

Exceptional versatility
for topical formulations
RHEOLOGY MODIFIER
MOTUSFLEX™



Your needs **OUR EXPERTISE**

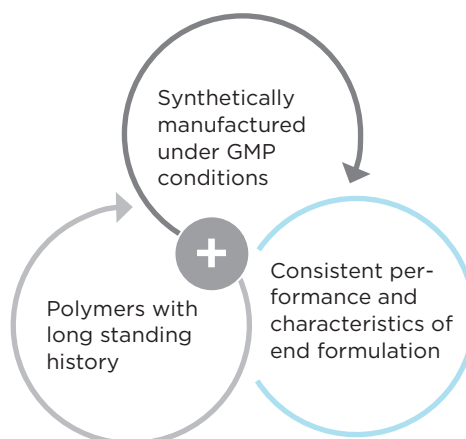
Pharma formulators have specific needs that polymer chemistry can address. With decades of experience in skin care applications, Clariant's scientists offer a deep know-how and expertise for topical formulations requiring quality products with exceptional features.



How to guarantee **PERFORMANCE**

Our Motusflex polymers are the ideal rheology modifiers providing many advantages for pharmaceutical formulations. Being synthetically manufactured under GMP conditions, they provide batch to batch consistency with defined impurity profile allowing robust formulation development with minimal risk of variations in end product performance and characteristics.

Motusflex polymers are based on Clariant's successful rheology modifier range - giving you the confidence of using a well established ingredients for your pharmaceutical formulations.



Offering FORMULATION FREEDOM

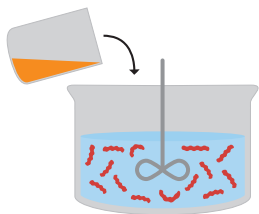
We understand the complexity of pharmaceutical topical formulations associated with difficult to handle APIs. Thus we offer you easy handling features of these polymers to reduce the complexity of your formulations.

EASY TO HANDLE

- > Ready to use: pre-neutralized
- > Stable in a broad pH range
- > High temperature resistance
- > Instant swelling of the dry polymer particles: no brine necessary
- > Crosslinked: good for particle/oil stabilization
- > Cold-processable: ideal for temperature sensitive APIs
- > Add to oil or water phase

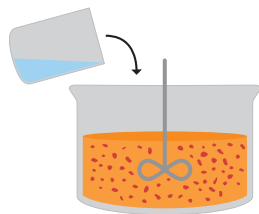
EASY TO USE AT ANY STEP

Aqueous phase



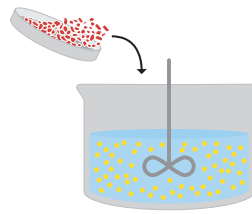
Immediate viscosity build-up, without the use of neutralizing agent

Oil phase



Polymer is easily dispersed, viscosity build-up occurs after aqueous phase has been added

Final phase



Immediate viscosity build-up, allowing for final adjustment of viscosity

EXCEPTIONAL VERSATILITY - FOR YOUR API'S FOR TOPICAL FORMULATIONS

Based on AMPS (acrylamido-2-methylpropanesulfonic acid), the Motusflex polymers range provides high performance thickening combined with outstanding sensory characteristics such as superior skin feel without sticky or tacky after feel.

For each challenge of topical formulations we have launched our Motusflex family with three prominent polymers:

MOTUSFLEX™ HV

> ideal for
high viscosity
formulations

MOTUSFLEX™ LV

> ideal for
low viscosity
formulations

MOTUSFLEX™ MF

> multi-functional
ideal for challenging
formulations

Most versatile polymer for efficient thickening

MOTUSFLEX™ HV

Motusflex™ HV is an ammonium acryloyldimethyltaurate/VP Copolymer which offers excellent thickening properties and provides stable rheological performance to pharmaceutical formulations even at lower concentration.

UNIQUE BENEFITS

- Excellent thickening properties
- Good compatibility with organic solvents
- Stable towards high shear stress
- Enable formulation at low and high pH conditions
- Emulsifying on its own a great amount of oils, without additional emulsifiers

A SUPERIOR SENSORY PROFILE FOR YOUR PRODUCTS

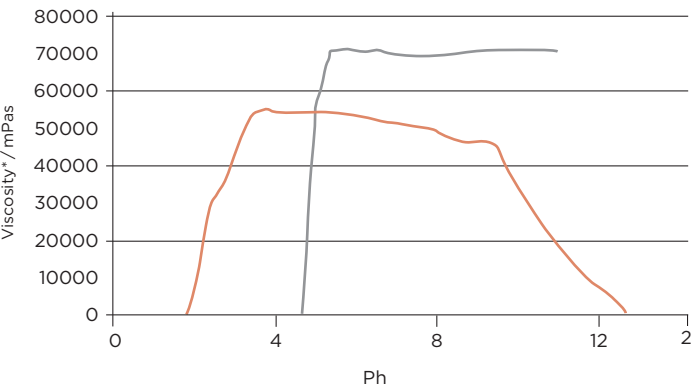
- Light and fresh skin feel
- No sticky after feel

APPLICATIONS

- O/W emulsions
- Cream gels & emulsifier free cream gels
- Hydroalcoholic gels



pH stability



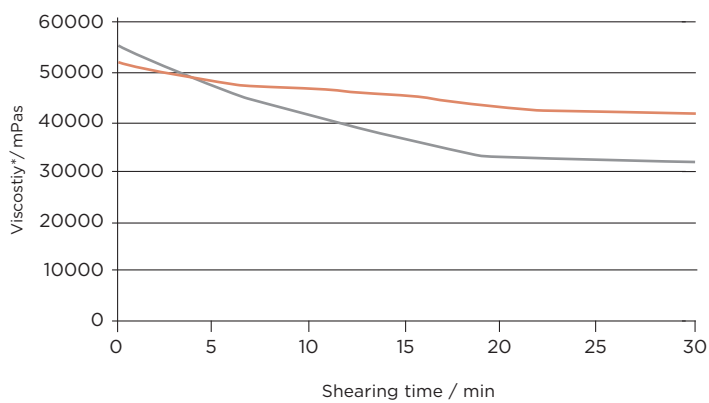
*1.0% aqueous gel, Brookfield RVT, 20 rpm, 20°C

■ Motusflex™ HV ■ Carbomer

DESCRIPTION

Trade name	Motusflex™ HV
Polymer type	crosslinked copolymer based on 2-acrylamido-2-methylpropane sulfonic acid and N-vinylpyrrolidone
Appearance [20°C]	white powder
Regulatory	DMF Type IV (under submission)

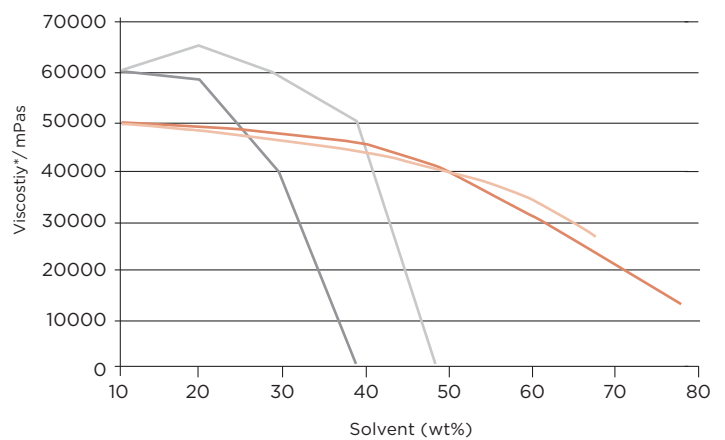
Shear stability of aqueous polymer dispersion



*Viscosity vs shearing time, Ultraturrax high shear mixer 20000 rpm, 1.0% Polymer, pH 5.5-6.5, Brookfield RVDV-1, 20°C, 20 rpm

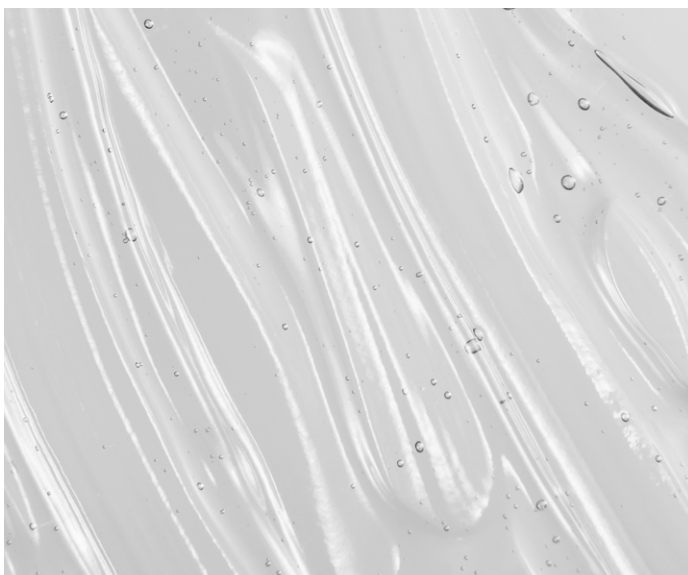
■ Motusflex™ HV (EtOH) ■ Carbomer

Compatibility with organic solvents



*Viscosity vs solvent (wt%), 1.0% Polymer, pH 5.5-6.5, Brookfield RVDV-1, 20°C, 20 rpm

■ Motusflex™ HV (EtOH) ■ Carbomer (EtOH)
■ Motusflex™ HV (Aceton) ■ Carbomer (Aceton)



Versatile thickener, offers significant viscosity at lower polymer concentration.

MOTUSFLEX™ HV

Low viscosity, perfect for sprayable formulations

MOTUSFLEX™ LV

Motusflex™ LV is an ammonium salt of acrylamidopropane sulphonic acid with hydrophobic side-chains which allows stable low viscosity lotions and gels. Motusflex™ LV has excellent emulsification properties due to its associative thickening mechanism. The rheology modifier shows broad pH stability and good suspension and stabilization properties.

UNIQUE BENEFITS

- Emulsification of high oil contents up to 40%
- Polymeric emulsifier for low viscosity cream gels
- Excellent formulation stability
- Very good suspension properties
- Quick breakdown for fresh sensory during application
- Effective at low usage levels

A SUPERIOR SENSORY PROFILE FOR YOUR PRODUCTS

- Enhanced skin feel

APPLICATIONS

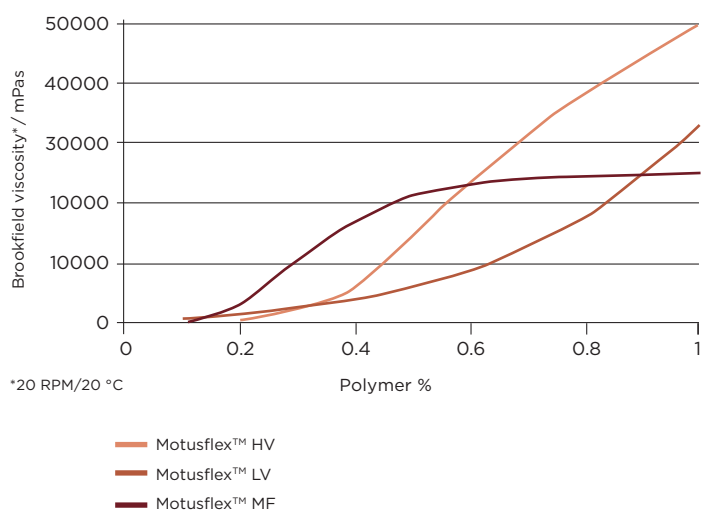
- Suitable for low viscosity o/w lotions and sprayable formulations
- Emulsifier free cream gels



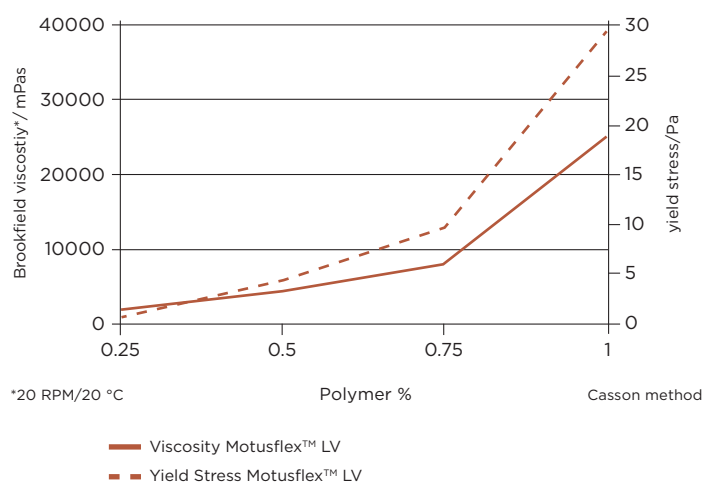
DESCRIPTION

Trade name	Motusflex™ LV
Polymer type	crosslinked copolymer based on 2-acrylamido-2-methylpropane sulfonic acid and ethoxylated behenyl alcohol methacrylate
Appearance [20°C]	white powder
Regulatory	DMF Type IV (under submission)

Viscosity building



Excellent yield stress profile



Perfect for low viscosity
formulations like sprayable
emulsions.

MOTUSFLEX™ LV

Multifunctional - for challenging formulations

MOTUSFLEX™ MF

Motusflex™ MF is a sodium salt of acrylamidopropane sulphonic acid which provides an outstanding flexibility in application. As a multi-benefit rheology modifier it has an excellent salt tolerance, broad pH compatibility and stabilizes high amounts of oil combined with soft texture and a silky after feel.

UNIQUE BENEFITS

- Great salt tolerance
- Fast dispersion
- Stable viscosity across broad pH range
- Texturizer and thickener for emulsions
- Compatible with solvents, glycerine and propylenglycol
- Stabilization of high amounts of oils

A SUPERIOR SENSORY PROFILE FOR YOUR PRODUCTS

- Silky and soft skin feel

APPLICATIONS

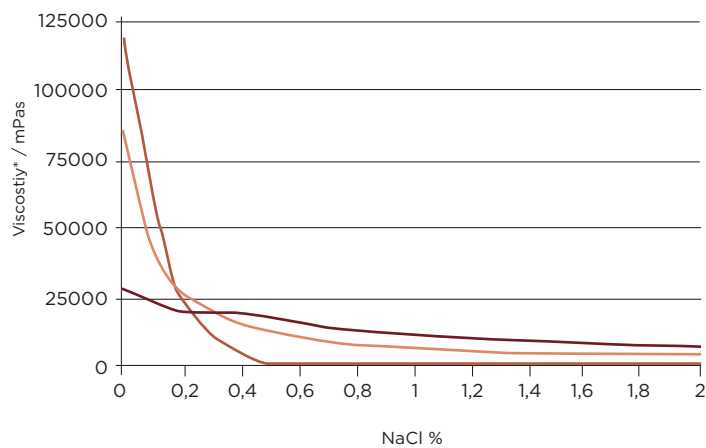
- Suitable for a broad range of topical formulations: emulsions, cream gels, aqueous gels and ointments
- Ideal for formulations with an elevated salt content



DESCRIPTION

Trade name	Motusflex™ MF
Polymer type	crosslinked homopolymer based on 2-acrylamido-2-methylpropane sulfonic acid
Appearance [20°C]	white powder
Regulatory	DMF Type IV (under submission)

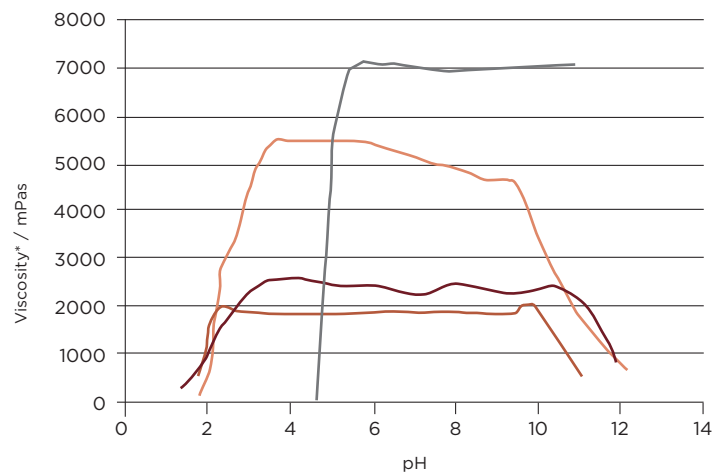
Salt impact on gel network



*2.0% gel after 24h; Brookfield RVDV-1, 20°C, 20 rpm

— Motusflex™ HV
— Motusflex™ LV
— Motusflex™ MF

High stability across broad pH range



*1.0% aqueous gel, Brookfield RVT, 20 rpm, 20°C

— Motusflex™ HV
— Motusflex™ LV
— Motusflex™ MF
— Carbomer



Excellent salt tolerance combined with an outstanding pH stability make challenging formulations easy.

MOTUSFLEX™ MF

Formulations

STABILITY STUDY WITH ACTIVE PHARMACEUTICAL INGREDIENTS

Formulation with Hydrocortisone

MOTUSFLEX™ HV

TRADE / INCI NAME		As is
A	Water	Diluent
	Propylene Glycol	Humectant
B	Motusflex HV	Rheology Modifier
C	Cprylic Capric Triglyceride	Emollient
	Cetearyl alcohol	Stabilizer
D	DMDM Hydantoin	Preservative
E	Citric Acid solution 10%	Neutralizer
F	Hydrocortisone	API

MANUFACTURING DESCRIPTION

- I Mix the components of A and heat up to 75°C.
- II Mix the components of C and heat up to 75°C.
- III Add B to I.
- IV Add II to III and homogenize with a high shear mixer at 15000 rpm for 2 minutes.
- V Change to a finger stirrer and stir at 200 rpm until cool.
- VI Add D and stir.
- VII Adjust the pH with E to 4.4 - 4.6.
- VIII Add F and stir until homogenous.

Formulation with Diclofenac-Na

MOTUSFLEX™ LV

TRADE / INCI NAME		As is
A	Cetareth-20	Emulsifier
	Mineral oil h.v.	Emollient
	Caprylic triglyceride	Emollient
B	Motusflex LV	Rheology Modifier, Thickener & Emulsifier
C	Water	Diluent
D	Diclofenac-Na	API
	Isopropanol	Solvent
	Propylene Glycol	Humectant
E	Motusflex LV	q.s.
F	DMDM Hydantoin	Preservative
G	Citric Acid solution 10%	Neutralizer

MANUFACTURING DESCRIPTION

- I Mix the components of A and melt at approx. 70°C.
- II Mix the components of D.
- III Add B to I and stir at 200 rpm.
- IV C to III and stir for 1 hour at 250 rpm until cool.
- V Change to a finger stirrer and stir at 200 rpm until cool.
- VI Add mixture of II into IV and stir.
- VII Add F to step V.
- VIII Adjust the pH with G to 4.4 - 4.6.

Formulation with Betamethasone

MOTUSFLEX™ MF

TRADE / INCI NAME		As is
A	Trilaureth-4 Phosphate	Emulsifier
	Mineral oil h.v.	Emollient
	Isopropyl Palmitate	Emollient
	Octyldodecanol	Emollient
B	Motusflex MF	Rheology Modifier
C	Water	Diluent
	DMDM Hydantoin	Preservative
D	Citric Acid solution 10%	Neutralizer
E	Betamethasone Valerate 17	API

MANUFACTURING DESCRIPTION

- I Mix the components of A.
- II Mix the components of C.
- III Mix B into I.
- IV Add II into C and homogenize with a high shear mixer at 15000 rpm for 2 minutes.
- V Change to a finger stirrer and stir at 200rpm .
- VI Adjust the pH with D to 4.4 - 4.6.
- VII Finally add E and stir until homogenous.

RESULTS

- Appearance: White cream
 - Viscosity: (Brookfield, 20°C, 20 rpm) 3100 mPas (benchmark 33000)
 - pH: 4.4 (benchmark 4.7)
 - Physical stability: No change of appearance during 3 months at RT and 40°C
 - Assay stability: No significant deviation during 3 months at RT and 40°C (benchmark 1%)
-

RESULTS

- Appearance: White cream/Gel/sprayable lotion/topical solution
 - Viscosity: Function of polymer concentration (benchmark 19000/10000)
 - pH: 7.5 (benchmark 7.38)
 - Physical stability: No change of appearance during 3 months at RT and 40°C
 - Assay stability: No significant deviation during 3 months at RT and 40°C (benchmark 1.3%)
-

RESULTS

- Appearance: White cream
 - Viscosity: (Brookfield, 20°C, 20 rpm) 18700 mPas (benchmark 20000)
 - pH: 4.5 (benchmark 3.7)
 - Physical stability: No change of appearance during 3 months at RT and 40°C
 - Assay stability: No significant deviation during 3 months at RT (benchmark 0.1%)
-

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