

Poloxamers as Gelling Agents for Topical Formulations

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Gelling agents are frequently utilized in topical pharmaceutical products to increase the viscosity of topical aqueous formulations. The chemistry of these species imparts viscosity building properties as a function of structure, temperature and concentration.

Poloxamers, polyethylene-propylene glycol copolymers, may be used in aqueous solutions as a thermoreversible gelling agents for the efficacious formulation and delivery of active ingredients.

Gelling functionality may be achieved through the use of:

- Kolliphor® P 188
- Kolliphor® P 407



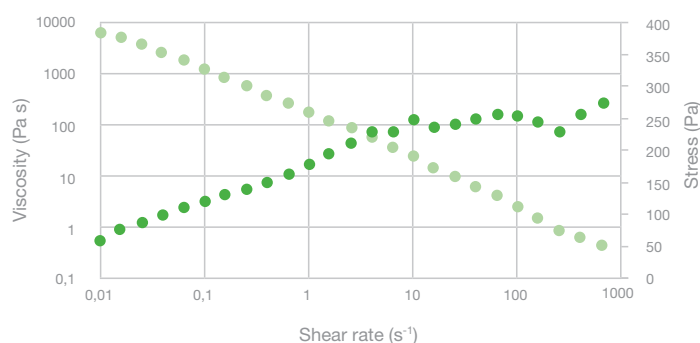
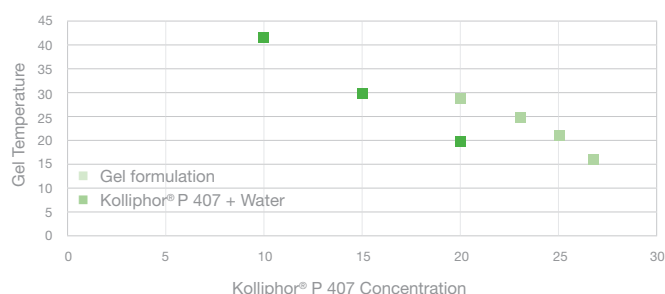
Phase	Component	Chemical name	Function	wt%
I	Ethanol 200 proof	Ethanol	solvent	10
	Kollisol® PG	Propylene glycol	solvent	10
	Glycerol	Glycerol	solvent	5
II	Kolliphor® P 407	Poloxamer 407	gelling agent	15-20
III	DI water	Water	solvent	53-58
IV	Kollicream® IPM	Isopropyl myristate	tack reducer	2

Materials and Methods

Phase II and III were mixed and maintained at 2°C overnight or until dissolved. The solution was heated to 40°C and Phase IV was added with slow stirring to not incorporate air. Phase I was added with slow stirring.

Results

The rheology of the gel formulations was analyzed using oscillatory measurements ($\omega=1$ rad/s and $\gamma=0.1\%$) while the temperature was increased at 1°C/minute. The gel temperature was determined for each sample by evaluating G' and G'' values as a function of temperature and recorded as a function of concentration (as shown at left). To note is the increase in gelling temperature with the addition of ethanol. A shear sweep of the gel (25 wt% poloxamer) at 32°C (shown below) demonstrates non-Newtonian behavior of the formed gel.



Formulation	Coefficient of Friction
With Kollicream® IPM	0.38±0.00
Without Kollicream® IPM	0.71±0.07

Although a suitable gel may be formed without the addition of a lipidic fluid, it has been observed (and measured using the Tribo-Rheometry accessory for the TA Instruments DHS-1 Rheometer with Vitro-Skin®) that the addition of 1% Kollicream® IPM reduces the coefficient of friction and perceived tackiness.