

EKÖMUL KREM 300 SERIES

RECOMBINED MILK TEXTURISING SYSTEMS

Co-Blended & Integrated Emulsifier/ Stabiliser Solutions

Introducing **Ekömul KREM 300 series** texturising systems to meet your recombined 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 Dosage

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	0.20 – 0.30%	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	0.20 – 0.30%	
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

RECOMBINED MILK APPLICATIONS

- Pasteurised
- Sterilised
- UHT
- Reconstituted 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

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

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 debblending.



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

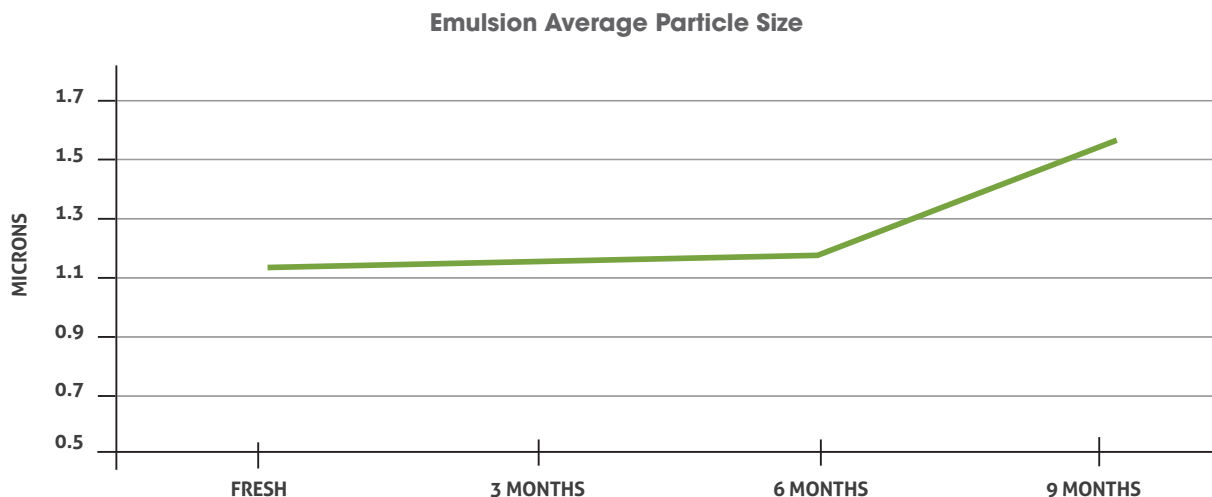
Ensuring that stabilisers within the texturising system hydrate at the optimal stage in the mixing process for a gradual build of viscosity

Emulsion Stability - A Critical Parameter of Product Quality

O/W emulsions are thermodynamically unstable. Over time, emulsions will separate into two distinct phases. In Recombined 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 recombined milk products.

Particle Size Analysis of Commercial UHT White 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 $>20^{\circ}\text{C}$. 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 Texturising Systems**



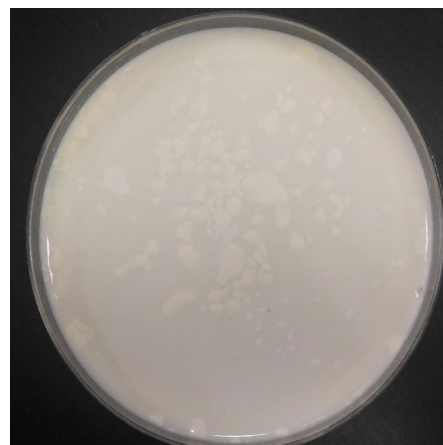
**Formation of thick
fat layer**

**UHT Plain Milk with
Ekömul KREM 301 SE**



**Very thin layer of
fat observed**

**The sample of UHT Plain Milk without Texturising
Systems was vigorously shaken**

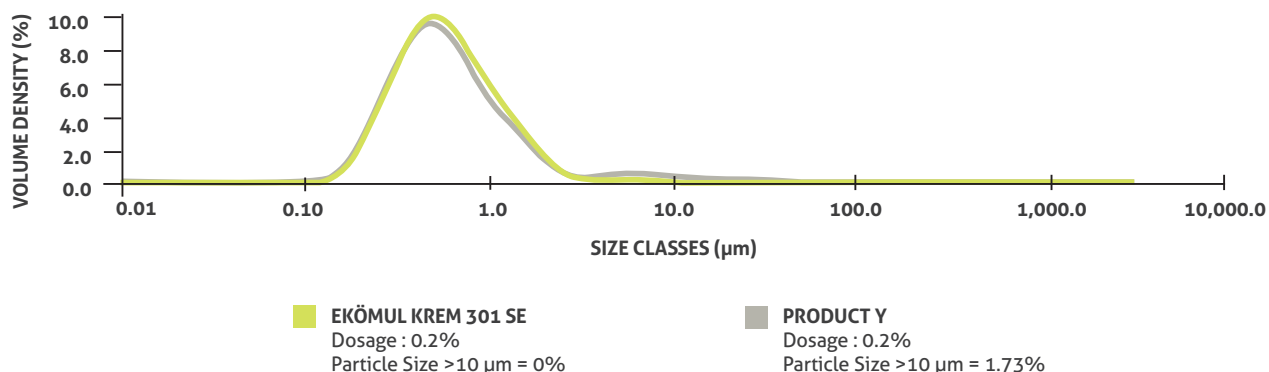


**Layer of fat formed is difficult to be dispersed
even after vigorously shaken**

Note: Test conducted with basic UHT White 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.

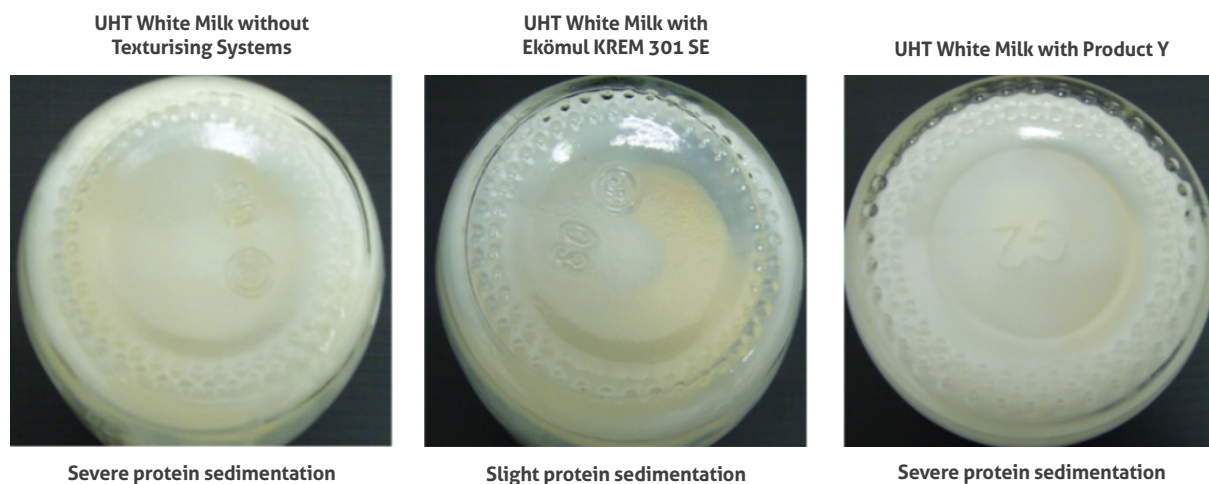


Note: Particle size measured on Mastersizer 3000 Laser Diffraction Particle Size Analyzer on freshly made UHT White Milk

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

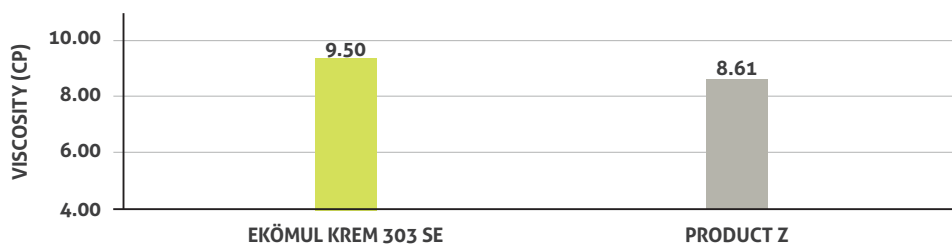
severity of heat treatment. Most importantly, sedimentation is irreversible. Therefore, **Ekömul KREM 301 SE** is formulated to reduce the risk of sedimentation in milk.



Note: Test conducted with basic UHT White 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 recombined 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 37°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%**

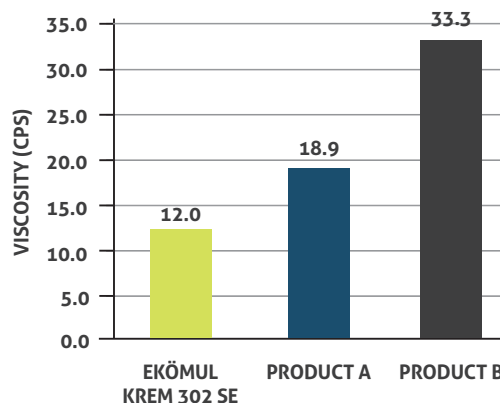


**SMOOTH GLASS
SURFACE**

**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.

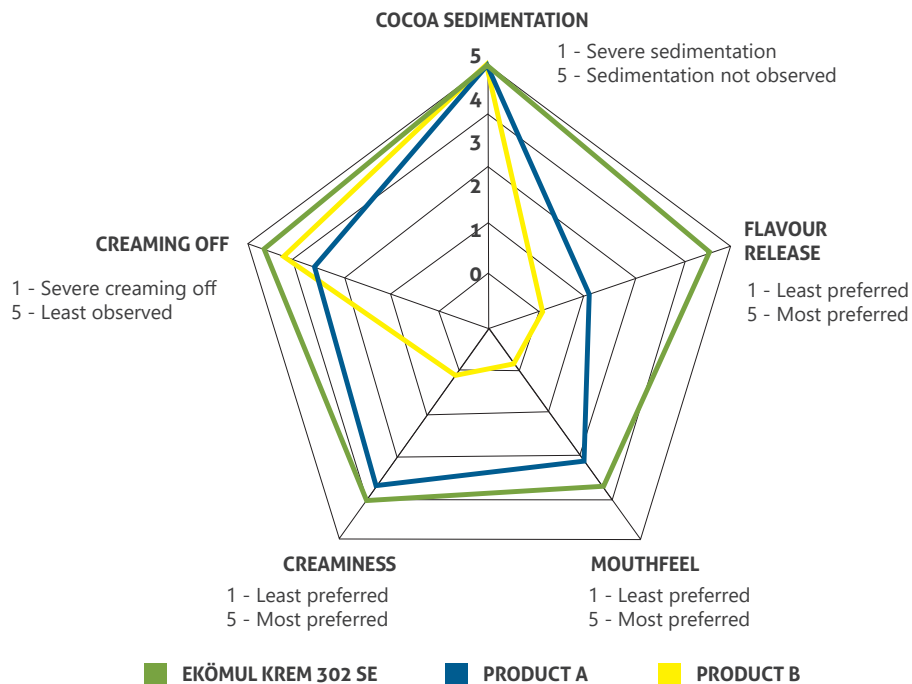


**Viscosity results of 3
UHT Chocolate Milk samples**

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

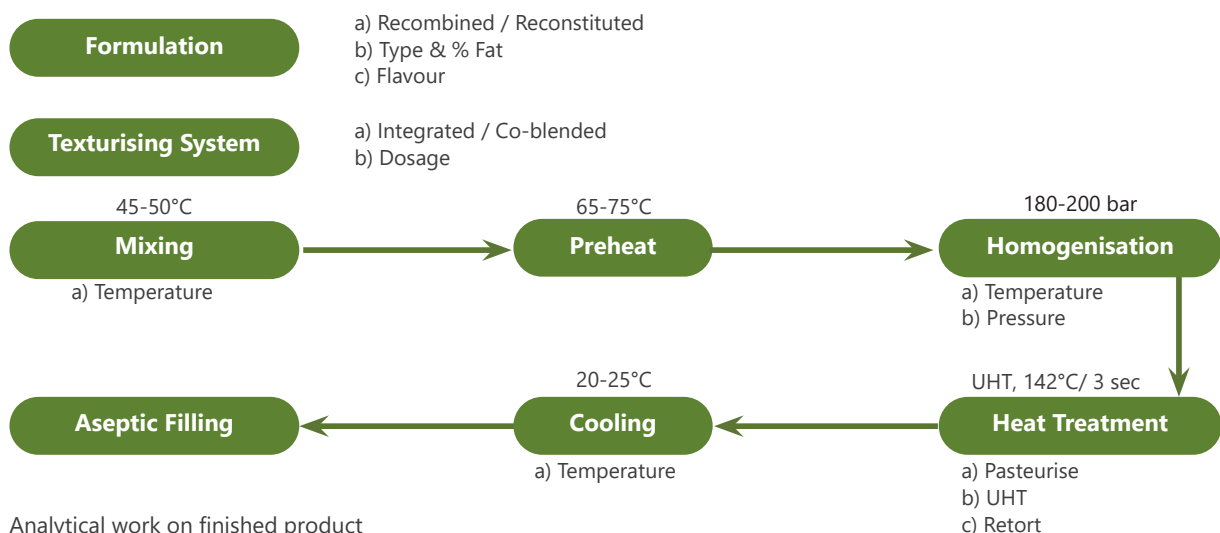
emulsion stability. It also imparts a good organoleptic profile in terms of flavour release, creaminess and mouthfeel.



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 Recombined Milk. Here are some critical considerations :



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.

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