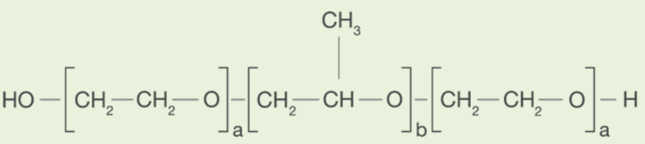
Kolliphor® Poloxamers as a Multifunctional Excipient for Foam Forming and Co-Emulsification Applications

Poloxamers are synthetic block copolymers of ethylene oxide and propylene oxide. Invented at BASF, the size of the ethylene oxide and propylene oxide blocks can be tuned to deliver unique properties.

Poloxamers are used in a variety of dosage forms for topical administration. For example, Kolliphor® P 407 may be used in aqueous solutions as a thermoreversible gelling agent for efficient formulating, and Kolliphor® P 188 is an effective foaming agent.

When combined with other emulsifiers such as Kolliphor® PS 60 or Kolliphor® CS 20, they offer the additional benefit of stabilizing emulsion microstructure, leading to highly stable formulations with long shelf lives.



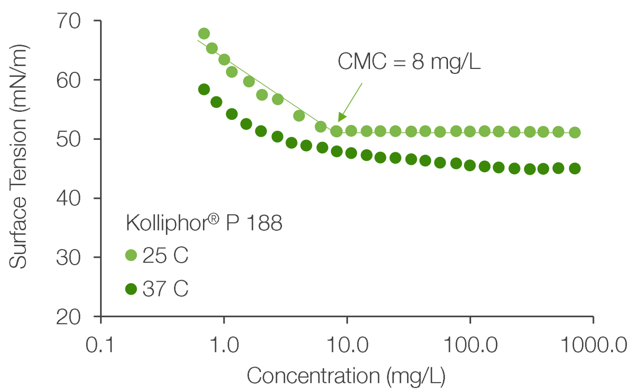
Kolliphor® Poloxamers are ABA-type copolymers. The values of a and b vary depending on the Poloxamer.

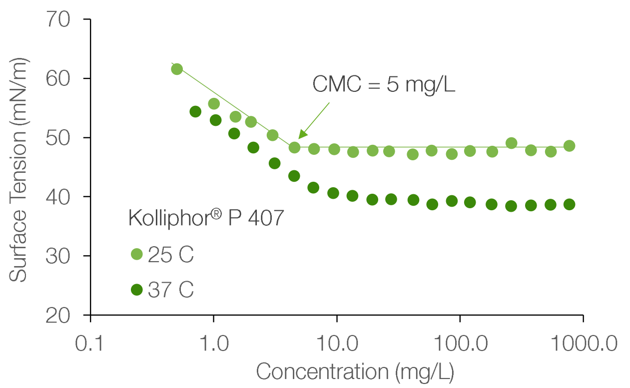
Methods

- Aqueous solutions containing dilute amounts of Kolliphor® P 188 and P 407 were prepared using deionized water.
- Surfactant characteristics were determined using a Kruss K100 force tensiometer equipped with a Wilhemy Plate
- A cream formulation was prepared via the hot processing method.
- Sensory and stability properties were measured using a TA instruments Discovery HR-1 Hybrid Rheometer with a 25mm sandblasted plate.

Ingredient	Functionality	Mass (wt/wt%)
Kolliwax® CSA 70	Viscosity Modifier	7.00
Kolliwax® GMS II	Viscosity Modifier	2.50
Kolliphor® PS 60	Emulsifier	3/2
Kolliphor® P 188	Co-Emulsifier	0/1
Kollisolv® MCT 70	Solvent/Emollient	11.50
Kollicream® IPM	Solvent/Emollient	1.30
Water	Solvent	70.40
Glycerin	Emollient	3.30
Preservative	Preservative	1.00

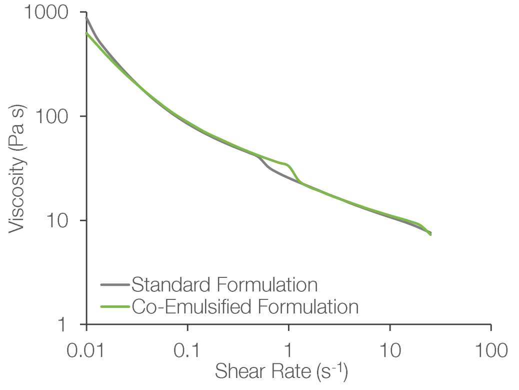
Surface tension reduction of poloxamers for foaming and co-emulsification

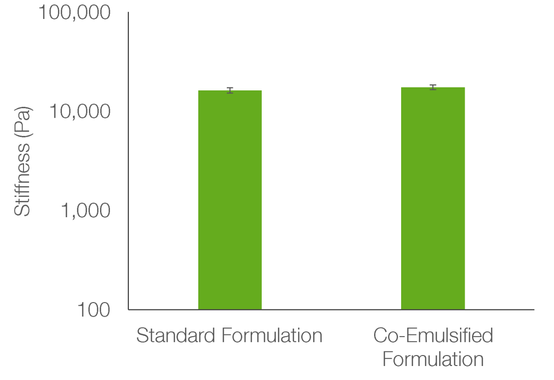




- Both P 188 and P 407 effectively reduce surface tension, with critical micelle concentrations (CMC) less than 10 mg/ml, making them ideal foam formers over a wide temperature range.
- Surface tension reduction points to use as a co-emulsifier in oil-in-water emulsions.

Comparing sensory and flow properties of poloxamer co-emulsified creams

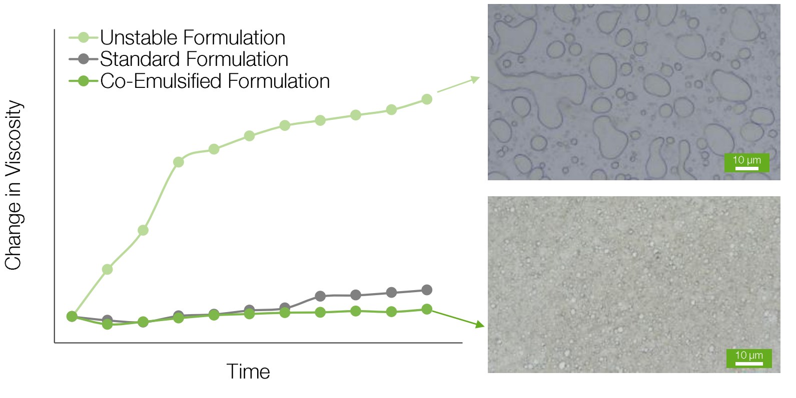




- The addition of Kolliphor® P 188 at co-emulsifier levels does not affect product flow or sensory properties, allowing it to be easily incorporated to your existing formulations.

Designing stable formulations with poloxamers as co-emulsifiers

- Kolliphor® P 188 effectively arrests changes in emulsion microstructure, leading to enhanced formulation stability
- Adding as little as 1 wt/wt% of poloxamer as a co-emulsifier can dramatically improve product shelf life



Conclusions

- Poloxamers are multi-functional excipients with applications across a wide range of topical dosage forms
- Kolliphor® P 188 and P 407 are effective surface tension reducers, making them ideal foam-formers and co-emulsifiers
- Co-Emulsified creams exhibit enhanced stability without affecting sensory performance, reducing formulation development times

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