SEPIPLUS™ 400
SEPIPLUS™ 265

The new generation of HSD thickener-emulsifiers

… for increased performances

- **Fluid HSD polymer, ready to use**
- **Improved electrolyte resistance profile**
- **Effective at low use level**
- **Excellent emulsifying power**
- **Creamy and glide-on feel**

(patent pending)

CONTENTS

1 – SEPIPLUS™ advantages

SEPIPLUS™ is a new generation of "Hydro Swelling Droplet" (HSD) thickener-emulsifiers with **performance superior** to that of the SEPIGEL™-SIMULGEL™ range, to meet the needs of your most demanding formulations.

Liquid and ready to use, SEPIPLUS™ has the **unique characteristic** of **combining**:

excellent thickening properties with **remarkable emulsifying-stabilizing properties**

⇩ ⇩

SEPIPLUS™ has greater thickening capacity:

- **in the presence of electrolytes** (NaCl, mineral water, phenyl benzimidazole sulphonic acid, dihydroxyacetone)
- over a wide pH range.

SEPIPLUS™ emulsifies-stabilizes all oil phases:

- **whatever the nature** of the oil
- **up to 50% oil phase**!
- without added emulsifier, **independently of the viscosity**.

⇩ ⇩

To produce a 50,000 mPa.s aqueous gel containing 0.6% NaCl:

➔ 2.8% SEPIPLUS™ 265 is enough
➔ or 3.6% SEPIPLUS™ 400
➔ compared with 6.2% SEPIGEL™ 305

To produce a 20,000 mPa.s gel-cream containing 15% oil phase:

➔ 0.65% SEPIPLUS™ 265 is enough
➔ or 0.70% SEPIPLUS™ 400
➔ IMPOSSIBLE using commercially-available polymers

⇩

SEPIPLUS™ is the ideal thickener-emulsifier, **effective at low use level**.

For optimum response to your needs, two SEPIPLUS™ thickener-emulsifiers are available: SEPIPLUS™400 and SEPIPLUS™ 265.

Features	SEPIPLUS™ 400	SEPIPLUS™ 265
If pH < 5, thickening power in the presence of	+++	+
If pH ≥ 5, thickening power in the presence of	++	+++
Stability of the thickening power as a function of	+++	++

Like the HSD thickener-emulsifiers developed previously by SEPPIC (SEPIGEL™, SIMULGEL™), SEPIPLUS™ gives a supple texture to cosmetic formulas. They leave a soft, non-tacky film on the skin. The **sensory feature of SEPIPLUS™** is to develop a **creamy, glide-on feel**.

2 – HSD thickener-emulsifiers

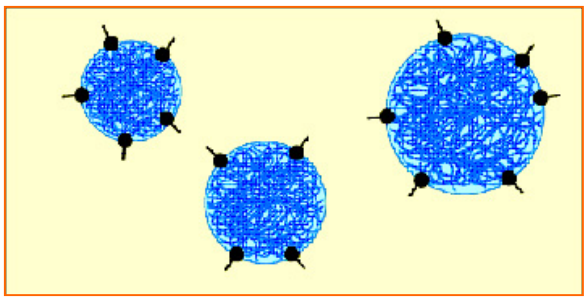
Like the earlier HSD thickener-emulsifiers, SEPIPLUS™ is manufactured using the **inverse emulsion polymerisation technology**.

This technology has the following benefits:

- **safety** for the consumer and the environment: no solvents, in contrast to polymers manufactured by precipitation polymerisation
- **performance** for the formulator: preferred technology for synthesizing high molecular weight polymers
- **convenience** for the manufacturer: polymer in liquid form, preneutralized, easy to use, ideal for cold processes.

What is the **thickening mechanism of SEPIPLUS™ in the presence of water**?

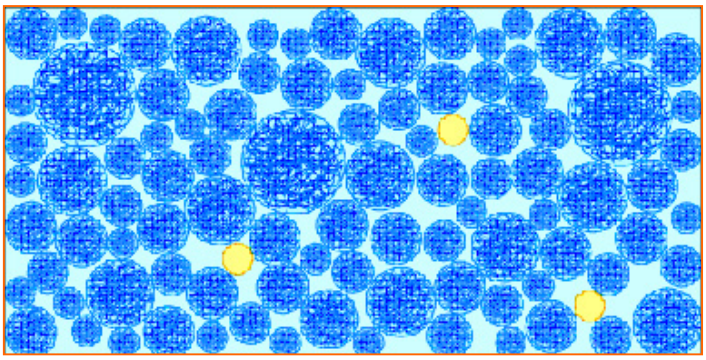
SEPIPLUS™ is a **reverse (w/o) emulsion**, with the polymer chains tightly folded within the aqueous internal phase:



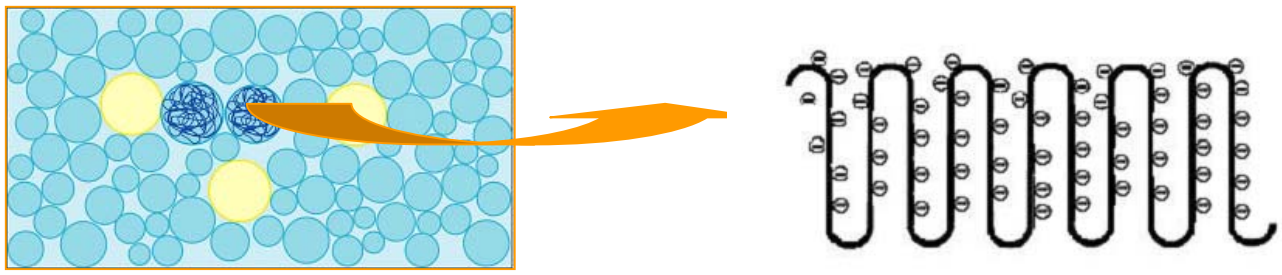
On addition of the aqueous phase, the "Hydro Swelling Droplet" mechanism consists of two steps:

- **reversal** of the reverse emulsion w/o → o/w,
- **expansion** of the polymer chains in the aqueous external phase, generating a crosslinked network of microgels.

➔ **Viscosity is thus generated by the congestion of the aqueous phase with the microgels**:

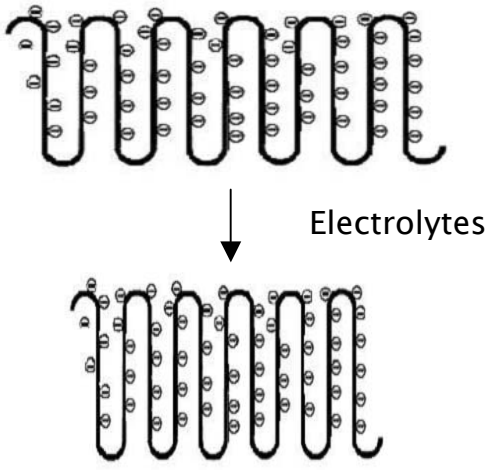


As the macromolecular chains of SEPIPLUS™ are polyanionic, the expansion of the polymer is driven by **electrostatic repulsion** mechanisms:



What happens in the **presence of electrolytes**?

When actives or other ingredients rich in electrolytes (cationic in particular) are added, the swelling equilibrium of the microgels is disturbed. A reduction of the expansion of the polymer chains is observed. This phenomenon is referred to as the "screening effect".



The consequence is a reduction of the volume of the microgels, and thus less congestion of the aqueous phase, leading to a reduction of the viscosity.

The SEPIPLUS™ high-polymer-content thickener–emulsifiers have been **designed to show higher thickening power in the presence of electrolytes**, as illustrated by the investigations described below.

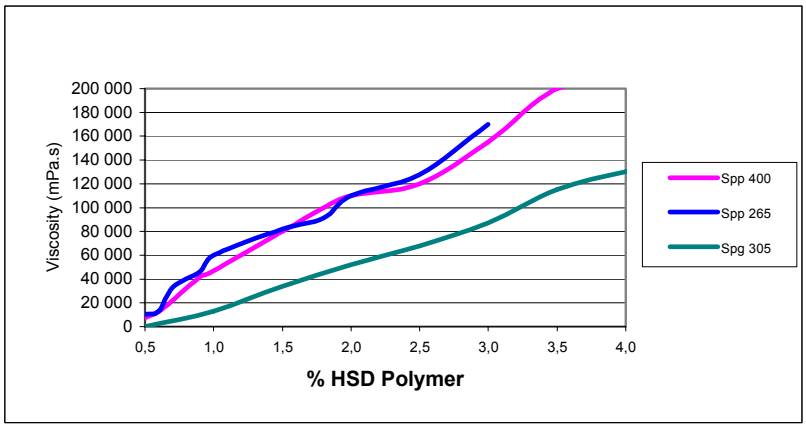
3 – SEPIPLUS™, greater thickening power

SEPIPLUS™ is a new generation of HSD thickeners-emulsifiers with **properties superior** to those of SEPIGEL™ or SIMULGEL™ to meet the requirements of your most demanding formulations.

- To produce an aqueous gel (in the absence of electrolytes, pH approx. 6) at **100,000 mPas**:

➔1.8% SEPIPLUS™ 265 is enough
or
➔1.9% SEPIPLUS™ 400 is enough
➔compared with 3.2% SEPIGEL™ 305

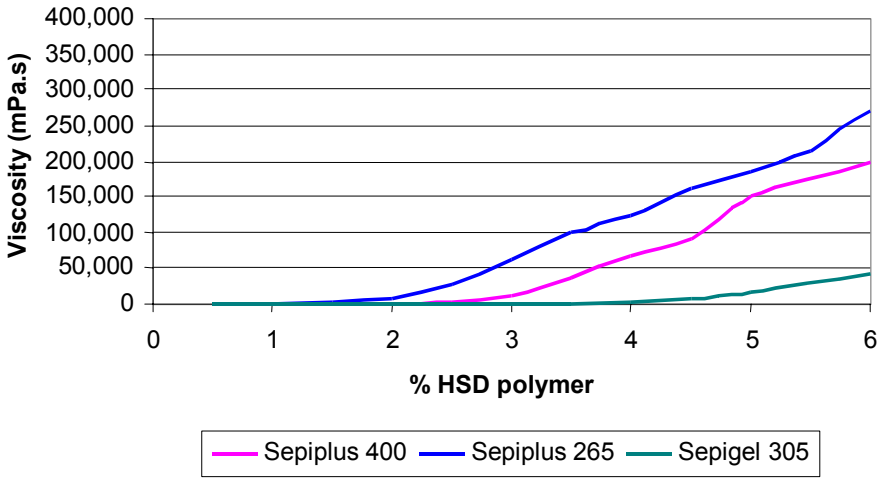
Graph 1: Viscosity of aqueous gels (in the absence of electrolytes, pH approx. 6) as a function of HSD polymer concentration



- In the presence of electrolytes, the thickening power of the SEPIPLUS™ range is particularly effective, as shown by graph 1. To produce an aqueous gel at **50,000 mPas at pH 6 containing 0.6% NaCl**:

➔ 2.8% SEPIPLUS™ 265 is enough
➔ or 3.6 % SEPIPLUS™ 400
➔ compared with 6.2% SEPIGEL™ 305

Graph 2: Viscosity of aqueous gels containing 0.6% NaCl as a function of HSD polymer concentration



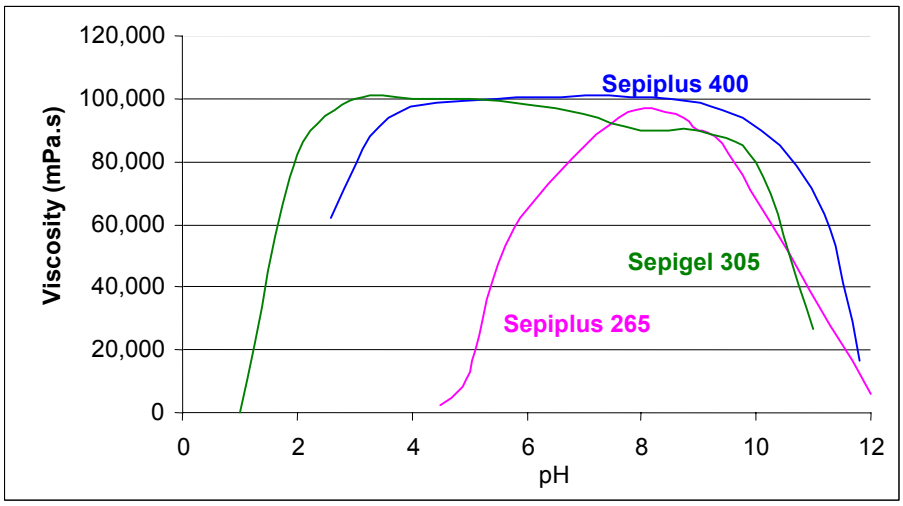
Formulas tested: x% SEPIPLUS™ or SEPIGEL™305/0.6% NaCl/water qs. pH approx. 6, viscosities measured on Brookfield LVT S6

The viscosity of the gels obtained does not change over time (> M1).

3.1 – Thickening power as a function of pH

SEPIPLUS™400 and SEPIPLUS™265 differ in their behaviour with regard to pH.

Graph 3: Viscosity of aqueous gels as a function of pH.



Formulas tested: 1.8% SEPIPLUS™ or 3% SEPIGEL™305/water qs 100, pH adjusted with lactic acid or triethanolamine. Viscosities measured using a Brookfield LVT S6.

The viscosity of the gels obtained does not change over time (> M1).

➔ **SEPIPLUS™ 400**, like SEPIGEL™305, is the essential formulation partner for thickening all your formulas, even when they require **extreme pH values** (pH 2.5 to pH 11).

➔ **SEPIPLUS™ 265** thickens your formulas **from pH 5.5** up to pH 10.

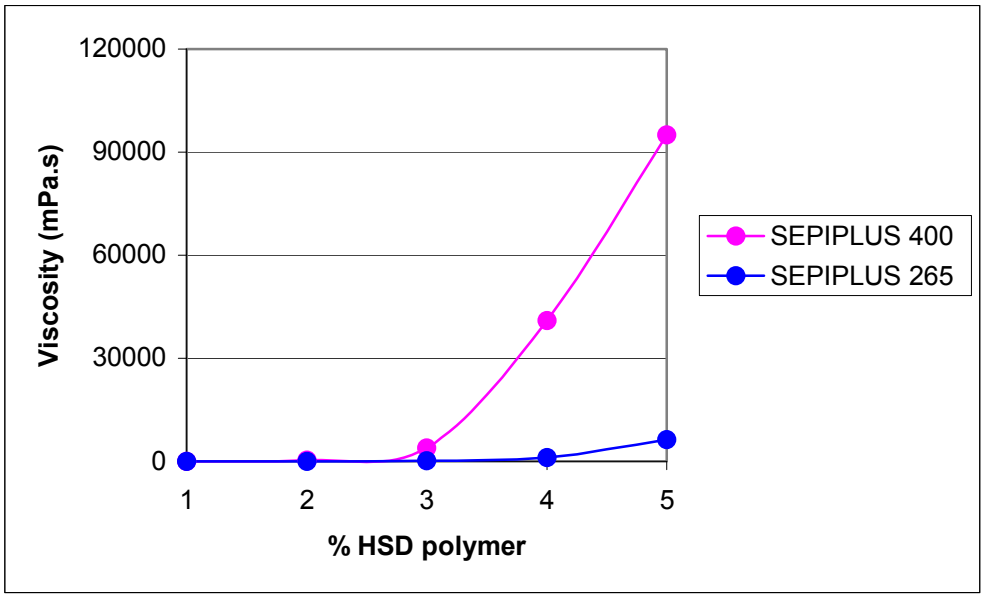
3.2 – Thickening power in the presence of salts

The SEPIPLUS™ thickener-emulsifiers are polyelectrolyte polymers, like SEPIGEL™-SIMULGEL™, so their thickening power is affected by addition of electrolytes. The SEPIPLUS™ range has been designed to have stronger thickening properties in the presence of electrolytes, as proven by the studies below.

The thickening power of SEPIPLUS™ in the presence of electrolytes differs as a **function of the pH** of the formulas.

- **If pH < 5 ⇒ SEPIPLUS™ 400 is the best choice**

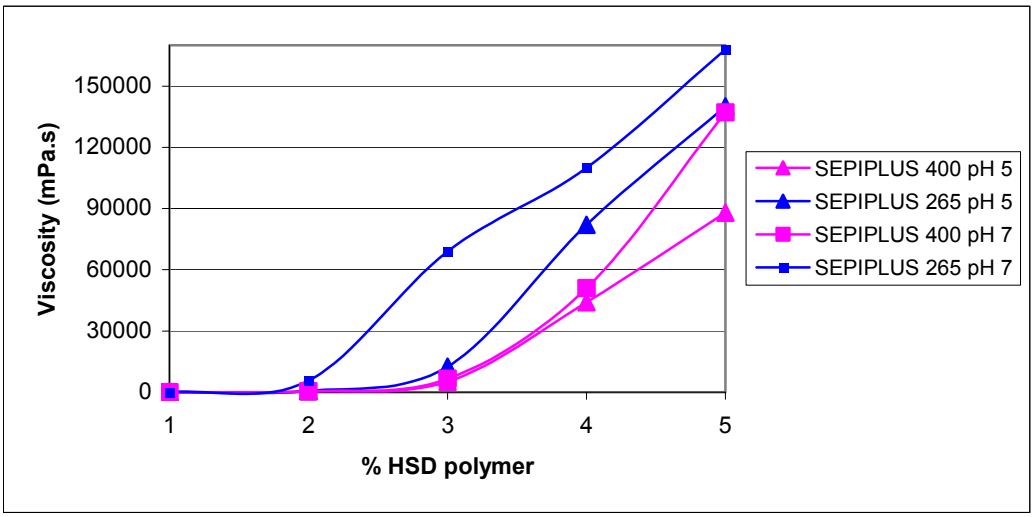
Graph 4: Viscosity of aqueous gels at pH 4 containing 0.6% NaCl as a function of HSD polymer concentration



Formulas tested: SEPIPLUS™/0.6% NaCl/water qs. pH 4,
viscosities measured on Brookfield LVT S6

- **If pH ≥ 5 ⇒ SEPIPLUS™ 265 is the best choice**

Graph 5: Viscosity of aqueous gels at pH 5 and 7 containing 0.6% NaCl as a function of HSD polymer concentration

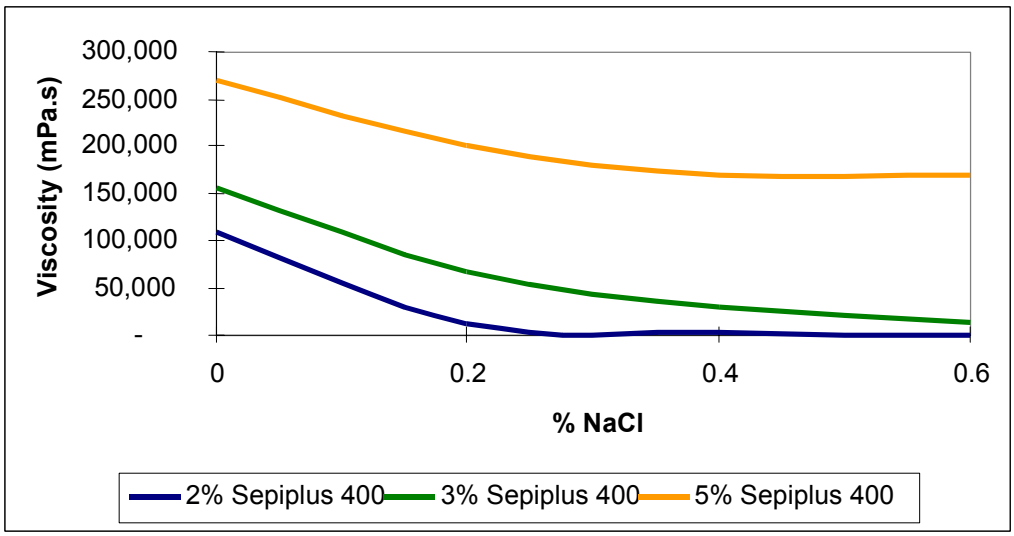


➔ SEPIPLUS™ 400 in the presence of electrolytes has thickening properties which are **stable over a wide pH range**.

➔ **SEPIPLUS™ 265** in the presence of electrolytes has thickening properties which depend on the pH. **From pH 5, SEPIPLUS™ 265 is the essential formulation partner for thickening your electrolyte-rich formulas**.

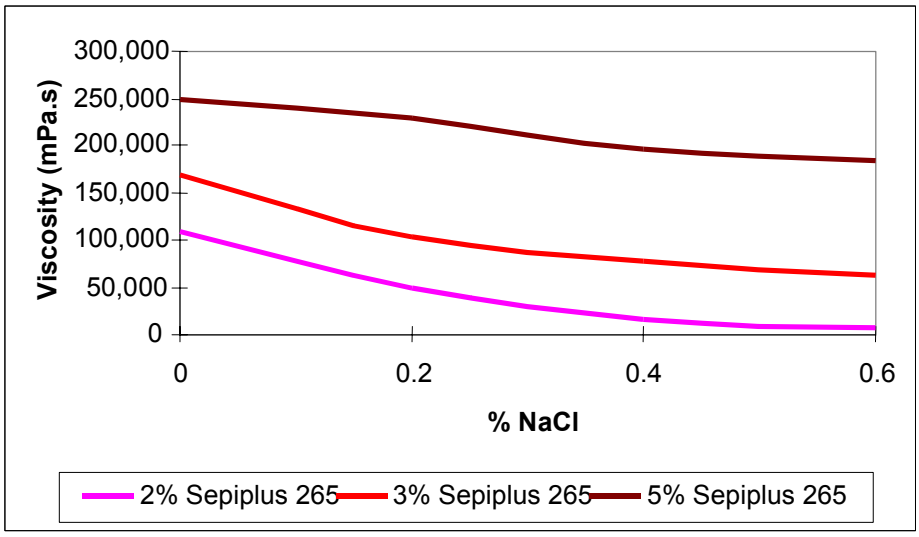
- **Thickening power in the presence of increasing NaCl concentrations**

Graph 6: Changes in the **viscosity of SEPIPLUS™400 aqueous gel** as a function of NaCl concentration



Formulas tested: SEPIPLUS™ 400 2% or 3% or 5%/NaCl X%/water qs.
pH approx. 6, viscosities measured with Brookfield LVT S6

Graph 7: Changes in the **viscosity of SEPIPLUS™265 aqueous gels** as a function of NaCl concentration



Formulas tested: SEPIPLUS™ 265 2% or 3% or 5%/NaCl X%/water qs/pH approx. 6.
Viscosities measured with Brookfield LVT S6

The viscosity of the gels obtained does not change over time (>M1).

- **Thickening power expressed as a function of the ionic strength of the medium**

In order to investigate the thickening capacity of SEPIPLUS™400 in various electrolyte media, it is of interest to examine the behaviour of SEPIPLUS™400 with respect to ionic strength. The ionic strength of a solution is a function of the concentration and the value of the ions present:

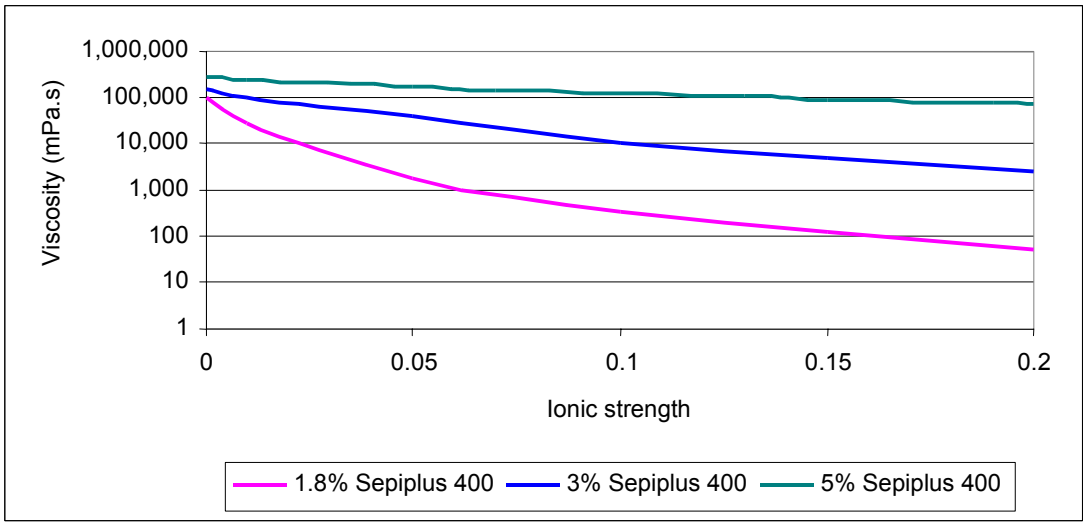
Ionic strength: $I = 0.5 \times \Sigma (Ci \times Zi^2)$

Ci: concentration of the hydrated ion (mol/l)
Zi: valency of the ion

The table below gives some practical equivalences between ionic strength and salt concentration:

Salt concentration	Ionic strength
0.2% NaCl or 0.1% MgCl2	0.03
0.5% NaCl or 0.3% MgCl2	0.09
0.6% NaCl	0.1
0.9% NaCl or 1.1% KCl	0.15

Graph 8: Changes in the **viscosity of electrolyte-rich aqueous gels** as a function of the SEPIPLUS™400 concentration



Formulas tested: SEPIPLUS™ 400 1.8% or 3% or 5%/NaCl or KCl or MgCl2 qs ionic strength/water qs/pH approx. 6. Viscosities measured with Brookfield LVT S6

The viscosity of the gels obtained does not change over time (>M1). Additional studies may be necessary to produce aqueous gels on AlCl3.

3.3 – Thickening power in the presence of active ingredients

SEPIPLUS™ thickens and stabilizes formulas containing many **electrolyte-rich active ingredients**, as shown by the studies below. The aqueous gels obtained are stable under extreme conditions: at high temperature, but also in freeze/thaw cycles (- 5 °C/+ 40 °C).

The formulator can choose the most suitable grade of SEPIPLUS™ according to the pH of the formulation.

◊ *if acid pH* ⇒ SEPIPLUS ™ 400

- **3 % glycolic acid at pH 3**
  ⇒ **3.8 %** SEPIPLUS ™ 400 **50 000 mPas**

Or 2% SEPIPLUS 400 + 1% xanthan gum *>50,000 mPa.s*
Or 2% SEPIPLUS 400 + 1% HEC *>50,000 mPa.s*

- **Minerals** rich formula **at pH 5**
  ⇒ cream gel until **90 000 mPas** with **2 %** SEPIPLUS™ 400

◊ *if pH ≥ 5*⇒ SEPIPLUS ™ 265

- **3 % glycolic acid at pH=7**
  ⇒ **4.5 %** SEPIPLUS ™ 265 **50 000 mPas**

Or 2% SEPIPLUS 265 + 1% Acrylates/C10-30 acrylate crosspolymer *>30,000mPa.s*
Or 2% SEPIPLUS 265 + 1% xanthan gum *>30,000 mPa.s*
Or 2% SEPIPLUS 265 + 1% HEC *>30,000mPa.s*

- **2 % phenylbenzimidazole sulfonic acid at pH 7,2**
  ⇒ **2.7 %** SEPIPLUS ™ 265 **50 000 mPas**

- **10 % Na Lactate at pH 7**
  ⇒ **4.8 %** SEPIPLUS ™ 265 **50 000 mPas**

- **3 % VCPMG** (magnesium ascorbyl phosphate) at **pH 7.5**
  ⇒ **3.9 %** SEPIPLUS ™ 265 **50 000 mPas**

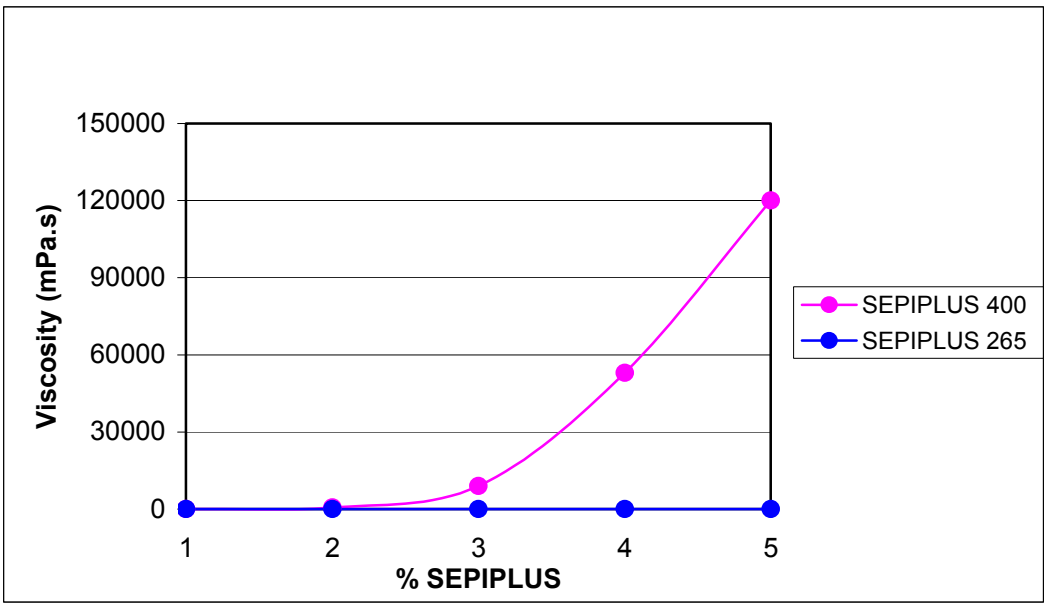
- **4 % Sepicontrol A5 à pH 5,5**
  ⇒*1.5%* SEPIPLUS ™ 265 *+ 0.5%* Acrylates/C10-30 acrylate crosspolymer

SEPIPLUS™ 400 particularly suitable for electrolyte-rich formulas at acidic pH

- **Formulation of glycolic acid in acidic pH**

SEPIPLUS™ 400 can be used to formulate aqueous gels up to 100,000 mPas at pH 3 in the presence of 3% glycolic acid.

Graph9: Viscosity of aqueous gels of glycolic acid at pH 3



Formulas tested: 3% glycolic acid, x% SEPIPLUS™, water qs 100%, pH 3, adjusted with lactic acid. Viscosities measured on Brookfield LVT S6

Under these conditions, there is a synergy of thickening in the presence of 2% Sepiplus 400 and 1% natural polymer (xanthan gum or HEC). The gel has a viscosity of 50 000 mPa.s, (but its texture is very stringy).

- **Formulation of mineral waters in acidic pH**

Mineral waters are used increasingly in the SPA – mineral balance concept. The thickening power of SEPIPLUS™ 400 is particularly effective in such situations, as illustrated in table 1.

Table 1: Thickening of gel-creams based on mineral waters of increasing ionic strength

Mineral water	Equivalent % NaCl	Viscosity SEPIGEL ™ 305	Viscosity SEPIPLUS ™ 400
Evian water (ionic strength = 0.0184)	0.05	37,000	90,000
Contrex water (ionic strength = 0.1125)	0.33	< 50	24,000
Hepar water (ionic strength = 0.1357)	0.44	< 50	10,600

Formulas tested: 15% 2-ethyl hexyl palmitate, 2% HSD polymer, mineral water qs 100%, pH approx. 5, viscosities measured on Brookfield LVT S6.

SEPIPLUS™ 265 particularly suitable for electrolyte-rich formulas at pH ≥ 5.5

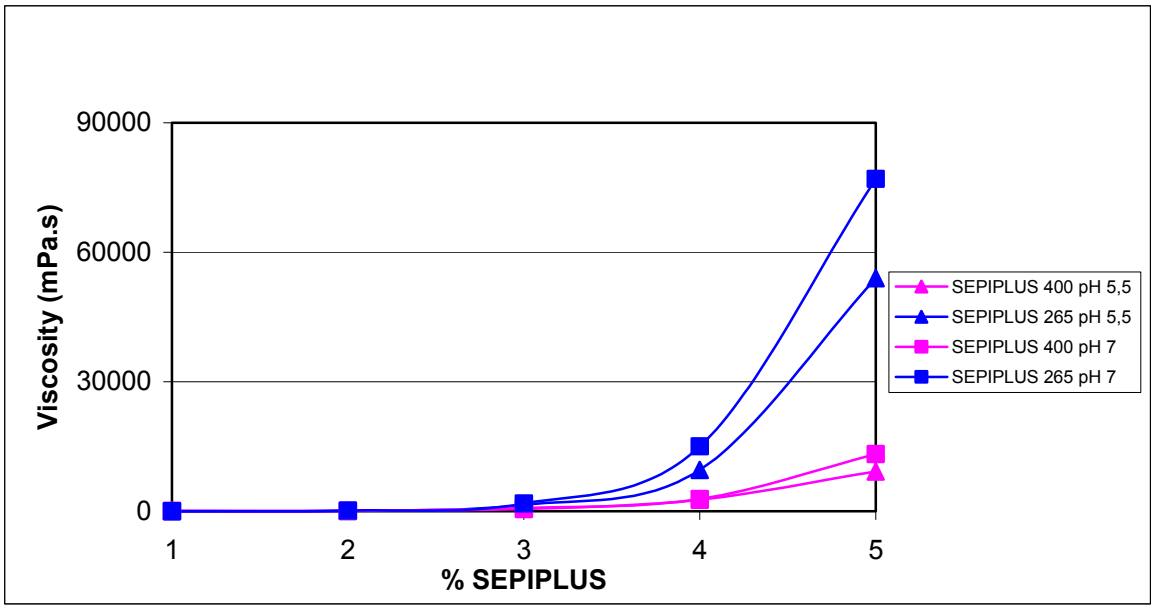
- **Formulation of glycolic acid at pH 5.5 and pH 7**

The thickening of formulas containing glycolic acid at pH 5.5 or above is particularly demanding, since the formulator combines two difficulties:

- presence of electrolytes contributed by the active ingredient in acid form
- presence of electrolytes contributed by the pH adjustment to 5.5 or 7.

In such a case, known to be difficult, SEPIPLUS™ 265 is particularly effective, as shown in graph 10.

Graph 10: Viscosity of aqueous gels of glycolic acid at pH 5.5 and 7



Formulas tested: 3% glycolic acid, x% SEPIPLUS™, water qs. 100%, pH 5.5 or 7 adjusted with triethanolamine. Viscosities measured on Brookfield LVT S6

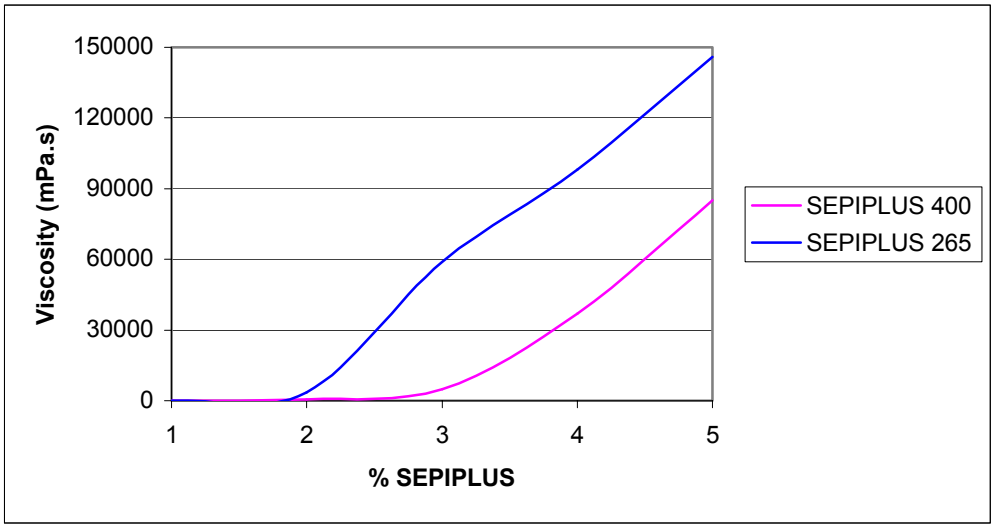
Under these conditions, there is a synergy of thickening :

- in the presence of 2% Sepiplus 265 and 1% natural polymer (xanthan gum or HEC). The gel has a viscosity of 30 000 mPa.s, (but its texture is very stringy).
- in the presence of 2% of Sepiplus 265 and 1% Acrylates/C10-30 acrylate crosspolymer. The gel has a viscosity of 30 000 mPa.s.

- **Formulation of phenylbenzimidazole sulphonic acid (pH = 7.2)**

SEPIPLUS™ 265 can be used to formulate aqueous gels up to 100,000 mPas or more in the presence of 2% phenylbenzimidazole sulphonic acid, a very electrolyte-rich sunscreen reputed to be difficult to thicken.

Graph 11: Viscosity of aqueous gels of phenylbenzimidazole sulphonic acid (pH 7.2)



Formulas tested: x% active ingredient under test, y% Sepiplus™ 265, 0.3% Sepicide™ HB, 0.2% Sepicide™ CI, water qs 100%, pH approx. 5 (except Mg ascorbyl phosphate pH 7)

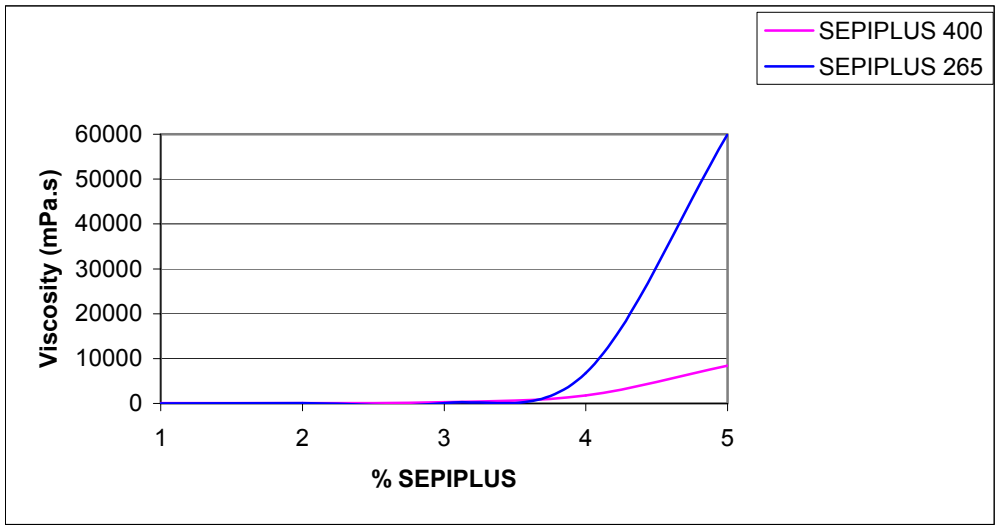
Consult our suncare formula "Protective gel-cream 6977 A" containing 2% phenylbenzimidazole sulphonic acid at pH 7.2.

➔ In this case **3% SEPIPLUS™ 265** gives a viscosity of **100,000 mPas**

- **Formulation of sodium lactate**

SEPIPLUS™ 265 can be used to formulate aqueous gels containing 10% sodium lactate (pH 7) with viscosities up to 50,000 mPas or more.

Graph 12: Viscosity of aqueous gels of sodium lactate (pH 7.2)

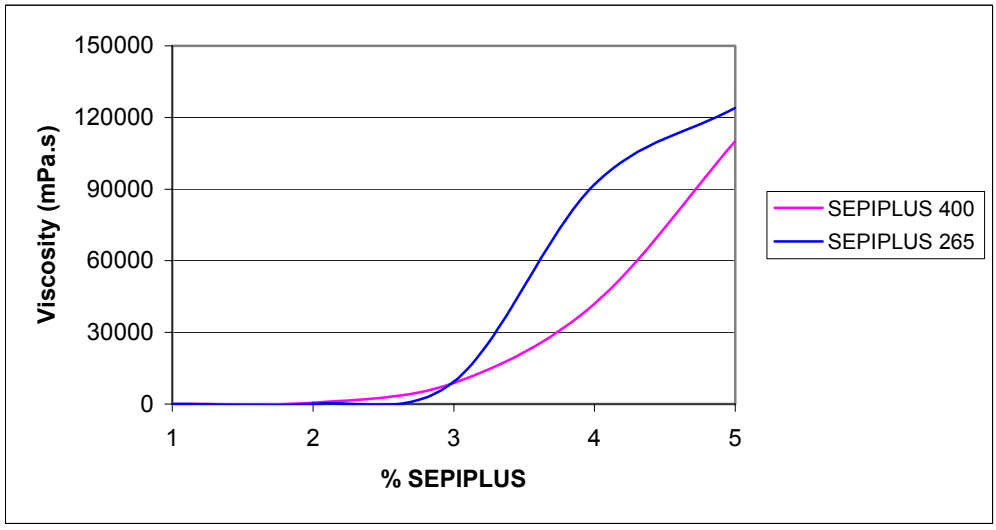


Formulas tested: 10% sodium lactate, x% SEPIPLUS™, water qs 100%, pH 7 adjusted with triethanolamine. Viscosities measured on Brookfield LVT S6

- **Formulation of VCPMG, a bleaching agent reputed to be "difficult"**

SEPIPLUS™ 265 can be used to obtain aqueous gels containing 3% magnesium ascorbyl phosphate (VCPMG) with viscosities up to 90,000 mPas.

Graph 13: Viscosity of aqueous gels of VCPMG (pH 7.2)



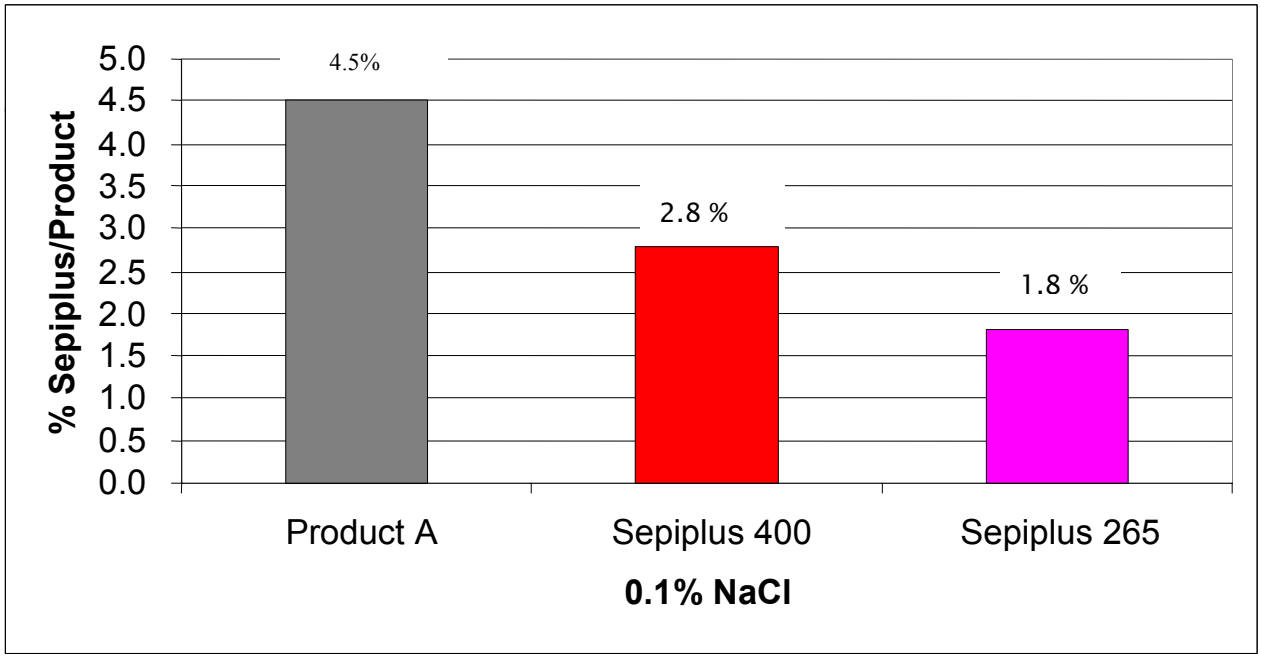
Formulas tested: 3% VCPMG, x% SEPIPLUS™, water qs. 100%, pH 7.5 adjusted with triethanolamine. Viscosities measured on Brookfield LVT S6

3.4 – Thickening power effective at low use level

In order to compare the thickening power of different polymers, a very simple protocol is used to reproduce the customary conditions of use in cosmetic formulation. It consists in producing an aqueous gel of defined viscosity (50,000 mPa.s – Brookfield) in the presence of salt (0.1% NaCl). The polymer concentrations necessary to attain the defined viscosity are the effective concentrations.

SEPIPLUS™ 400, 265 and commercially-available product A (*acrylates/acrylamide copolymer/mineral oil/Polysorbate 85)* were compared, and the results are shown in graph 3.

Graph 14: Comparative study of effective commercial polymer concentrations to obtain a 50,000 mPa.s aqueous gel containing 0.1% NaCl



Formulas tested: polymer qs viscosity 50,000 mPa.s, 0.1% NaCl, water qs 100%, pH 6.5, viscosities measured with Brookfield LVT S6.
Product A: acrylates/acrylamide copolymer/mineral oil/Polysorbate 85

➔ To produce a 50,000 mPa.s aqueous gel containing 0.1% NaCl:

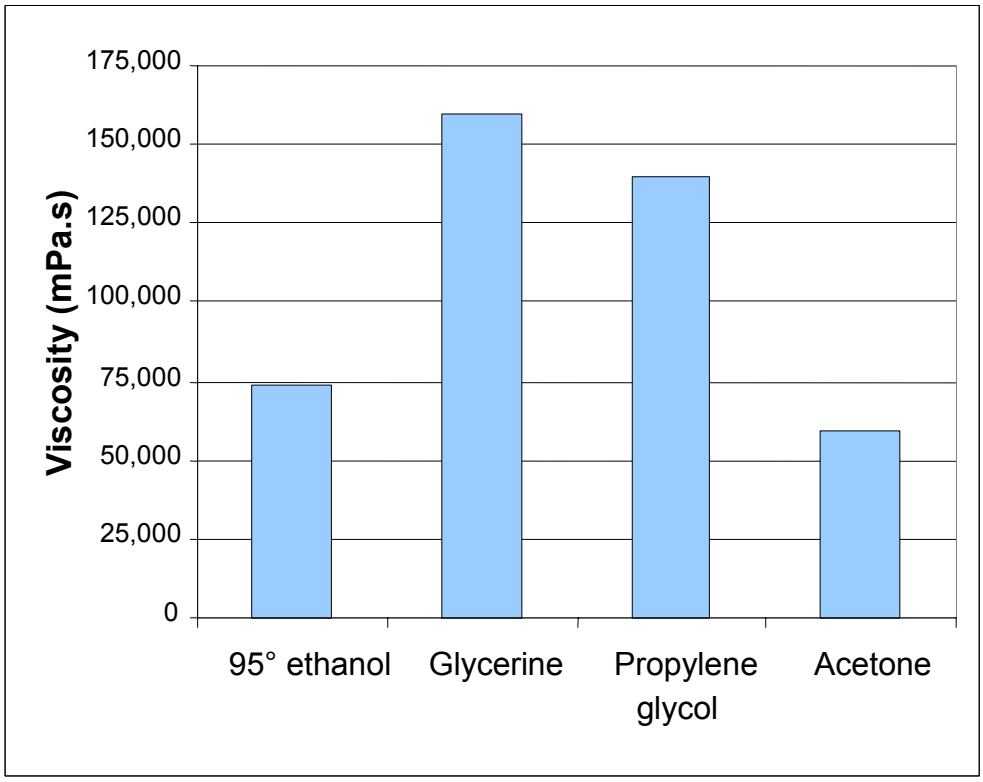
➔ the effective concentration of **SEPIPLUS™400 is 40% less** than that of product A
➔ the effective concentration of **SEPIPLUS™265 is 60% less** than that of product A

SEPIPLUS™ are formulation partners **effective at low use level** for thickening your formulas containing electrolytes.

3.5 – Thickening power the presence of solvents

SEPIPLUS™ can thicken media containing up to 50% polar solvents. The viscosity of the gels obtained does not change over time (> M3).

Graph 15: Thickening power of SEPIPLUS™400 in the presence of solvents (50%)



Formulas tested: 50% solvent, 1.8% SEPIPLUS™400, water qs 100%.
pH approx. 5 – 6, viscosities measured with Brookfield LVT S6.

➔ Thanks to its ability to thicken solvent-rich media, SEPIPLUS™ is the essential formulation partner for slimming gels, heavy-legs formulas, dissolving gels, hair gels, masks, skin care serums, "aromatherapy" products rich in essential oils, etc.

- **Special case of anhydrous gels**
  By selecting a suitable solvent, it is also possible to produce anhydrous gels based on SEPIPLUS™. Glycerine, at 98.1% with 1.8% SEPIPLUS™ 400 + 0.1% Polysorbate 20, can be used to formulate opaque gels with very high viscosity of around 600,000 mPa.s (viscosity Brookfield RV speed 5). Implementation of a high shear process is recommended in this case.

4 – SEPIPLUS™, a powerful emulsifier-stabilizer

The unique characteristic of SEPIPLUS™ consists in combining:

- an aqueous medium **thickening** capacity with
- an oil phase **emulsifying** and stabilizing capacity, even at low viscosity.

The SEPIPLUS™ are the only polymers on the market that show such versatility.

- **Whatever the nature of the oil**

The emulsifying capacity of SEPIPLUS™ is confirmed on oil phases of very different natures (refer to table 3). The gel-creams obtained are highly stable under extreme conditions: high temperature, but also in freeze/thaw cycles (-5/+40 °C).

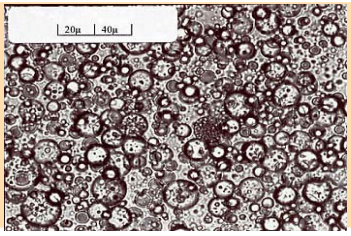
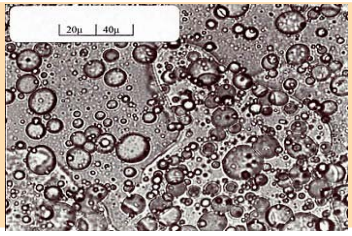
Table 2: Emulsifying capacity of SEPIPLUS™ 400 with different oil phases

	SEPIPLUS™ 400 1.8% ; oil phase 15%, water qs 100%			
Oil phase under test	Vegetable oils	Silicone oils	Mineral oils	Esters
Viscosity (mPa.s) *(Brookfield RV, speed 5)*	> 100,000	> 100,000	> 100,000	> 100,000
Stability *1 month at 50 °C*	Stable	Stable	Stable	Stable

- **Capable of emulsifying large quantities of oil**

As shown in table 4, SEPIPLUS™ is capable of emulsifying up to 50% polar or nonpolar oil phase.

Table 3: Emulsifying capacity of SEPIPLUS™ 400 with polar and nonpolar oil phases

	Triglyceride C8-C10	***Mineral oil***
Viscosité mPas	***> 100 000***	***> 100 000***
Stabilité (1 mois) ***à 50°C***	***Stable***	***Stable***
Aspect microscopique J7		

Formulas tested: 50% oil phase, 1.8% SEPIPLUS™400, water qs 100%, pHi 5.5/Viscosities measured with Brookfield LVT S6.

- **Emulsifying capacity independent of the viscosity**

The great novelty of SEPIPLUS™, like SEPIGEL™ 305, is its capacity to emulsify oil phases independently of the final viscosity of the formula. As shown in table 5, other commercially-available polymers do not have such performance.

Table 4: Stability of cream-gels formulated with SEPIPLUS™ 400 at 2 different viscosities: 20,000 mPa.s and 50,000 mPa.s.

Polymer	Sepigel™ 305	SEPIPLUS™ 265	SEPIPLUS™ 400	Acrylates/ acrylamide copolymer /mineral oil /polysorbate 85	Acrylates/C10-30 alkyl acrylates crosspolymer	Ammonium acryloyl-dimethyltaurate/ vinylpyrolidone copolymer	Acrylic polymer
CREAM-GEL 20,000 mPa.S							
Content	1.3%	0.65%	0.7%	0.9%	0.2%	0.5%	0.2%
Stability at RT	Stable > M3	Stable > M3	Stable > M3	Unstable	Unstable	Unstable	Unstable
CREAM-GEL 50,000 mPa.S							
Content	2 %	1 %	1 %	2,5 %	0,7 %	0,75 %	0,3 %
Stability at RT	Stable > M3	Stable > M3	Stable > M3	Unstable	Stable > M3	Unstable	Unstable

Formulas tested: 15% cetearyl octanoate, SEPIPLUS™400 qs viscosity, 1% Sepicide LD, water qs 100%, pH 5- 6/Viscosities measured with Brookfield LVT S6.

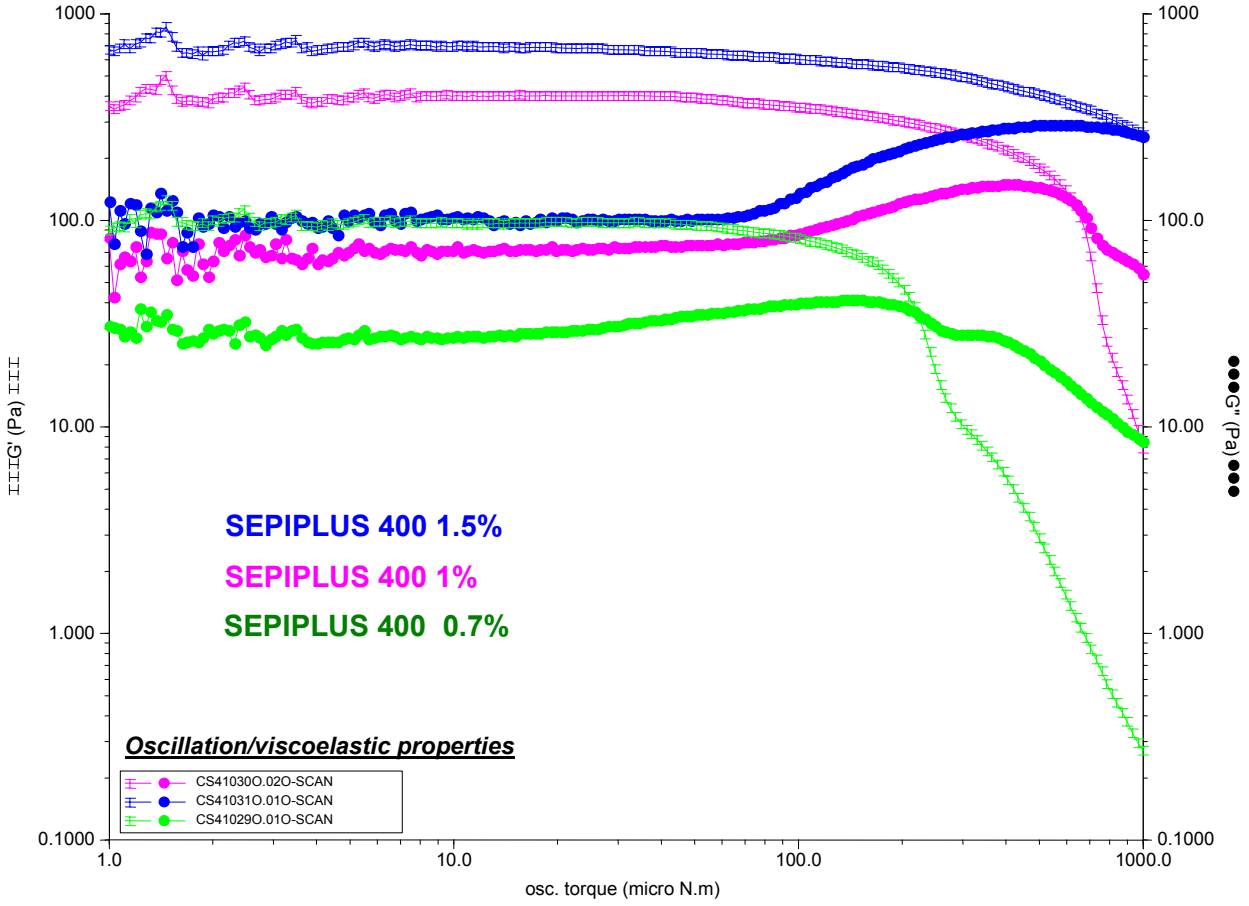
In the gel-cream formulation studied (based on 15% cetearyl octanoate), both SEPIPLUS™ 400 and 265 are remarkable emulsifiers.

These results are corroborated by the rheological analysis of SEPIPLUS™400 gels (see graph 6).

Table 5 : Viscoelastic properties of aqueous gels containing 0.7%, 1% or 1.5% SEPIPLUS™400

SEPIPLUS™400	Aqueous gel 0.7%	Aqueous gel 1%	Aqueous gel 1.5%
Elastic component – mean G'	103	397	677
Viscous component – mean G"	31	70	101
G'/G"	**3.4**	**5.6**	**6.7**

Graph 16: Viscoelastic properties of aqueous gels containing SEPIPLUS™400



Graph 16 shows two characteristics of SEPIPLUS™:

- a concentration-dependent elastic character
- a highly elastic character (G'/G" = 3.4) at concentrations from 0.7%, i.e. a 20,000 mPa.s aqueous gel.

This explains the **excellent stability and reproducibility of gels and cream-gels produced using SEPIPLUS™, including at low viscosity**.

5 – SEPIPLUS™, sensory profile

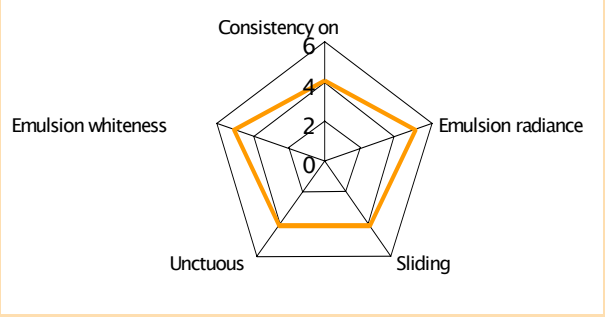
The sensory profile of SEPIPLUS™400 was established using a very simple cream-gel (SEPPIC formula 6961):

2-ethyl hexyl palmitate 15%, SEPIPLUS™400 2%, mineral water qs 100%
Viscosity (Brookfield RVT S5): 100,000 mPa.s, pH 5.5

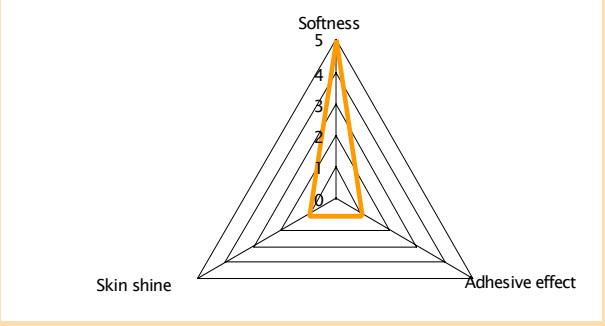
This cream-gel was tested by 5 panelists who scored the following sensory characteristics:

- *<u>Assessment on application</u>*
  emulsion whiteness
  emulsion radiance
  spreading consistency
  sliding effect
  unctuous feel on spreading
- *<u>Feelings after spreading</u>*
  softness on the skin
  residual shininess on the skin
  adhesive effect on the skin

Assessment on spreading



Sensations after spreading



The sensory analysis shows that gel-cream 6961, based on SEPIPLUS™400, has the following characteristics:

- **creamy and consistent texture**
- silicone-like **glide-on spreading**
- **soft**, non-tacky **film** on the skin
- **white and glossy** emulsion.

6 – Formulation advice

6.1 – Instructions

SEPIPLUS™ is fully resistant to shear and high temperatures. This property offers a great deal of freedom in the use of the product.

- **Aqueous gel :** add SEPIPLUS™ to the aqueous phase while agitating mechanically (deflocculator, anchor, propeller)

- **Cream gel :** disperse preferentially SEPIPLUS™ in the oily phase. Then add water all at once while agitating (anchor, deflocculator, rotor-stator + scraper).

  Specific recommendations:

  ↳ Tinted cream-gel: formulation with mineral filters
  Add the pigment paste to the cream-gel produced at the end of the process .

  ↳ Consistent cream-gel: formulation with waxes (hot process)
  Heat the oily phase containing the waxes to 80°C. Add HSD polymer to this pre-heated oily phase then add the aqueous phase. Start mechanical agitation (rotor-stator in combination with a scraper or an anchor)

  ↳ Very fluid formulations: wipes (viscosities < 5 000 mPa.s)
  Disperse HSD polymer in the oily phase. Add this mix to a proportion of the water (30 to 50%), agitate, add the rest of the water and agitate again.

- **Emulsion :** Disperse SEPIPLUS™ in the pre-heated oily phase (if necessary) or the aqueous phase before emulsification. Emulsify then cool with anchor agitation.

  Other process :

  ↳ Incorporation of the polymer immediately after emulsification or during the cooling phase

  Specific recommendation:

  ↳ Tinted emulsion: formulation with mineral filters
  Add the pigment paste to the aqueous phase before emulsification.

- **Hydroalcoholic gel** : It is advisable to prepare the aqueous gel first, then add the solvent gradually with stirring.

Some tips : it is preferable to:

↳ add the electrolytes at the end of the process

↳ In particularly difficult cases, if the thickening capacity of SEPIPLUS™ is insufficient, it is advisable to form synergistic combinations, for example with cellulose derivatives, xanthan gums, guar gums, vinyl polymers or any other type of polymer.

6.2 - Concentration

In emulsions, when SEPIPLUS™ is used as thickener-stabilizer, its concentration can be from **0.2% to 3%**, depending on the nature of the other ingredients of the formula.

In cream-gel, when SEPIPLUS™ is used as the sole emulsifier of the formula, its concentration can be between **0.5 and 3%**, depending on the nature of the other ingredients of the formula.

7 – Technical data

7.1 – Toxicological data

The good tolerance of SEPIPLUS™ 400 and 265 was assessed using the customary cosmetics methods.

HET-CAM

● SEPIPLUS™400 was tested at 3% in water using the HET-CAM technique (method published in the French official journal on 26/12/1996).
→ Under these conditions, SEPIPLUS™ 400 is classified as **non-irritant** with a score = 0 (SEPPIC expert report HET-CAM 2581)

● SEPIPLUS™265 was tested at 3% in water using the HET-CAM technique (method published in the French official journal on 26/12/1996).
→ Under these conditions, SEPIPLUS™ 265 is classified as **non-irritant** with a score = 0 (SEPPIC expert report HET-CAM 2630)

RBCA

SEPIPLUS™400

- Haemolyzing capacity

The haemolyzing capacity of SEPIPLUS™400 on red blood cells was assessed using the technique published by INVITTOX no. 37.
The test consists in determining the test product concentration causing lysis of 50% of the red blood cells, using a dose-response curve prepared simultaneously. This value is identified L.
In the case of SEPIPLUS™400, diluted to 5%, the result obtained was L>1000 µl: SEPIPLUS™400 is classified as **non-haemolyzing**.

- Denaturing capacity

The denaturing capacity assessment consists in measuring the degree of denaturation of oxyhaemoglobin. This effect, secondary to the haemolysis, provides indications on the alteration of intracellular proteins.

SEPIPLUS™400, diluted to 5%, was assessed on this criterion according to the INVITTOX 37 recommendations. The denaturation index obtained was 6%; consequently SEPIPLUS™400 is considered to be **non-denaturing**.

→ Tested using the RBCA technique, SEPIPLUS™400 diluted to 3% is classified as **non-irritant**, with a ratio L/D > 100 (SEPPIC expert report RBCA 993).

SEPIPLUS™265

- Haemolyzing capacity

The haemolyzing capacity of SEPIPLUS™265 on red blood cells was assessed using the technique published by INVITTOX no. 37.
The test consists in determining the test product concentration causing lysis of 50% of the red blood cells, using a dose-response curve prepared simultaneously. This value is identified L.
In the case of SEPIPLUS™265, diluted to 5%, the result obtained was L>1000 µl: SEPIPLUS™265 is classified as **non-haemolyzing**.

- Denaturing capacity

The denaturing capacity assessment consists in measuring the degree of denaturation of oxyhaemoglobin. This effect, secondary to the haemolysis, provides indications on the alteration of intracellular proteins.

SEPIPLUS™265, diluted to 5.5%, was assessed on this criterion according to the INVITTOX 37 recommendations. The denaturation index obtained was 8%; consequently SEPIPLUS™265 is considered to be **non-denaturing**.

→ Tested using the RBCA technique, SEPIPLUS™265 diluted to 3% is classified as **non-irritant**, with a ratio L/D > 100 (SEPPIC expert report RBCA 994).

Patch test

● SEPIPLUS™ 400 was tested in an occlusive patch test for 48 hours on 20 healthy volunteers, diluted to 3.00% and 4.60% in water.
→ Tested at these two concentrations, SEPIPLUS™ 400 *is classified as* ***non-irritant*** (expert reports DERMSCAN 1040031 LCE04001 – 58734 a confidential and DERMSCAN 1040031 LCE04002 – 58735 a confidential).

● SEPIPLUS™ 265 was tested in an occlusive patch test for 48 hours on 20 healthy volunteers, diluted to 5.00% in water.
→ Tested under these conditions, SEPIPLUS™ 265 *is classified as* ***non-irritant*** (expert report DERMSCAN DN – 153 1040389 LCE04018 f/a confidential).

Sensitization

SEPIPLUS™400 was tested at 5.00% on a panel of 49 healthy volunteers according to the MARZULLI-MAIBACH protocol. SEPIPLUS™400 is considered ***non-irritant*** and ***non-sensitizing*** (expert report ASTER PC 3504).

SEPIPLUS™265 was tested at 5.00% on a panel of 49 healthy volunteers according to the MARZULLI-MAIBACH protocol. SEPIPLUS™265 is considered ***non-irritant*** and ***non-sensitizing*** (expert report DERMSCAN LISKIN DN-289/PALMER 05E0078).

Ames test

SEPIPLUS™400
According to the AMES test, SEPIPLUS™400 is considered to be **non-mutagenic** (LEMI expert report 2004-DTT662-2 FINAL LCE04003 fr/en confidential).

SEPIPLUS™265
According to the AMES test, SEPIPLUS™ 265 is considered to be **non-mutagenic** (LEMI expert report AMES 2004 – DTT662-5 LCE 04048 en/fr confidential).

The maximum recommended utilization concentration of SEPIPLUS™400 and 265 is 5% in cosmetics applications. The SEPIPLUS™ 400 and 265 safety data sheet must be consulted before any handling.

7.2 - Analytical data

- SEPIPLUS™ 400

	Results	Methods
20°C Aspect	Emulsion translucent to opaque	Visual
pH 2% in water	5.0 – 6.5	NFT 73 206
Viscosity at 2% in water	80,000 – 130,000 mPas	Brookfield RVT, M6, 5rpm
Viscosity at 2% in water + 0.1% NaCl	10,000 – 30,000 mPas	Brookfield RVT, M3, 5rpm
Residual Acrylamide	2 ppm	Seppic 52-174E

- SEPIPLUS™ 265

	Results	Methods
20°C Appearance	Emulsion translucent to opaque	Visual
pH 2% in water	5.0 – 6.5	NFT 73 206
Viscosity at 2% in water	65,000 – 90,000 mPas	Brookfield RVT, M6, 5rpm
Viscosity at 2% in water + 0.1% NaCl	35,000 – 65,000 mPas	Brookfield RVT, M5, 5rpm
Residual Acrylamide	2 ppm	Seppic 52-174E

Note: The values below are given for guidance; only the analysis certificate supplied with each batch guarantees the product specification.

7.3 – Regulatory data

- SEPIPLUS™ 400

INCI name : *Polyacrylate 13/Polyisobutene/Polysorbate 20*

CAS no. : *152728-72-8/90003-27-4/9005-64-5*

EINECS/ELINCS no. : not relevant

Regulatory status :
Europe, USA, Japan : authorized for cosmetic applications
Australia: Not authorized for cosmetic applications
Canada: authorized for cosmetic applications (recent notification)

- SEPIPLUS™ 265

INCI name : *Acrylamide / Ammonium acrylate copolymer (and) Polyisobutene (and) Polysorbate 20*

CAS no. : *26100-47-0/90003-27-4/9005-64-5*

EINECS/ELINCS no. : not relevant

Regulatory status :
Europe, USA, Japan : authorized for cosmetic applications
Australia: authorized for cosmetic applications (listed on the AICS list)
Canada: authorized for cosmetic applications (listed on the DSL lists, 4 May 2004).

8 - Applications

SEPIPLUS™ is an indispensable partner for cosmetic formulation. It can be used easily in the development of gels, gel-creams, and emulsions. It can be also used as stabilizer of multiple emulsions.

SEPIPLUS™ can be used in a very wide range of applications:

- foundations, coloured gels,
- sun protection and after-sun products
- mascaras,
- cleansers,
- baby lotions,
- skin-care products,
- products containing heat-sensitive or pH-dependent active ingredients,
- pigment removers,
- self-tanning products,
- bleaching agents,
- hair colour products,
- cream-gels, emulsion-gels, …etc.

PLEASURES OF MINERAL BALANCE
CREAM GEL
6961A

Formula

A	• Chlorphenesin	0.2 %
	• Ethanol	1.0%
B	• **SEPIPLUS™ 400** *(Polyacrylate 13 & Polyisobutene & Polysorbate 20 – SEPPIC)*	2.0 %
	• Ethyl hexyl palmitate	15.0 %
C	• Aqua mineral / Mineral Water	Qsp 100 %
D	• **SEPICIDE™ HB** *(Phenoxyethanol/Methylparaben/Ethylparaben /Propylparaben /Butylparaben - SEPPIC)*	0.3 %
	• Parfum / Fragrance	0.2 %

Procedure

Solubilize Chlorphenesin in ethanol under mixing during 5 minutes.
Disperse SEPIPLUS™ in oil to prepare phase B.
Add mineral water in phase B under mixing.
When the cream-gel is made, add Chlorphenesin solubilized in ethanol, then phase D.

Comments

SEPIPLUS™ 400 A New generation of « Hydro Swelling Droplet » polymers, for improved performance. SEPIPLUS™ polymers are designed to give an improved electrolyte resistance profile and stronger emulsifying properties. SEPIPLUS™ 400 is particulary designed to be effective on a wide pH range. Thickening and emulsifying agents in ready to use liquid form (neither predispersion nor neutralization).

SEPICIDE™ HB Preservative.

Characteristics

Appearance	Shiny white cream
pH	approx. 7
Viscosity	around 100, 000mPa.s Brookfield RVT V6
Stability	Stable at RT, 40 °C, 50 °C

Notes

Fragrance: Garden Hotel Ref RS11744 (TECHNICO FLOR)
Mineral water: Evian

MANDARIN COMFORT
GEL-CREAM
6962

Formula

A	• **SEPIPLUS™ 400** *(Polyacrylate 13 & Polyisobutene & Polysorbate 20 – SEPPIC)*	3.0%
	• Aqua/Water	Qs 100%
B	• Lemon essential oil	2.0%
	• Ethyl hexyl palmitate	20.0%
	• Plant squalane	5.0%
C	• **SEPICIDE™ HB** *(Phenoxyethanol/Methylparaben/Ethylparaben /Propylparaben /Butylparaben - SEPPIC)*	0.3%
	• **SEPICIDE™ CI** *(Imidazolidinyl urea - SEPPIC)*	0.2%
	• Parfum/Fragrance	0.2%
	• Colorant/Dye	0.3%

Comments

SEPIPLUS™ 400 A New generation of « Hydro Swelling Droplet » polymers, for improved performance. SEPIPLUS™ polymers are designed to give an improved electrolyte resistance profile and stronger emulsifying properties. SEPIPLUS™ 400 is particulary designed to be effective on a wide pH range. Thickening and emulsifying agents in ready to use liquid form (neither predispersion nor neutralization).

SEPICIDE™ HB Preservative.

SEPICIDE™ CI Preservative.

Characteristics

Appearance	Shiny orange cream
pH	Around 6
Viscosity	Around 150, 000mPa.s (Brookfield RV S7)
Stability	Stable at RT- 40°C – 50°C

Notes

Fragrance: Cocktail Mandarine Energisant Ref E11464 (MANE)
Dye: Orange Ref W2000 at 1% (WACKHERR)

SELF-TANNING LIGHT EMULSION
6963

Formula

A	• Dihydroxyacetone • Aqua/Water	5.0% 6.0%
B	• **MONTANOV™ 202** *(Arachidyl alcohol and Behenyl alcohol and Arachidylglucoside - SEPPIC)* • Ethyl hexyl palmitate • **SEPIPLUS™ 400** *(Polyacrylate 13 & Polyisobutene & Polysorbate 20 – SEPPIC)*	2.0% 20.0% 1.0%
C	• Aqua/Water	Qs 100%
D	• Parfum/Fragrance • Lactic acid • **SEPICIDE™ HB** *(Phenoxyethanol/Methylparaben/Ethylparaben /Propylparaben /Butylparaben - SEPPIC)*	0.2% 0.03% 1.0%

Procedure

Solubilize the DHA with magnetic stirring.
Heat MONTANOV™ and the ester at 80°C and add SEPIPLUS™.
Introduce phase C into phase B in one step and homogenize with high shear for few minutes (rotor/stator turbine).
Cool the emulsion under moderate stirring and introduce phase D and A at around 30°C.
Check that the final pH of the emulsion is between 4.5 and 5, adjust it if necessary.

Comments

SEPIPLUS™ 400 A New generation of « Hydro Swelling Droplet » polymers, for improved performance. SEPIPLUS™ polymers are designed to give an improved electrolyte resistance profile and stronger emulsifying properties. SEPIPLUS™ 400 is particulary designed to be effective on a wide pH range. Thickening and emulsifying agents in ready to use liquid form (neither predispersion nor neutralization).

MONTANOV™ 202 Glucolipid emulsifier in harmony with nature. It produces emulsions with a very light, evanescent feel that are easy to apply and rapidly absorbed. These emulsions leave the skin feeling soft and non-greasy. Their matt finish effect helps prevent shine. MONTANOV 202 can promote liquid crystals according to the emulsion diagram, creating water reservoirs within the emulsion to help maintain skin moisturization. In combination with the other grades of the MONTANOV range, MONTANOV 202 can be used to modulate the texture and flexibility of the emulsions as desired.

SEPICIDE™ HB Preservative.

Characteristics

Appearance	White cream
pH	Around 4.8
Viscosity	Around. 80,000 mPa.s
Stability	Stable at RT, 40 °C, 50 °C

Notes

Fragrance: Aromacalm Ref U220353 (QUEST)

PROTECTIVE SUN CREAM GEL
6977A

Formula

A	• Phenylbenzimidazole sulfonic acid	2.0 %
	• Sodium hydroxide	Qs pH 7-7.2
	• Aqua / Water	10.0 %
B	• **SEPIPLUS™ 265** *(Acrylamide ammonium acrylate copolymer & Polyisobutene & Polysorbate 20 – SEPPIC)*	2.5 %
	• Aqua / Water	Qsp 100%
C	• Isodecyl neopentanoate / Diisopropyl sebacate / Lauryl lactate	15.0 %
	• Butyl methoxydibenzoylmethane	1.5 %
	• Ethylhexyl methoxycinnamate	7.5 %
	• Ethylhexyl salicylate	5.0 %
D	• **SEPICIDE™ HB** *(Phenoxyethanol/Methylparaben/Ethylparaben /Propylparaben /Butylparaben - SEPPIC)*	1.0 %
	• Parfum / Fragance	0.1 %

Procedure

Solubilize the Phenylbenzimidazole sulfonic acid in water at 80°C , then adjust the pH around 7.2 with the sodium hydroxide (the mixture should be clear).
Prepare the phase B by solubilizing the butylmethoxydibenzoylmethane into the ester when heating. Then stop heating and add the two other filters (this phase should also be clear). Then add SEPIPLUS™.
Add water into the phase B under mixing.
Introduce slowly the phase A into the cream-gel, under mixing.
Add the phase D.
Check that the final pH of the formula is around 7.2 and adjust it if necessary.

Comments

SEPIPLUS™ 265 A New generation of « Hydro Swelling Droplet » polymers, for improved performance. SEPIPLUS™ is designed to give an improved electrolyte resistance profile. Compatible with a wide range of actives over a wide pH range (pH 5 to 11). A thickening and emulsifying agent in a liquid form, ready to use (no predispersion or neutralization).

SEPICIDE™ HB Preservative.

Characteristics

Aspect	White cream
pH	Around 7.2
Viscosity	Around 65,000mPa.s
Stability	Stable at RT – 40°C – 50°C

Notes

Phenylbenzimidazole sulfonic acid : Eusolex 232 (MERCK)
Butyl methoxydibenzoylmethane : Parsol 1789 (ROCHE)
Ethylhexyl methoxycinnamate : Uvinul MC80 (BASF)
Ethylhexyl salicylate : Eusolex OS (MERCK)
Parfum : Aromatonic Ref U215750 (QUEST)
Isodecyl neopentanoate / Diisopropyl sebacate / Lauryl lactate: DUB SYNERSOL (STEARINERIE DUBOIS)

MOISTURIZING BODY LOTION – DRY SKIN
6982B

Formula

A	• **LANOL 99** *(isononyl isononanoate – SEPPIC)*	3.00 %
	• Dimethicone	1.00 %
	• **SIMULSOL 165** *(Glyceryl stearate and PEG-100 stearate - SEPPIC)*	2.00 %
	• **MONTANOV 202** *(Arachidyl alcohol & behenyl alcohol & arachidyl glucoside - SEPPIC)*	1.00 %
B	• Aqua/Water	Up to 100%
	• Glycerin	5.00 %
C	• Isohexadecane	3.00 %
	• **SEPIPLUS 400** *(Polyacrylate-13 & polyisobutène & polysorbate 20 – SEPPIC)*	0.30 %
D	• **SEPICIDE HB** *(Phenoxyethanol/Methylparaben/Ethylparaben /Propylparaben /Butylparaben - SEPPIC)*	0.30 %
	• DMDM Hydantoïn	0.20 %
	• Fragrance	0.15 %

Procedure

Heat fatty phase A to 80°C and aqueous phase to the same temperature. Introduce A into the aqueous phase and homogenize with a rotor stator (1500 rpm DUMEK – 2kg batch) for 10'. After 4' introduce isohexadecane and SEPIPLUS 400 under homogenisation. When stopping homogenisation, begin to cool slowly and add ingredients of phase D at about 30°C: at this step homogenize again for 1'. Adjust final pH if necessary

Comments

MONTANOV 202 Glucolipid emulsifier in harmony with nature. It produces emulsions with a very light, evanescent feel that are easy to apply and rapidly absorbed. These emulsions leave the skin feeling soft and non-greasy.

SIMULSOL 165 Self emulsifying base. Can be used synergistically with any emulsifier of MONTANOV range in order to produce smooth and stable creams.

SEPIPLUS™ 400 A New generation of « Hydro Swelling Droplet » polymers, for improved performance. SEPIPLUS™ is designed to give an improved electrolyte resistance profile. Compatible with a wide range of actives over a wide pH range (pH 3 to 11). A thickening and emulsifying agent in a liquid form, ready to use (no predispersion or neutralization).

LANOL 99 Silky ester.

SEPICIDE HB Preservative.

Characteristics

Appearance	White lotion
PH	5.6
Viscosity	15,000mPa.s (Brookfield LV4 S6)
Stability	Stable at room temperature – 40°C – 50°C Stable after 18h at –18°C Stable when centrifuged 20' at 3000rpm

Notes

Dimethicone : DC200.350 (DOW CORNING)
Isohexadecane (EXXON)
Fragrance: delice figues RS12021 (TECHNICOFLOR)

Nota

The analytical specifications warranted are only those mentioned on the certificate of analysis supplied with each delivery of the product.

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