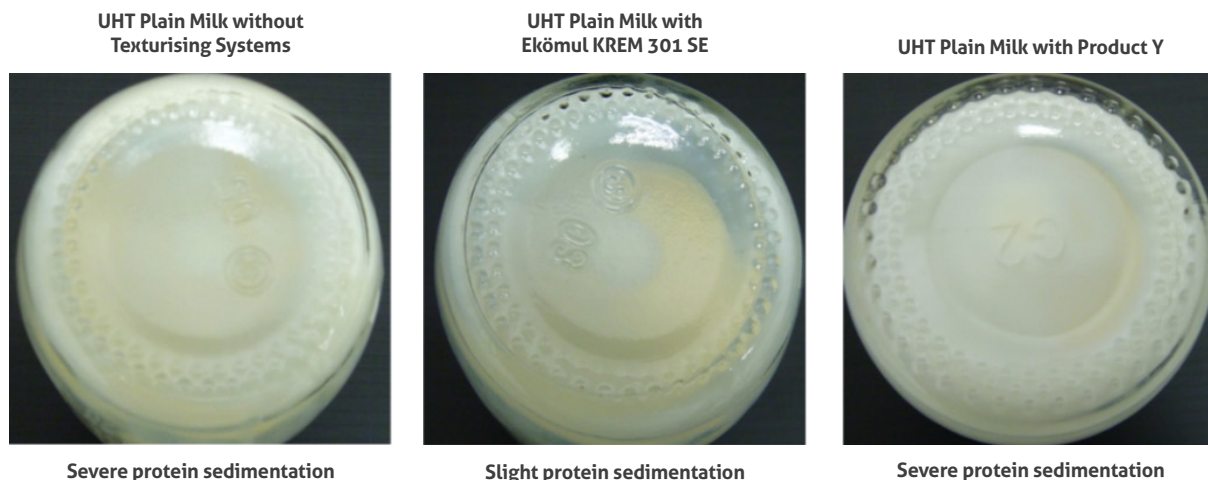
A narrow and controlled particle size distribution is indicative of a robust emulsion. The ideal average fat globule particle size for whiteness is 1µm. The wider the fat globule size distribution, the higher the risk of coalescence leading to creaming off.



Note: Particle size measured on Mastersizer 3000 Laser Diffraction Particle Size Analyzer on freshly made UHT Plain Milk

Ekömul KREM 301 SE aids in Controlling Protein Sedimentation

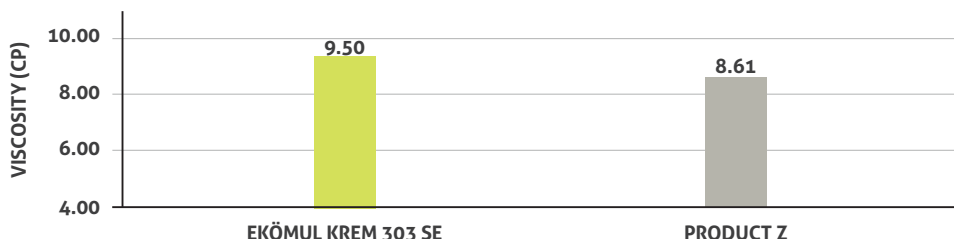
Protein sedimentation is a relatively common defect which shortens the shelf life of milk products through deposition of a layer of proteinaceous material. Native protein sediments to some extent, however sedimentation increases with the severity of heat treatment. Most importantly, sedimentation is irreversible. Therefore, **Ekömul KREM 301 SE** is formulated to reduce the risk of sedimentation in milk.



Note: Test conducted with basic UHT Plain Milk formulation added with 0.2% texturing systems

Ekömul KREM 300 Series imparts increased viscosity for optimal mouthfeel

Ekömul KREM 300 series positively impacts product appearance. Additionally it creates a better, more robust mouthfeel and good flavour release of liquid milk while preventing gel formation through an overly strong gel network.



Note: Test conducted with basic UHT White Milk formulation added with 0.2% texturing systems

Improved cocoa suspension with Ekömul KREM 302 SE

Ekömul KREM 302 SE is designed with the optimal balance of emulsifiers and stabilisers to create a matrix to suspend cocoa particles and build viscosity for both sensory enhancement and to retard cocoa sedimentation.

UHT Chocolate Milk without Texturising Systems



Heavy creaming and cocoa sedimentation

UHT Chocolate Milk with Product X



Creaming and slight cocoa sedimentation

UHT Chocolate Milk with Ekömul KREM 302 SE



Very slight creaming and cocoa sedimentation

Note: Test conducted with basic UHT Chocolate Milk formulation added with 0.2% texturising systems Accelerated shelf life study for 8 weeks at 40°C

Prevention of gelation with Ekömul KREM 302 SE

Gelation of UHT milk is also a major factor limiting its shelf-life. The selection of stabilisers play an important role to:

- Prevent the formation of gelation as a result of an overly strong 3D gel network.
- Control protein denaturation. High viscosity is typically indicative of a strong network and blurps (milk containing lumps or small pieces of gel that do not break) will be observed when the chocolate milk is poured.

UHT CHOCOLATE MILK WITH Ekömul KREM 302 SE @ 0.25%

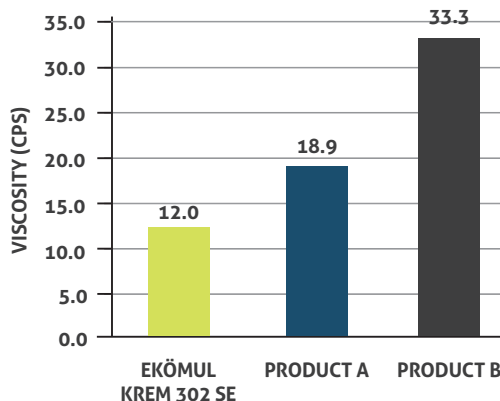


SMOOTH GLASS SURFACE

SLIGHT DENATURED PROTEIN OBSERVED ON GLASS

SEVERE DENATURED PROTEIN OBSERVED ON GLASS

Note: Test conducted with basic UHT Chocolate Milk reduced fat formulation. Picture was taken immediately after filling.

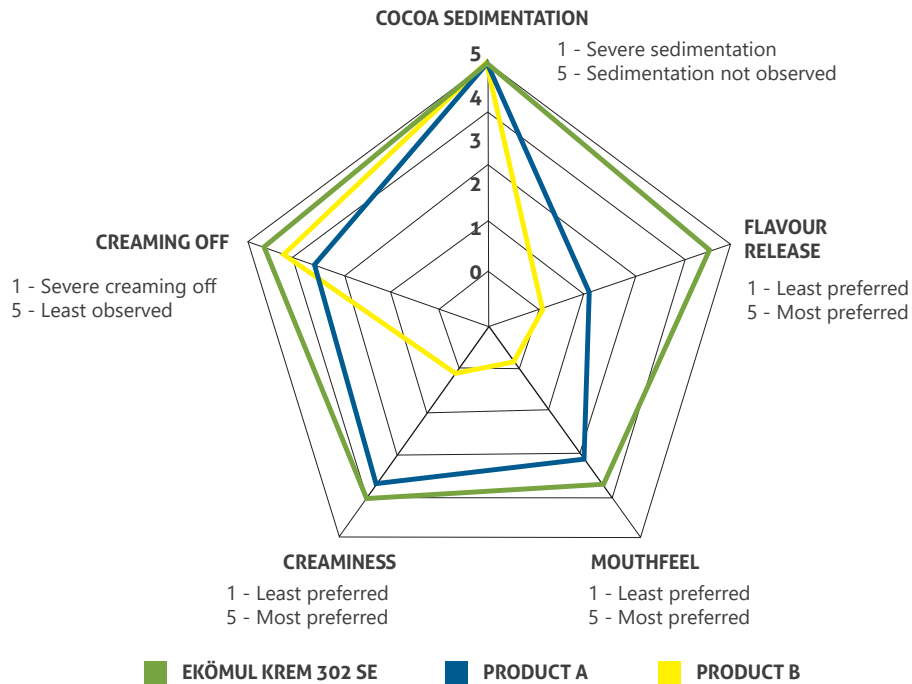


Viscosity results of 3 UHT Chocolate Milk samples

Balancing Performance and Ideal Organoleptic Profiles

Despite the low viscosity of **Ekömul KREM 302 SE**, the product performs favourably against comparable products in chocolate milk in terms of cocoa sedimentation and

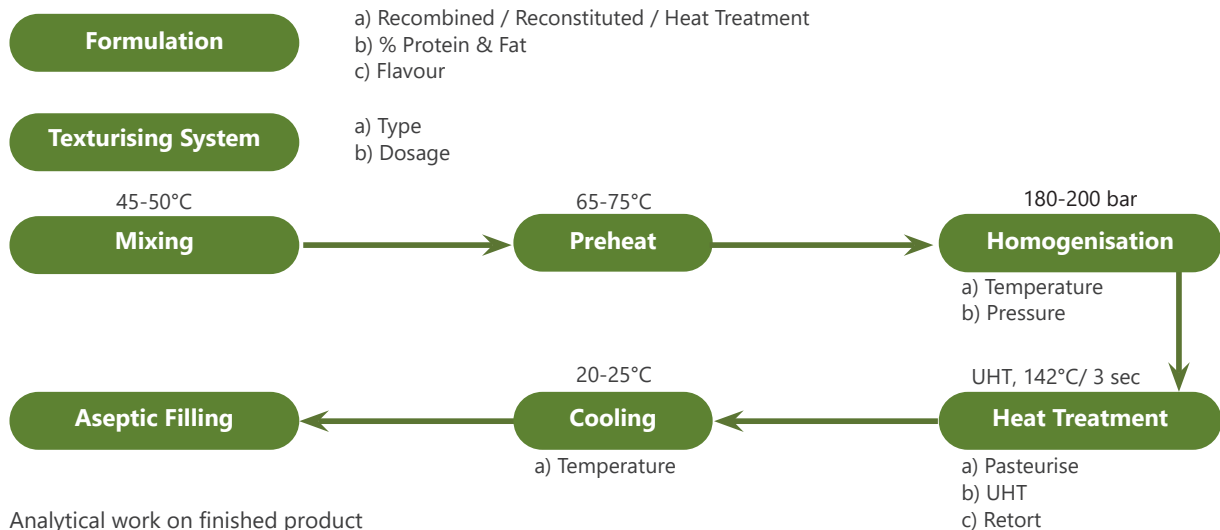
emulsion stability. It also imparts a good organoleptic profile in terms of flavour release, creaminess and mouthfeel.



Organoleptic profile of 3 UHT Chocolate Milk samples

Key Considerations in Product Selection

A balance between product formulation, processing and cost limitations impact the overall performance of liquid Milk. Here are some critical considerations :



Analytical work on finished product

What sensory, textural and stability properties can we help to improve?

Disclaimer: The information and recommendations contained herein are to the best of our knowledge reliable. However, nothing herein is to be construed as a warranty of representation in respect of safety in use, suitability, efficacy or otherwise including freedom from patent infringement. Users should conduct their own tests to determine the suitability of our product for their own specific purposes and the legal status for their intended use of the product.

MANUFACTURING SITE

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