PROTELAN ENS

A versatile self-emulsifying base

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I. INTRODUCTION

An emulsion is a two or three phases system; if we examine the most simple type of emulsions (that is a two phase emulsion) we can find an inner phase (droplets) in a continuous external phase with surfactants spontaneously adsorbed to the interface between the two mutually insoluble liquids and thickeners lending viscosity to the continuous phase. The surfactants used to stabilize this system are called emulsifier or emulsifying agents.
The selection of a suitable emulsifying agent is not an easy process and often it is a compromise between the desired performance properties of the emulsion and practical problems.
Many attempts were made in the past to find a systematic method able to assist in the right choice of an emulsifier. One of the most useful was the HLB system proposed by Griffin. Of course, it had some strong limitations (for example it considers the emulsifying agent in isolation) but it was the first scientific device to work with emulsions.
HLB values can be now calculated in many ways; the common aim is however to assign an HLB value to the oil to be emulsified and to find an emulsifier with the same HLB value. The better the match, the longer the stability of the emulsion, even if the question is not so easy to handle.
Thousands of emulsifiers are now commercially available. These surface active molecules may be broadly classified as anionic (*e.g.*, soap), cationic (*e.g.*, quaternaries), nonionics (*e.g.*, ethylene oxide adducts), and amphoterics or ampholytics (*e.g.*, betaines).
To obtain a stable emulsion is however necessary not only to have a surfactant with the same HLB of the emollient you want to emulsify but also to have a consistence factor, that is a molecule able to act as a coemulsifier and responsible for the consistence and stability of the emulsion itself.
Protelan ENS (Emulsifying Natural System) is a self-emulsifying that joins the effectiveness of an anionic surfactant with the action of non ionic and anionic coemulsifiers.

II. THEORY

As seen in the previous paragraph, oil-in-water emulsions are traditionally analyzed in terms of a two phase model with oil droplets in a continuous water phase, surfactants (amphiphiles) stabilizing the interface and thickeners lending viscosity to the continuous phase. More modern interpretations involve a three phase model of oil, water and liquid crystalline (LC) gel network structures. Mixed surfactants comprised of anionic and low HLB nonionic emulsifiers build liquid crystalline structures in the continuous (water) phase. Such structures both stabilize the oil/water interface and lend viscosity to the bulk.

Gel network formers are low HLB nonionic surfactants with linear hydrocarbon chains that are solid at room temperature. Mixed with water and heated above their melting points, these surfactants form a lamellar phase. Upon re-cooling, gel networks form at around the melting point of the hydrocarbon chains.

The mechanism of the gel network formation can be described as follows. In a first step the hydrophilic surfactant such as acyl aminoacid builds in the aqueous phase micelles that are present in a spherical form. In the presence of hydrophobic gel network formers such micelles grow and change their shape to disk types and with increasing concentrations of the co-surfactant to rod sphere micelles. During cooling to the melting point, the rodlike micelles consisting of the hydrophilic surfactant and the gel network forming co-surfactant turn into lamellar liquid crystalline structures and whilst further cooling into rigid liquid crystalline gel networks.

For each combination of gel network formers and “swelling agents” in a particular aqueous system (with particular electrolyte concentration, pH, choice of ingredients etc.), there is an optimal ratio of gellant to swellant to achieve maximum swelling. At such a maximum, the surfactant combination is referred to as “balanced”. Different high HLB surfactants, and consequently different acyl aminoacid type surfactants, will have both different efficacies (amount of swelling achieved at optimum use level) and different efficiencies (amount of swelling per unit of surfactant used) as swelling agents, depending on the system. Once these dynamics are understood, blends can be engineered that are fairly robust against most of the variables encountered in everyday formulations.

III. PROTELAN ENS

Protelan ENS is a new O/W self-emulsifying base, completely vegetable and with outstanding performances
Protelan ENS can be used in emulsions of high cosmetic elegance.
It is able to provide a very nice and silky skin feeling to any type of emulsions and to give in this cosmetic aspect a detectable difference to commonly used emulsifiers.
By variation of the use concentration both creams and lotions can be produced with any available equipment in the industry.
Furthermore an excellent moisturizing effect is provided.
Protelan ENS has a lot of interesting properties. It is able to:

- form liquid cristals
- work with high quantity of oils
- tolerate oils with different polarities
- have good skin feeling
- have thermal stability
- be resistant to salt, pH, H_2O_2 and NH_3
- be self-bearing
- be easy to be handled and used
- have low toxicity
- be biodegradable
- have excellent ratio price/performances

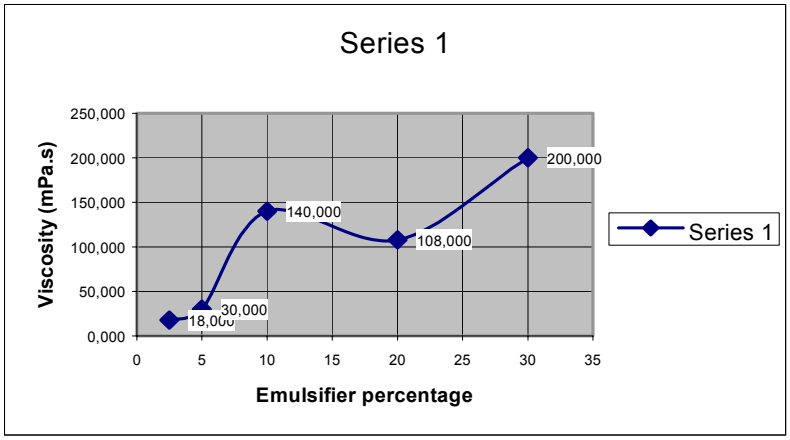
IV. SELF EMULSIFYING CAPABILITY

Variations have been registered in the viscosity of the water / Protelan ENS formulation, depending on the concentration of the emulsifier. The table below shows viscosity values at 25°C:

% EMUL.	Viscosity mPa.s
2.5	18,000
5.0	30,000
10.0	140,000
20.0	108,000
30.0	200,000

Stability tests: SPINNING (6740 rpm / 30 minutes): stability was OK at every concentration rate. Results are summarized in figure 1.

FIGURE 1 - Self-emulsifying capability



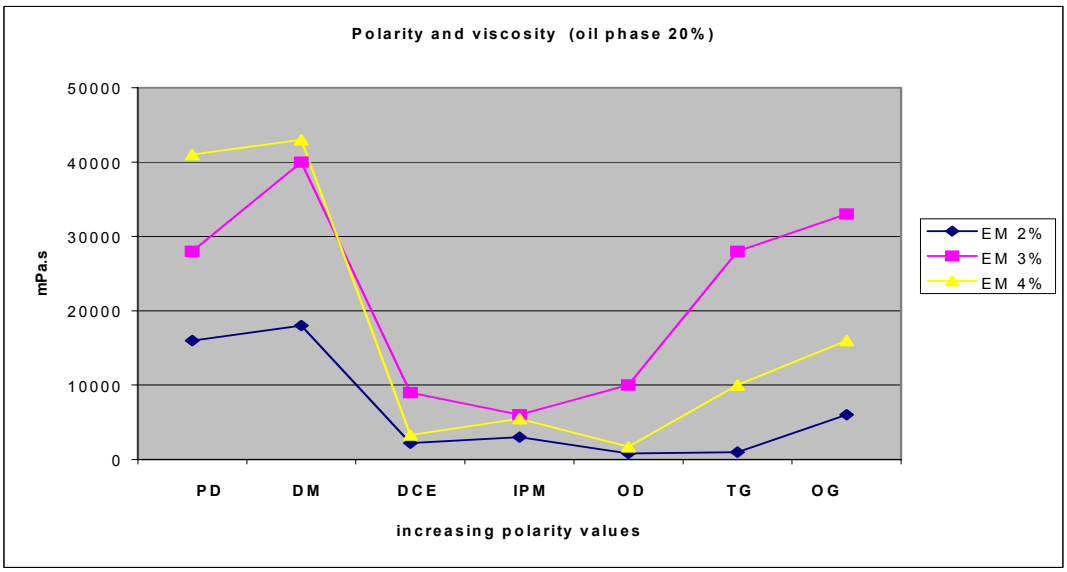
NOTES:

When the concentration value of Protelan ENS becomes higher than 30%, the consistency of the emulsion changes from gelatinoid and ice coloured to rigid and creamy, thus making spreading on skin and removal by water more and more difficult. The best results are obtained at concentration values between 10 and 15%, when the emulsion is not soapy neither filmy ("water effect"). Protelan ENS behaves like a self-emulsifying base which can absorbe up to 9 times its weight whilst in water or other liquids. Formulations with low concentration proved particularly suitable for oil free emulsions.

V. STABILITY AND COMPATIBILITY WITH OILS WITH DIFFERENT POLARITY

The emulsifying power of Protelan ENS is generally good, reaching higher performances at the extremes of the polarity scale of oils; that means that Protelan ENS gives rigid and viscous creams with both low polarity oils (hydrocarbons, silicones) and high polarity ones (triglycerides).
Protelan ENS shows less effective performances if combined with dicaprylyl ether, fluid alcohols such as octyldodecanol and fluid esters such as IPM; combinations with short chain triglycerides (C8-C10) showed middle range results. Viscosity is considered a sign that a product is compatible and can be easily emulsified, as it has been shown by the stability testes. Obviously such tests have been run without adding thickening and stabilizing agents.
In addiction to polarity oils, it should be noticed that those combinations with low viscosity oils are the least satisfactory ones. Therefore the influence of this parameter on the consistence and the stability of emulsions should not be ruled out.
Stable systems are obtained already at low use rates of Protelan ENS, with a ratio of 1:10 or even 0.75:10 for silicone oils and triglycerides (oil phase 20%). Higher use levels only increase the viscosity of the products. Stable emulsions can also be achieved with oils characterized by little compatibility at low use levels of emulsifier. Such emulsions are more fluid though, showing a ratio of 1.35:10 (in the 30% oily phase) or 2:10 (in the 20% oily phase). Outstanding efficiency is therefore granted.
It's possible to emulsify systems with high oil concentration without difficulty. Viscosity is not influenced by the amount of oily phase. In other words the emulsion maintains its viscosity also by dilution or vice versa by concentration (evaporation phase). Viscosity depends strongly on the emulsifier use amount (caprylic capric triglyceride excepted).
Figure 2 shows the behaviour of Protelan ENS with different oils at 20% concentration.

FIGURE 2



LIST OF ABBREVIATIONS

PD	Polydecene	DM	Dimethicone
DCE	Dicaprylyl Ether	IPM	Isopropyl Myristate
OD	Octyldodecanol	TG	C8-C10 Triglyceride
OG	Wheat Germ Oil		

The stability of the emulsions realized checked after spinning at 6740 rpm for 30 minutes and after 10 days storage at 43°C confirms what was said previously: ethers, simple esters like IPM and some short chain triglycerides C8-C10 didn't pass all or some of the tests. Their stability grows worse when they contain low percentages of emulsifier and/or oil.

TABLE 1

STABILITY DATA								
	% ENS	KIND OF OIL / OILY PHASE 20%						
		PD	DM	DCE	IPM	OD	TG	OG
SPINNING	2	I	S	I	I	I	S	S
(time = t°)	3	S	S	I	I	I	S	S
	4	S	S	S	I	I	S	S
HEATER	2	S	S	I	I	I	I	I
(after 8 days)	3	S	S	I	I	I	S	S
	4	S	S	S	I	I	S	S
APPEARANCE	2	fluid	creamy fluid	fluid	fluid	fluid	fluid	fluid
	3	creamy fluid	creamy	fluid	fluid	fluid	creamy fluid	creamy fluid
	4	creamy	creamy	creamy fluid	creamy fluid	fluid	creamy fluid	creamy fluid

TABLE 2

SENSORIAL PROPERTIES						
	KIND OF OIL / OIL PHASE 20%					
	PD	DM	DCE	IPM	TG	OG
Appearance	smooth	soft	smooth	=	shiny	shiny
Spreading	good	fairly good	good	=	good	good
Absorption	quick	rather quick	quick	=	quick	rather quick
After fell	not sticky	slightly sticky	shiny on skin	=	shiny on kin	sticky

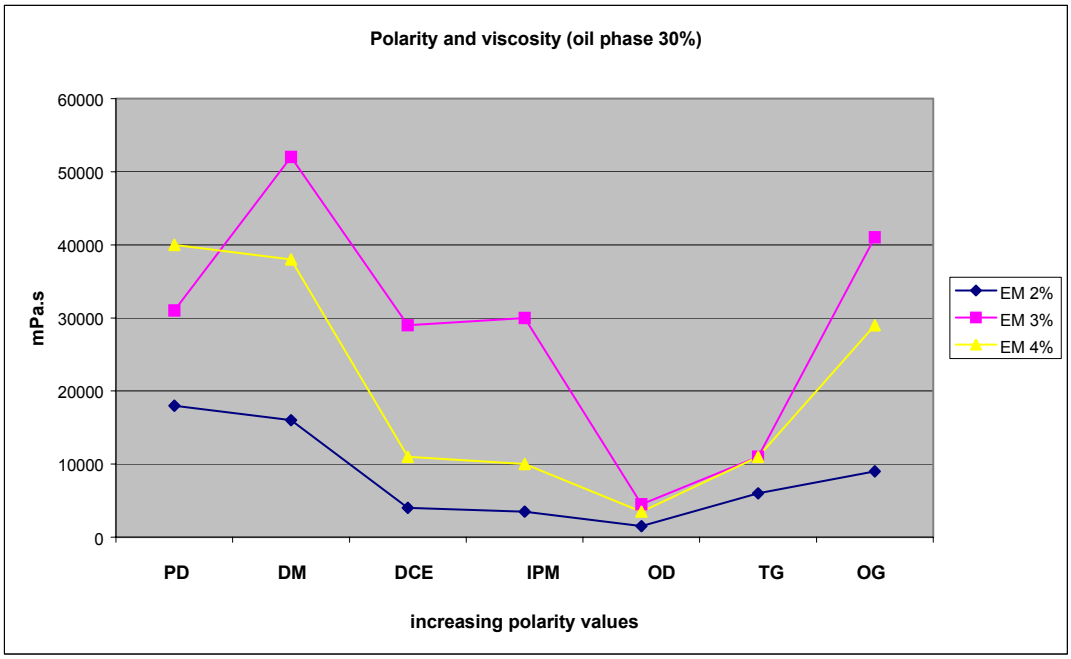
NOTES:

Stability
Caprylic ether and IPM ester showed little stability, while it was necessary to increase the ratio between emulsifier and oily phase for short chain triglycerides (C8-C10).

Feeling
On the whole, the final skin feeling is not influenced by viscosity, but it strongly depends on the kind of oil employed. The emulsifier does not mask the feeling provided by the oil, whose effect can be perceived in its wholeness during massage.

Figure 3 shows the behaviour of Protelan ENS with different oils at 30% concentration.

FIGURE 3



LIST OF ABBREVIATIONS

PD	Polydecene	DM	Dimethicone
DCE	Dicaprylyl Ether	IPM	Isopropyl Myristate
OD	Octyldodecanol	TG	C8-C10 Triglyceride
OG	Wheat Germ Oil		

Stability and sensorial properties were checked as explained at page 9.

TABLE 3

STABILITY DATA								
	% ENS	KIND OF OIL / OIL PHASE 30%						
		PD	DM	DCE	IPM	OD	TG	OG
SPINNING	2	I	S	I	I	I	S	S
(time = t°)	3	S	S	I	I	I	S	S
	4	S	S	S	I	I	S	S
HEATER	2	S	S	I	I	I	I	I
(after 8 days)	3	S	S	I	I	I	S	S
	4	S	S	S	I	I	S	S
APPEARANCE	2	creamy fluid	creamy fluid	fluid	fluid	fluid	fluid	fluid
	3	creamy	creamy	fluid	fluid	fluid	creamy fluid	fluid
	4	creamy	creamy	creamy fluid	creamy fluid	fluid	creamy fluid	creamy fluid

TABLE 4

SENSORIAL PROPERTIES						
	KIND OF OIL / OIL PHASE 30%					
	PD	DM	DCE	IPM	TG	OG
Appearance	smooth	soft	smooth	shiny	shiny	smooth
Spreading	good	good	good	good	good	good
Absorption	quick	rather quick	quick	rather quick	quick	rather quick
After fell	slightly sticky	slightly sticky	shiny on skin	not sticky	shiny on kin	sticky

NOTES:

Stability
The previous results were confirmed. Ethers and IPM esters revealed little stability. With short chain triglycerides (C8-C10) the ratio between emulsifier and oily phase needs to be increased of 10%. Natural triglycerides too require bigger quantities of emulsifier.

Feeling
On the whole, the final skin feeling is not influenced either by the amount of emulsifier or by the product viscosity. In some cases the addiction of anti-shiny agents is suggested, while in other (products for exposure to sun) the shiny effect could be even enhanced.

Other experiments were made with a 10% concentration of oil phase.
In the following tables stability has been checked at 2%, 3% and 4% Protelan ENS concentration values with a 10% oil phase.
Among oil phase, the most used were natural triglycerides, because of their growing employment in the cosmetic field. Ordinary skin feeling conditioners such as silicones and paraffinics underwent the test too. List of the employed raw materials:

OG	Wheat Germ Oil	MD	Sweat Almond Oil	OO	Olive Oil
TG	C8-C10 Triglyceride	DM	Dimethicone 1000cst	PD	Polydecene

TABLE 5 - Viscosity

Protelan %	MD	OG	OO	TG	DM	PD
2	4000	4000	2000	2000	=	10000
3	8000	6000	6000	4000	=	18000
4	34000	26000	30000	14000	52000	46000

Final pH, without alteration: 6.8 to 7.8

TABLE 6 - Spinning test

Protelan %	MD	OG	OO	TG	DM	PD
2	I	OK	I	OK	=	OK
3	OK	OK	OK	OK	=	OK
4	OK	OK	OK	OK	OK	OK

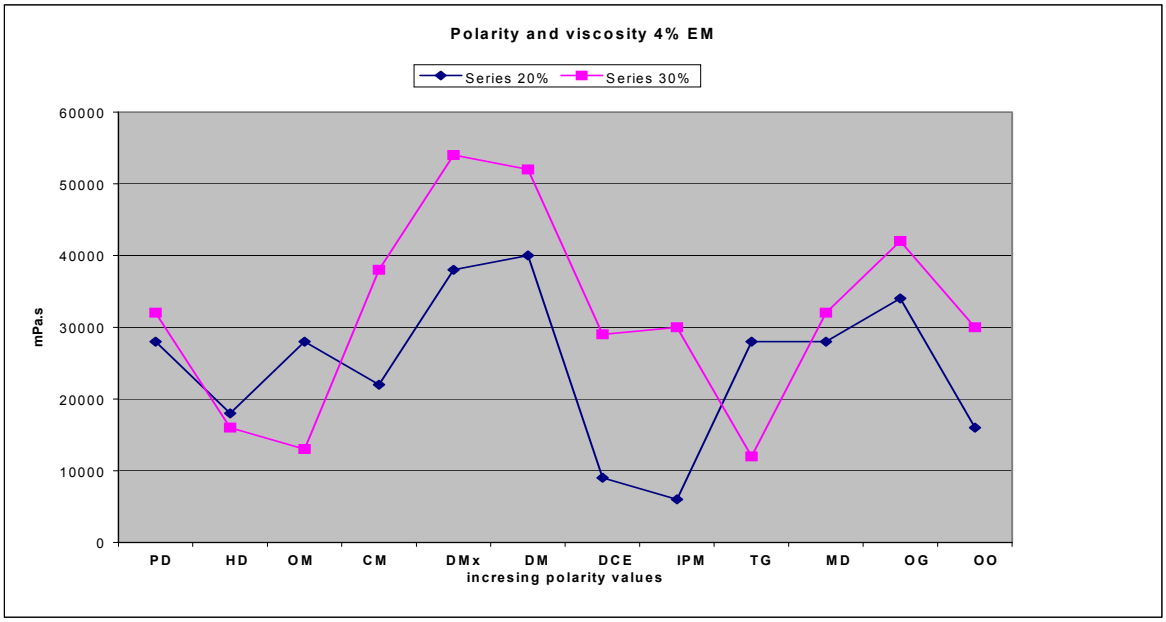
TABLE 7 - Heating test

Protelan %	MD	OG	OO	TG	DM	PD
2	OK	OK	OK	OK	=	OK
3	OK	OK	OK	OK	=	OK
4	OK	OK	OK	OK	OK	OK

The ratio between emulsifier oil phase proved again to be decisive parameter. Protelan ENS revealed outstanding emulsifying properties with triglycerides, silicones and paraffinics.

The behaviour of 4% concentration of Protelan ENS was then checked with 20% and 30% oils of different polarity and viscosity.
Figure 4 summarizes the obtained results.

FIGURE 4 - Stability and compatibility of Protelan ENS with different polarity oils



Oil	*Polarity*	*Name*	*Series 20%*	*Series 30%*
Polydecene	1	PD	28000	32000
Isohexadecane	2	HD	18000	16000
Vaseline Oil	3	OM	28000	14000
Cyclomethicone	4	CM	22000	38000
Dimethicone (with low viscosity)	5	DMx	38000	54000
Dimethicone	6	DM	40000	52000
Dicaprylyl Ether	7	DCE	8800	28400
Isopropyl Myristate	8	IPM	6400	30000
Triglyceride	9	TG	28000	12000
Sweet Almond Oil	10	MD	28000	32000
Wheat Germ Oil	11	OG	34000	42000
Olive Oil	12	OO	16000	30000

NOTES:

Stability tests on wider ranges of products confirmed the trends of the previous charts for 20% and 30% oil phases with 4% emulsifier use levels. It's interesting to point out the stabilizing power of emulsions containing silicone and vegetable triglycerides, because such oils are the hardest to be emulsified.

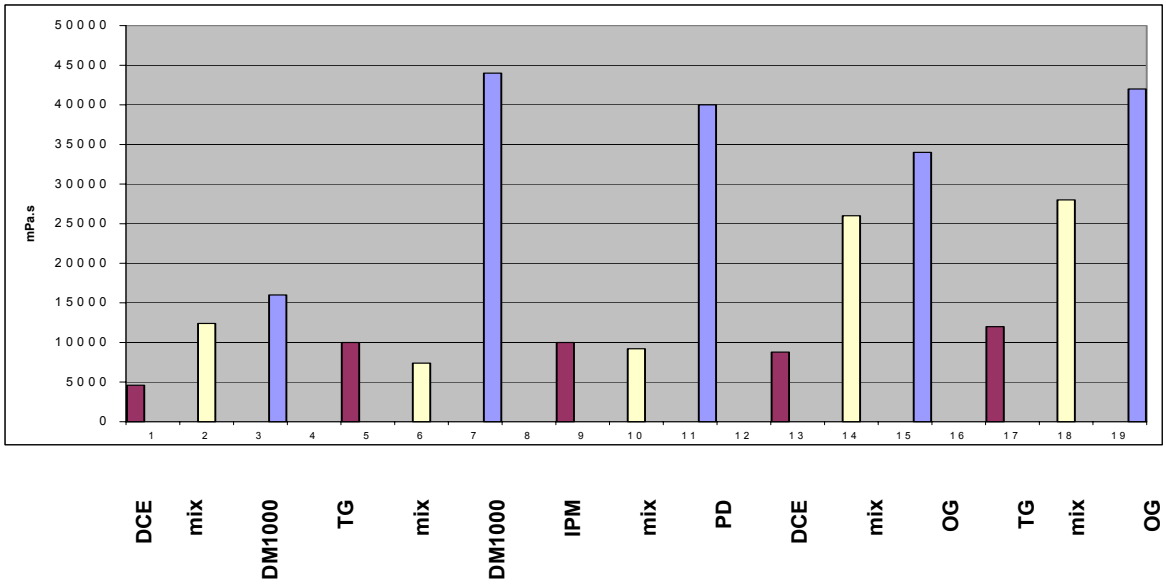
Feel

Though different, oil viscosity values range from 10.000 to 50.000 mPa.s, which is a relatively short span. One should notice than the skin feeling is not influenced by the viscosity, but it strongly depends on the kind of oil employed.

VI. STABILITY AND COMPATIBILITY WITH BLENDS OF OILS

Binary oil blends with ratio 1:1 produce different results depending on the kind of oils employed: the best compatible oil will give rise to well blended formulations with middle viscosity values, whereas the least compatible ones (IPM - TG) will result into low viscosity compounds. Viscosity of mixed TG turned out to be still lower than non mixed TG.
Abbreviations are the same used at page 13. Figure 5 shows the obtained results.

FIGURE 5



A) Protelan ENS 2%, oil phase 30%				
	DCE	4600 mPa.s	spinning	it separates
	mix 1:1	12400	SPINNING	**it separates**
	DM1000	16000	spinning	OK
B) Protelan ENS 3%, oil phase 20%				
	TG	10000 mPa.s	spinning	OK
	mix 1:1	7400	SPINNING	OK
	DM1000	44000	spinning	OK
C) Protelan ENS 3%, oil phase 30%				
	IPM	10000 mPa.s	spinning	it separates
	mix 1:1	9200	SPINNING	**OK**
	PD	40000	spinning	OK
D) Protelan ENS 4%, oil phase 20%				
	DCE	8800 mPa.s	spinning	OK
	mix 1:1	26000	SPINNING	OK
	OG	34000	spinning	OK
E) Protelan ENS 4%, oil phase 30%				
	TG	12000 mPa.s	spinning	it separates
	mix 1:1	28000	SPINNING	**OK**
	OG	42000	spinning	OK

NOTES:

In tests C and E both the instable component C and the stable one E lead to a stable mix. In test C viscosity does not increase. In test A only viscosity increases, whereas stability does not change.

VII. COMPATIBILITY WITH ACIDS AND BASIS

Different trials were made to see Protelan ENS pH compatibility.

a) self-emulsifying systems

Protelan ENS 10% water q.s. to 100%

pH	*for 100 g product*	*Appearance*	*Spinning*	*Heater*
about 12	5 g NaOH 10%	liquid	OK	OK
about 9	2.5 g NaOH 10%	liquid	OK	OK
about 2.5	5 g glycolic acid 70%	instable	no	no
	2.5g glycolic acid 70%	instable	no	no

b) emulsified systems

Protelan ENS 4% **Wheat Germ Oil 20%** water q.s. to 100%

pH	*Appearance*	*Spinning*	*Heater*
about 12	stable	OK	OK
about 9	stable	OK	OK
about 2.5	instable	no	no
	instable	no	no

Protelan ENS 4% **Dimethicone 1000cst 20%** water q.s. to 100%

pH	*Appearance*	*Spinning*	*Heater*
about 12	stable	OK	OK
about 9	stable	OK	OK
about 2.5	stable	OK	OK
	stable	OK	OK

Protelan ENS 4% **Dicaprylyl ether 30%** water q.s. to 100%

pH	*Appearance*	*Spinning*	*Heater*
about 9	fluid	no	OK
about 2.5	stable	no	no
	stable	no	no

Results
Save for silicones (a strange case which still needs to be looked into), acid pH ranges are responsible for instability. Compatibility is satisfactory in alkaline pH ranges.

VIII. COMPATIBILITY WITH HYDROGEN PEROXIDE

Protelan ENS is compatible with H_2O_2. The following formulation was realized:

Oil phase	Protelan ENS	20
Water phase	Propylene Glycol	5
	Cocamidopropyl Betaine	1
	Dehiquart	1
	Cocamide DEA	1
	Hydrogen Peroxide 30% vol.	5
	Aqua	q.s.

This creamy compound was proved to be stable.

IX. COMPATIBILITY WITH POWDERS

Protelan ENS is an excellent emulsifier for powders and pigments, in particular for make up products.
The evaluation of the practical application of Protelan ENS confirmed its encouraging effects on powders. Protelan ENS confers to some cosmetic products excellent properties: powders can be easily homogenized and wetting properties are enhanced. Application of products is easier and even, but at the end they leave a thin and permanent layer on the skin (similar effects were noticed in massage creams too). This could also be seen as an additional advantage of Protelan ENS, especially for sun creams, which should leave a steady and protective layer on the skin.

X. COSMETIC USES AND RECOMMENDATIONS OF EMPLOY

Protelan ENS is really a great innovation in the world of emulsions.
It comes from vegetable, fully renewable raw materials, it is completely biodegradable and it hasn't ethoxilated compounds.
It contains Sodium Lauroyl Glutamate that has been used for decades for its mildness, safety and moisturizing power.
The outstanding properties of Sodium Lauroyl Glutamate are now in this new self-emulsifying base.
Protelan ENS is a very flexible product able to give both lotion type emulsions and more rigid creams.
It provides to the emulsions where it is used a very nice and silky skin feeling completely different from the touch of the commonly used emulsifiers.
Protelan ENS can be therefore considered not only a vehicle for active ingredients but an active ingredient itself able to help the beauty and the health of our skin.
In order to avoid stickiness and difficulty of application typical of some natural triglycerides, silicones are often of great help.
Dimethicone (Abil 350 - Degussa) is added at 0.5% in order to avoid soap-like effect while Stearoxy Dimethicone (Abil Wax 2434 - Degussa) is added to increase spreadability.

XI. HOW TO WORK

Different emulsification procedures can be used with Protelan ENS.
Sure the formulator should always screen the ingredients: heat sensitive molecules must be added for example during the cooling process.
The standard manufacturing method is the following.
Heat the oil phase at 65°C - 90°C (depending on the ingredients), heat water phase at 65°C - 90°C (always depending on the ingredients) and introduce slowly under stirring oil phase in water phase, then begin cooling under stirring.
It's possible to solubilize Protelan ENS in water phase (65°C - 90°C) and add the oil phase at room temperature if the lipids are fluid.
Protelan ENS can be successfully used also with LEE (Low-Energy Emulsification) method where a concentrated emulsion is formed (with about 20-30% of the previous water) while the remainder is added after during the cooling process.

XII. FORMULATION EXAMPLES

The flexibility of Protelan ENS is showed by the following formulation examples.

DAY CREAM

Ingredients	[% w/w]
Phase A	
Protelan ENS	4,00
Cetearyl Alcohol	1,50
Ascorbyl Palmitate	0,50
Caprylic/capric Triglyceride	9,00
Di-C12-13 Alkyl Malate	8,00
Hexyl Laurate	3,00
Dimethicone	0,50
Preservative	q.s.
Phase B	
Glycerin	5,00
Xanthan Gum	0,25
Aqua and preservative	q.s. to 100
Total	**100,00**

Characteristics:

pH = 6.5
viscosity at 20°C = 28000 mPa.s

SUNSCREEN MILK

Ingredients	[% w/w]
Phase A	
Protelan ENS	5,00
Octyl Methoxycinammate	5,00
Butil Methoxydibenzoylmethane	1,00
Di-C12-13 Alkyl Malate	3,00
Hexyl Laurate	3,00
Dimethicone	0,50
Preservative	q.s
Phase B	
Glycerin	5,00
Xanthan Gum	0,25
Aqua and preservative	q.s. to 100
Total	**100,00**

Characteristics:

pH = 6.5
viscosity at 20°C = 22000 mPa.s

BODY LOTION

Ingredients	[% w/w]
Phase A	
Protelan ENS	3,00
Jojoba Oil	2,00
Tocoperol Acetate	2,00
Dicaprylyl Ether	4,00
Hexyl Laurate	3,00
Dimethicone	0,50
Preservative	q.s.
Phase B	
Glycerin	5,00
Panthenol	2,00
NaOH	q.s.
Carbomer	0,20
Aqua and preservative	q.s. to 100
Total	**100,00**

Characteristics:

pH = 6.7
viscosity at 20°C = 22000 mPa.s

MASSAGE CREAM

Ingredients	[% w/w]
Oil phase	
Polydecene	5,00
Triticum Vulgare	5,00
Dimethicone (1000 cs)	10,00
Butyrospermum Parkii	3,00
Isostearyl Isostearate	5,00
Diisopropyl Dimer Dilinoleate	5,00
Protelan ENS	5,00
Methylparaben	0,25
Propylparaben	0,25
Vitamin E Acetate	0,50
Water phase	
Aqua	q.s. to 100
Acrylates/C10-30 Alkyl Acrylate Crosspolymer	0.20
Xanthan Gum	0.20
Betaine	2.00
Triethanolamine	0.30
Perfume	q.s. to 100
Total	**100,00**

Characteristics:

pH = 7.0
viscosity at 28°C = 160000 mPa.s (Brookfiled RVT, 2.5 rpm, Helipath C)

NIGHT CREAM

Ingredients	[% w/w]
Oil phase	
Protelan ENS	5,00
Cetearyl Alcohol	2,00
Butyrospermum Parkii	4,00
Buxus Chinensis	4,00
Glycine Soja Sterol	2,00
Vitamin E Acetate	1,00
Methylparaben	0,30
Propylparaben	0,30
Phenoxyethanol	0,40
BHT	0,10
Water phase	
Aqua	q.s. to 100
Glycerin	5,00
Total	**100,00**

Characteristics:

pH = 6.8
viscosity at 20°C = 88000 mPa.s (Brookfiled RVT, 2.5 rpm, Helipath C)

EYE - EDGE CREAM

Ingredients	[% w/w]
Oil phase	
Protelan ENS	3,00
Limnanthes Alba	18,00
Polysorbate 60	2,20
Sorbitan Stearate	0,50
Cetyl Alcohol	1,10
Stearine	0,50
Vitamin E Acetate	0,20
Methylparaben	0,25
Propylparaben	0,20
Water phase	
Aqua	q.s. to 100
Carbomer	0,30
Diazolidinyl Urea	0,25
EDTA	0,25
Dimethicone (1 cs)	5,00
Sol. NaOH (30%)	q.s. pH 6 - 7
Total	**100,00**

Characteristics:

pH = 7.30
viscosity at 20°C = 100000 mPa.s (Brookfiled RVT, 2.5 rpm, Helipath C)

FOUNDATION

Ingredients	[% w/w]
Oil phase	
Protelan ENS	5,00
Isopropyl Myristate	2,00
Paraffinum Liquidum - Lanolin Alcohol	4,50
Cetearyl Alcohol 50	2,50
Dimethicone (100 cs)	5,00
Isostearyl Alcohol	2,50
Butyrospermum Parkii	2,00
Vitamin E Acetate	0,50
Phenoxyethanol	0,40
Propylparaben	0,30
Methylparaben	0,20
Titanium Dioxide	11,0
Iron Oxide	2,00
Water phase	
Aqua	q.s. to 100
D-Panthenol	0,10
Xanthan Gum	0,40
Glycerin	4,00
Magnesium Aluminum Silicate	0,50
Betaine	1,00
Aqua - Butylene Glycol - Glycerin - Beta Glucan	1,00
Sol. NaOH (30%)	q.s.
Total	**100,00**

Characteristics:

pH = 8.00
viscosity at 20°C = 200000 mPa.s (Brookfiled RVT, 2.5 rpm, Helipath C)

FACE AND BODY GEL

Ingredients	[% w/w]
Water phase	
Xanthan Gum	0,40
TEA	0,35
Betaine	1,00
Methylparaben	0,30
Aqua	q.s. to 100%
Oil phase	
Mica-Titanium Dioxide	4,20
Mica-Titanium Dioxide - Iron Oxides	3,50
Isopropyl Myristate	2,00
Paraffinum Liquidum - Lanolin Alcohol	4,50
Cetearyl Alcohol	2,00
Protelan ENS	4,00
Dimethicone (100 cs)	5,00
PEG-7 Glyceryl Cocoate	6,00
Isostearyl Alcohol	2,50
Propylparaben	0,30
Phenoxyethanol	0,40
Total	**100,00**

Characteristics:

pH = 8.1
viscosity at 20°C = 18000 mPa.s

ANTICELLULITE CREAM

Ingredients	[% w/w]
Oil phase	
Protelan ENS	5,00
Cetyl Alcohol	1,50
Petrolatum	3,00
Prunus Armeniaca	3,00
Calendula Officinalis	3,00
Triticum Vulgare	2,50
Isostearyl Isostearate	3,00
Dimethicone (100 cs)	2,00
BHT	0,50
Phenoxyethanol	0,40
Ethylparaben	0,30
Propylparaben	0,30
Vitamin E Acetate	1,00
Water phase	
Aqua	q.s. to 100
Carbomer	0,20
Glycerin	3,00
Camelia Sinensis	0,10
Propylene Glycol - Aesculus Hippocastanus	2,00
Propylene Glycol - Hedera Helix	2,00
Anhydrous Caffeine	0,10
Theophylline	0,10
Perfume	q.s. to 100
Sol. NaOH (30%)	q.s. pH 6 - 7
Total	**100,00**

Characteristics:

pH = 6.40
viscosity at 20°C = 220000 mPa.s

XIII. PERFORMANCES

Droplet size of inner phase produced by Protelan ENS is smaller than those produced by conventional equivalent anionic self-emulsifying system.
Figure 6 and 7 show this difference.

FIGURE 6 - Droplet size obtained with Protelan ENS

Inserire figura brochure precedente

FIGURE 7 - Droplet size obtained with conventional self-emulsifying base

Inserire figura brochure precedente

XIV. ANALYTICAL DATA

INCI name: **blend of Glyceryl Stearate (and) Cetearyl Alcohol (and) Stearic Acid (and) Sodium Lauroyl Glutamate**

Characteristics	*Values*	*Analytical methods*
Aspect at 20°C	solid flakes	visual
Colour	white-ivory	visual
Acidity number	40 - 45 mg KOH/g	zsi-am-02
Moisture	2% maximum	zsi-am-05
Hydroxyl number	54 - 58 mg KOH/g	Kijeldah
Melting point	56°C - 64°C	zsi-am-62
Nitrogen	0.4% minimum	zsi-am-40
Total bacterial count	less than 10 ufc/g	plate count

NOTE

- This brochure was printed in April 2002 and replaces all the previous data

- The only analytical specifications guaranteed are those mentioned on the certificate of analysis supplied with each delivery

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