



FROM BIOMASS TO COSMETIC

# Biosourced odourless Pentylene Glycol



Anti-microbial



Emollient



Moisturizer



Solubilizer



Extraction solvent



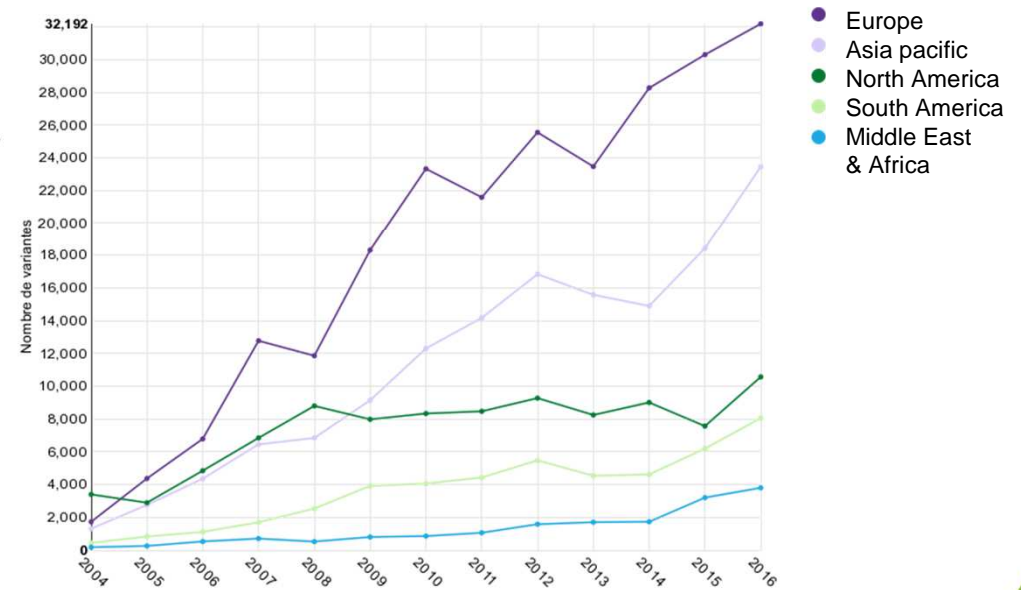
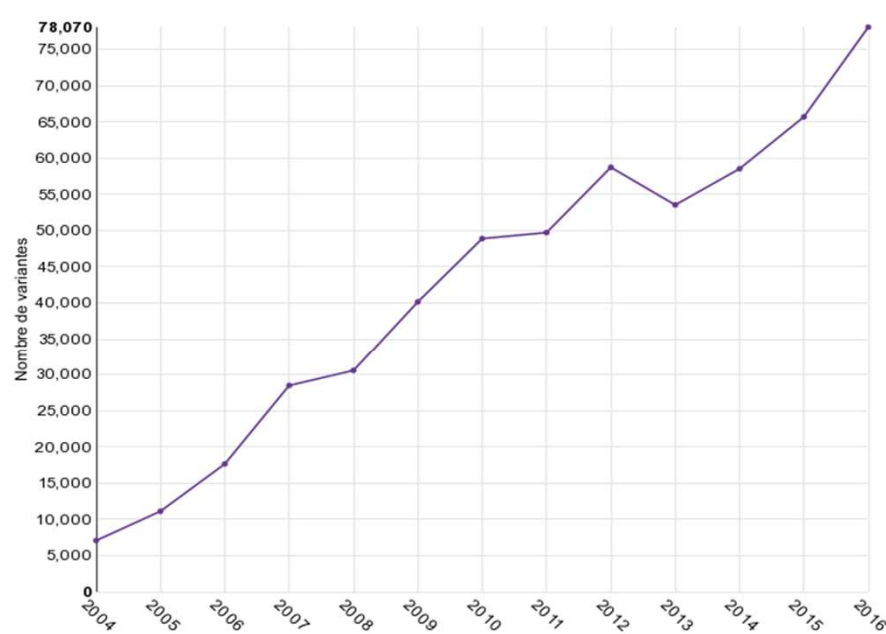
COSMOS  
APPROVED

**MINASOLVE**  
RAW MATERIALS FOR YOUR APPLICATION

green  
solving  
attitude.

# Beauty & Personal Care launches, from 2004 to 2016, claiming on « Ethical - Environmentally Friendly Product »

Mintel



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# The cosmetic industry leads the increasing sustainability trend

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**Environmental impact** starts to become more and more a key driver for cosmetic formulations

The **need for new sustainable ingredients** and solutions is highly demanded by cosmetic players and consumers



**MINASOLVE**<sup>®</sup>  
BIO-INGREDIENTS FOR YOUR APPLICATIONS

**green  
solving  
attitude.**

## Cosmétiques : L'Oréal se tourne de plus en plus vers les ingrédients bio

### Le géant des cosmétiques veut passer de 54 % à 65 % d'ingrédients bio dans ses produits.

Pour L'Oréal, utiliser des ingrédients bio est devenu une priorité depuis une dizaine d'années. « C'est un processus continu », explique Laurent Gilbert, directeur de l'innovation durable du groupe. « Nous sommes déjà passés de 35 % à 40 % de matières premières d'origine renouvelable en 2005 à 54 % aujourd'hui. Et nous espérons monter à 65 % d'ici dix ans ». Pour le géant des cosmétiques, il s'agit de répondre à une demande croissante de ses clients, alors que les associations de consommateurs alertent sur la **dangerosité de certaines substances**. « Il y a une attente des consommateurs sur l'origine des ingrédients, mais aussi des filières : ils sont de plus en plus attachés au caractère durable des produits comme des processus de production ».

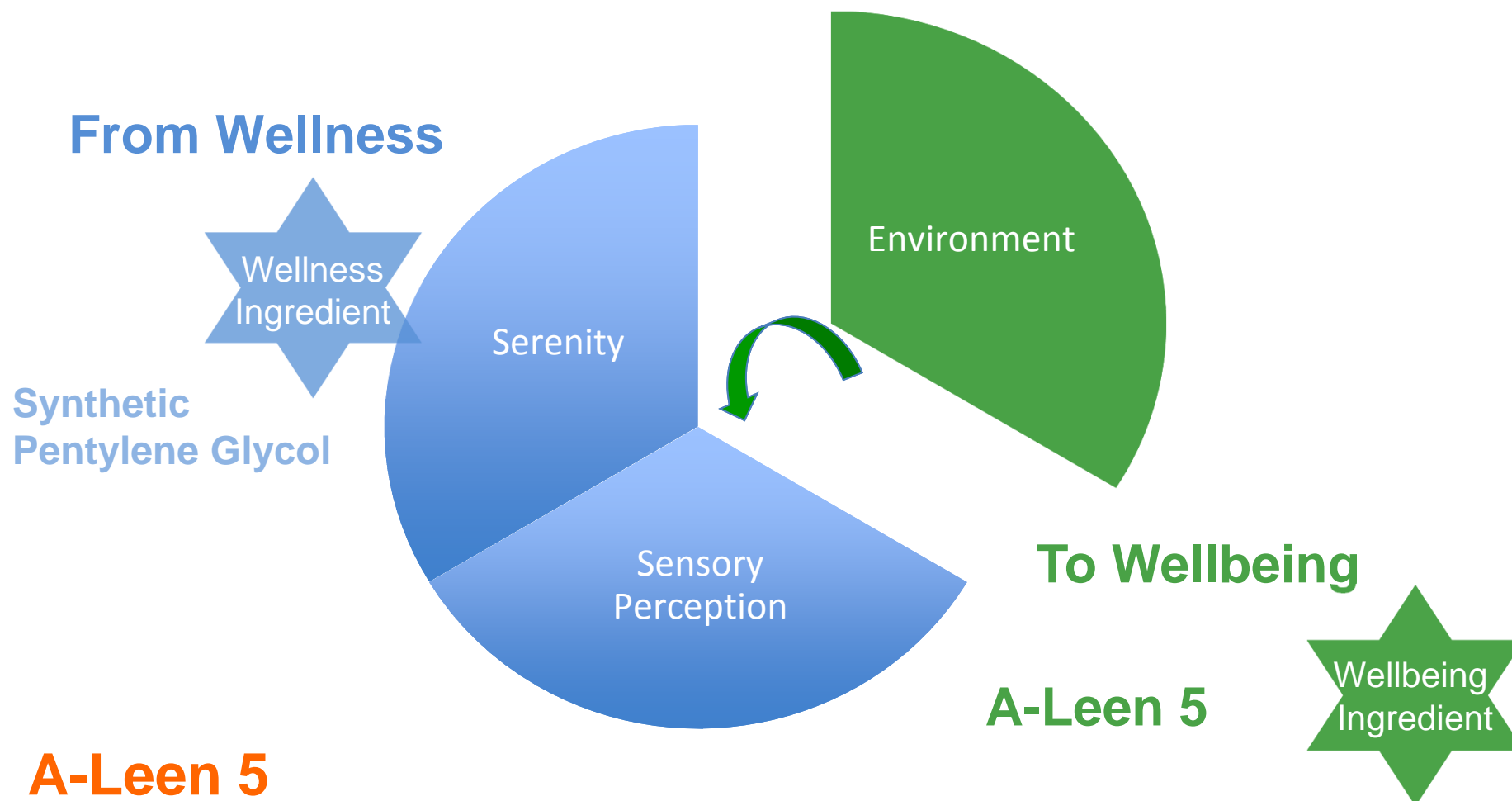
## « De nouvelles filières industrielles »

Le groupe attend donc des efforts en ce sens de la part de ses fournisseurs. « Il peut être complexe de mettre en place des filières répondant à ces critères de durabilité, en maintenant la performance des ingrédients mais sans en renchérir le coût - un critère indispensable », poursuit-il. « Les chimistes ont pris conscience de ces enjeux, et on voit naître des filières industrielles inimaginables il y a quelques années ».

Le groupe a par exemple adopté récemment le pentylène glycol du fabricant français Minasolve, qui a réussi à le produire à partir de bagasse (le résidu de la canne à sucre) : or il s'agit d'un solvant extrêmement courant, utilisé comme humectant et comme conservateur dans les cosmétiques. L'Oréal a aussi conclu un partenariat avec la **start-up française Global Bioenergies**, qui produit à partir de sucre de l'isobutène, une molécule jusque-là issue du pétrole, et dont les dérivés sont largement utilisés dans la cosmétique.

# The Minasolve Approach

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**A-Leen 5**

**Multifunctional Ingredient for Sustainable Cosmetics**

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# A-Leen 5

## A Multifunctional Ingredient for Sustainable Cosmetics

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### Multifunctional Ingredient:

- Preservative Booster
- Skin Care Agent: moisturizer and emollient

+ Green Formula Protection

+ Green Extraction Solvent

+ Green Solubilizer

+ Green Bioavailability enhancer\*

### + Sustainable Cosmetics:

- Made from agricultural waste materials
- Sustainable & eco-responsible product
- “Green chemistry” manufacturing process
- Ecocert & Cosmos approved, Natrue compliant
- Nature derived alternative to the synthetic version

\* Heuschkel Sandra, Wohlrab Johannes, Schmaus Gerhard, Neubert Reinhard H.H. (2008) Modulation of Dihydroavenanthramide D Release and Skin Penetration by 1,2-alkanediols. *Eur J Pharm Biopharm* 70(1): 239-247.

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# A-Leen 5

## Pionner of bio-based Pentylene Glycol

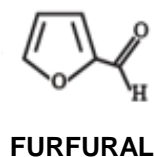
Back Integrated Raw Materials – Full Traceability

« Pennakem, our US sister company is active in renewable chemistry since the 1940's »

**FURFURAL  
APPLICATIONS**



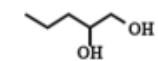
SUGAR CANE BAGASSE  
RESPONSIBLE SOURCING



→ Food  
→ Pharma  
→ **Cosmetics**  
→ Rubber  
→ Agro

Furfuryl  
Alcohol  
Purified

**A-Leen 5**



**COSMETIC GRADE  
ODOURLESS**

Green Chemistry





- Natural Origin Index = 1 (ISO 16128-2)
- 100 % Renewable carbon
- Halal compliant
- Vegan compliant
- Natrue compliant

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# A-Leen 5

## Green Added Value

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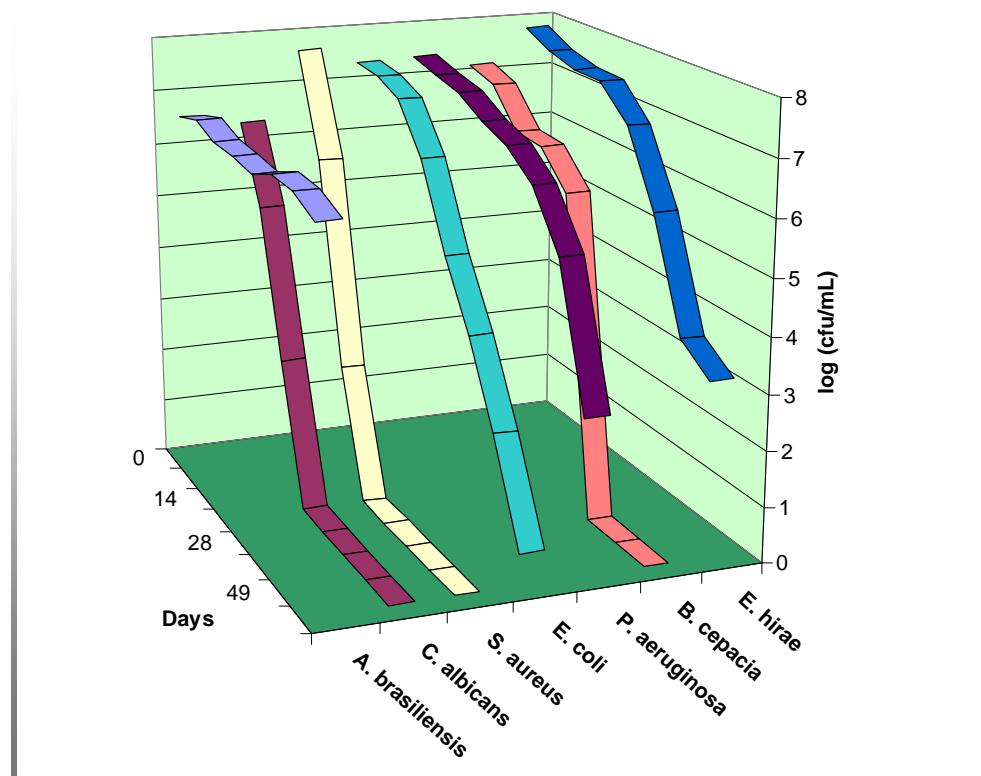
	Pentiol	A-Leen 5
Appearance	Clear colourless liquid	
Odour	Comparable	
Solubility	Miscible with water, ethanol, 1-2 alkanediols	
INCI	Pentylene Glycol	
% use	0,5 - 5%	
Formulation	Incorporation into the aqueous phase	
	Non temperature sensitive	
	Non pH sensitive	
Origin	petrochemical	natural
Approved		Ecocert, Cosmos Valorisation of waste made from non food part of sugarcane Minasolve exclusivity
Labels		   



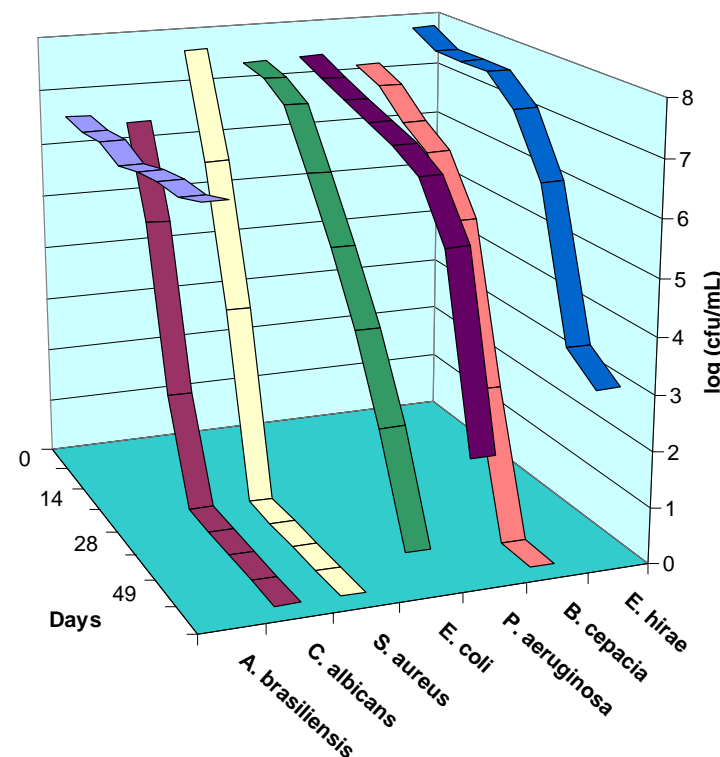
# A-Leen 5

## Green Added Value – Identical Antimicrobial Performance

A-Leen 5  
vegetal origin



Pentiol  
petrochemical origin



**Both ingredients provide the same antimicrobial efficacy**

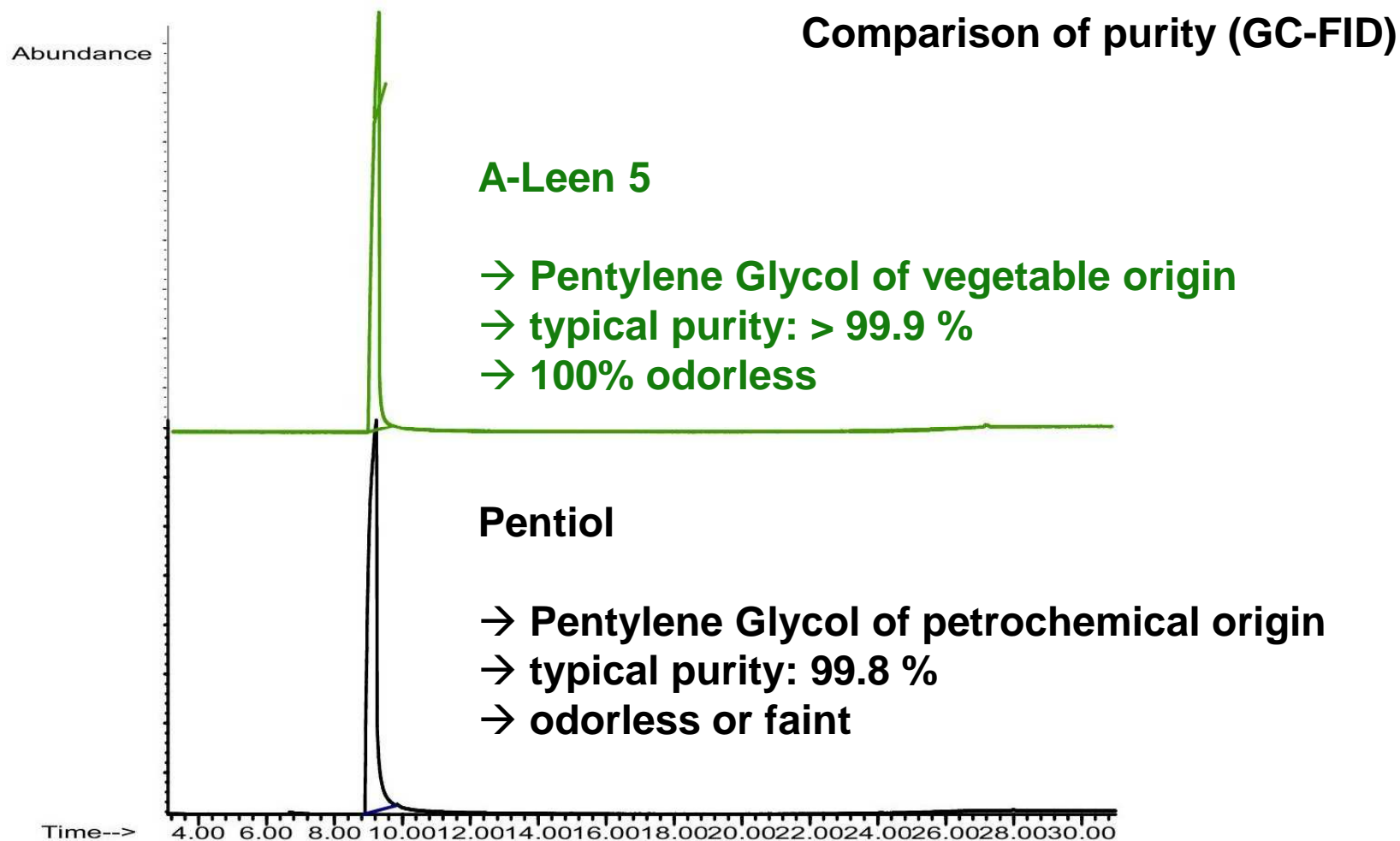
Variation of germ count with time in aqueous growth medium with 0.3 g/L BSA at 20°C containing 5 % Pentiol / 5 % A-Leen 5 (cfu = colony forming units, BSA = bovine serum albumine).

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# A-Leen 5

## Green Added Value – High Purity

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# A-Leen 5

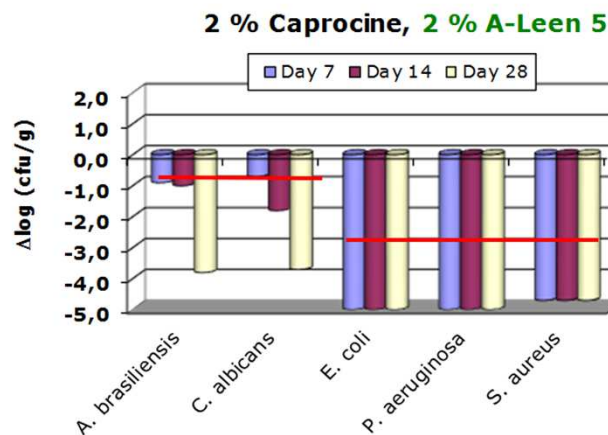
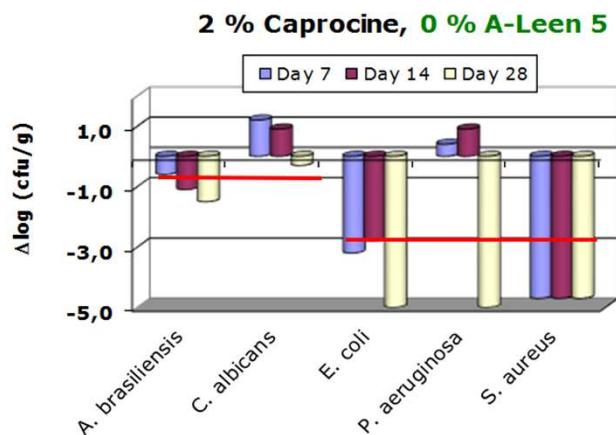
## Antimicrobial efficacy booster (Caprocline)

O/W emulsion, protected by 2 % A-Leen 5 and 2 % Caprocline, pH 5.5

Phase	Ingredient	INCI name	%
A	Water	Aqua	ad 100
	Xanthan Gum PC	Xanthan Gum	0.50
	Caprocline	Capryloyl Glycine	2.00
	A-Leen 5	Pentylene Glycol	2.00
B	Emulgade PL 68/50	Cetearyl Glucoside (and) Cetearyl Alcohol	5.00
	Lipex Sheasoft	Butyrospermum Parkii (Shea) Butter	3.00
	Joboba Oil	Simmondsia Chinensis (Jojoba) Oil	3.00
	Hazelnut Oil	Corylus Avellana (Hazel) Seed Oil	3.00
C	Bioxan T70	Tocopherol	0.10
D	Citric Acid (50%)	Citric Acid (and) Aqua	ad pH 5.5



Subjected to challenge test, according to ISO 11930



A.brasiliensis (Mould)  
C.albicans (Yeast)  
E.coli (Gram -)  
P. aeruginosa (Gram -)  
S.aureus (Gram +)

ISO 11930 : reduction of germ count after 28 days (criteria A)



Can act as an effective preservative booster

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# A-Leen 5

## Preservative booster (EasySafe Hexam+)

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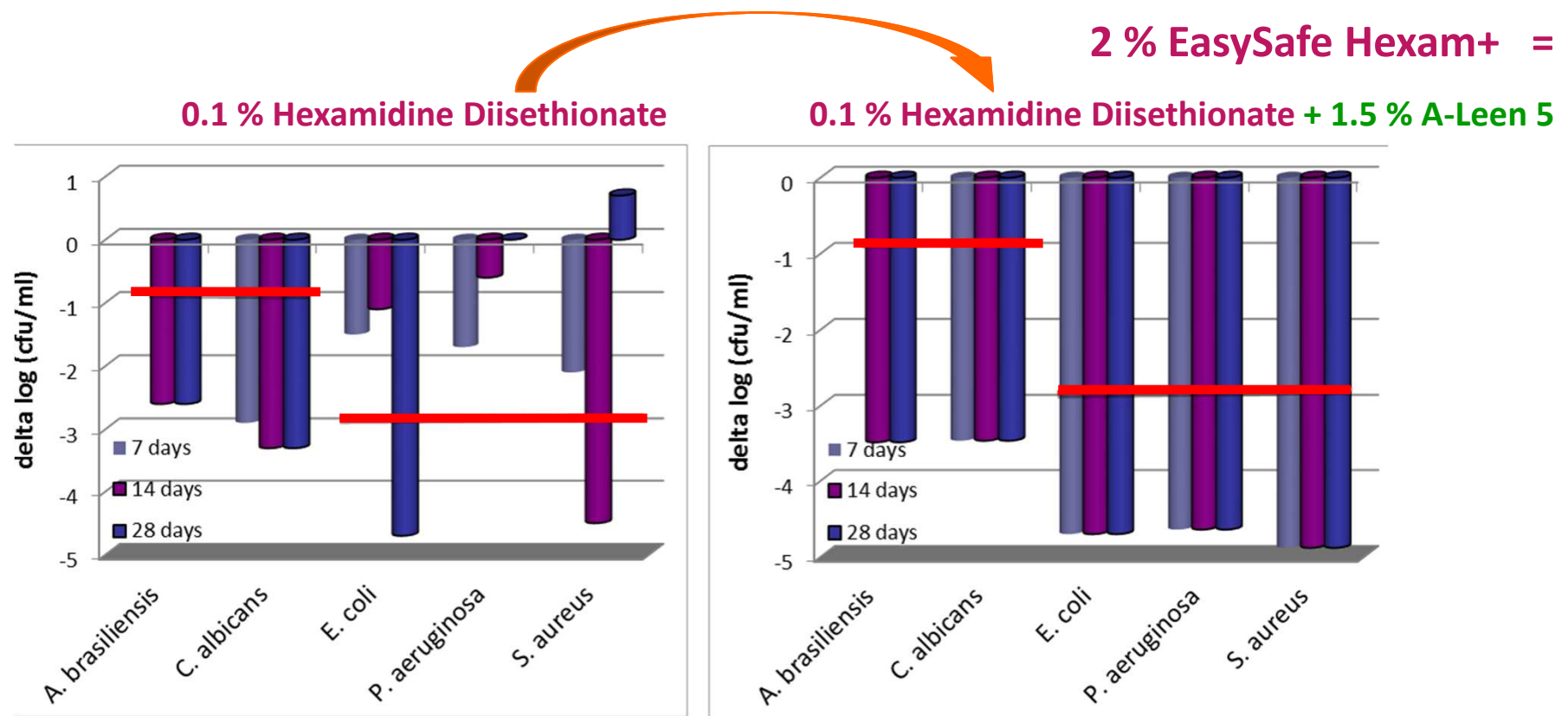
### Sulfate-free Shampoo, pH 5.5

Phase	Ingredient	INCI name	%
A	Water	Aqua	ad 100.0
	Xanthan Gum OC	Xanthan Gum	0.6
	Cocoglucoside	Coco Glucoside	15.0
	Plantapon ACG HC	Sodium Cocoamphoacetate	5.0
	Tegobetain F50	Cocamidopropyl Betain	5.0
B	Citric acid (50% aq. solution)	Aqua (and) Citric acid	ad pH 5.5
C	<i>EasySafe Hexam+</i>	<i>Pentylene Glycol (and) Water (and) Hexamidine Diisethionate</i>	<i>2.0</i>

# A-Leen 5

## Preservative booster (EasySafe Hexam+)

### Preservation of Sulfate-Free Shampoo, pH 5.5



— ISO 11930 requirements for log (cfu/mL) reduction after 28 days (criteria A)



**Synergistic effect between Minasolve Hexam and A-Leen 5**

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# A-Leen 5

## Green Formula Protection @ 5%

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O/W emulsion, **protected by 5 % A-Leen5, pH 5.5**

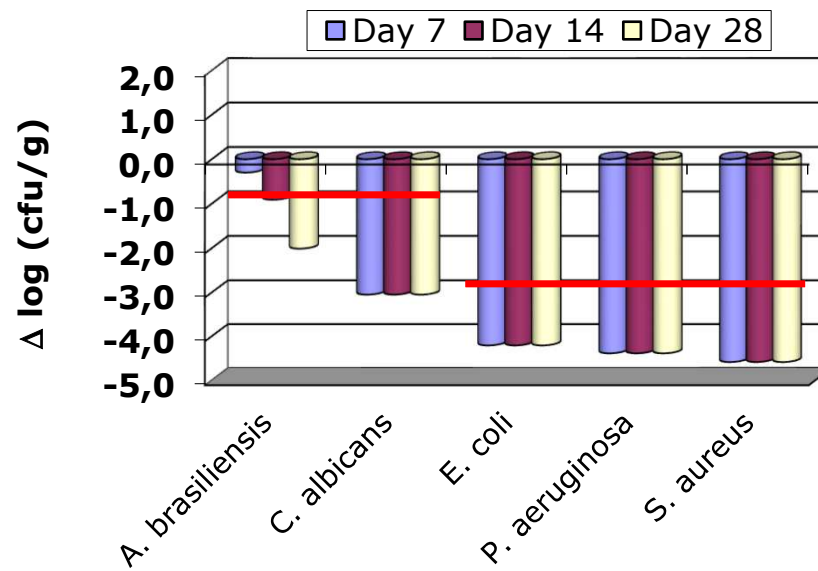
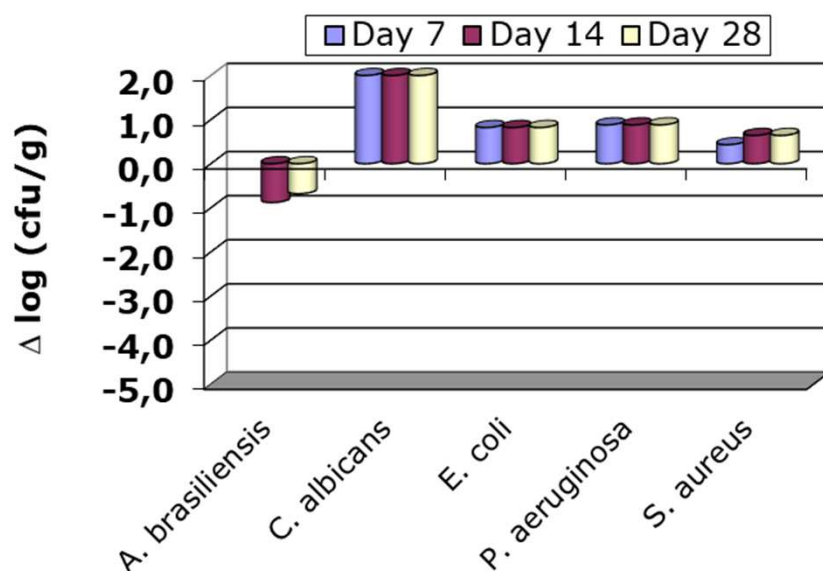
Phase	Raw material	INCI Name	%
A	Water	Aqua	80.40
	Xanthan Gum OC	Xanthan Gum	0.5
	<b>A-Leen 5</b>	<b>Pentylene Glycol</b>	<b>5.00</b>
B	Emulgrade PL 68/50	Ceterayl Glucoside (and) Cetearyl Alcohol	5.00
	Lipex Sheasoft	Butyrospermum Parkil (Shea) Butter	3.00
	Jojoba oil	Simmondsia Chinensis (Jojoba) Oil	3.00
	Hazelnut Oil	Corylus Avellana (Hazel) Seed Oil	3.00
C	Boixan T70	Tocopherol	0.10
D	Citric Acid (50%)	Citric Acid (and) Aqua	ad pH 5.5

# A-Leen 5

## Green Formula Protection @ 5%

O/W emulsion, protected by 5 % A-Leen5, pH 5.5

Subjected to challenge test, according to ISO 11930



— ISO 11930 : reduction of germ count after 28 days (criteria A)

➔ Meets criteria for standalone preservation at 5%

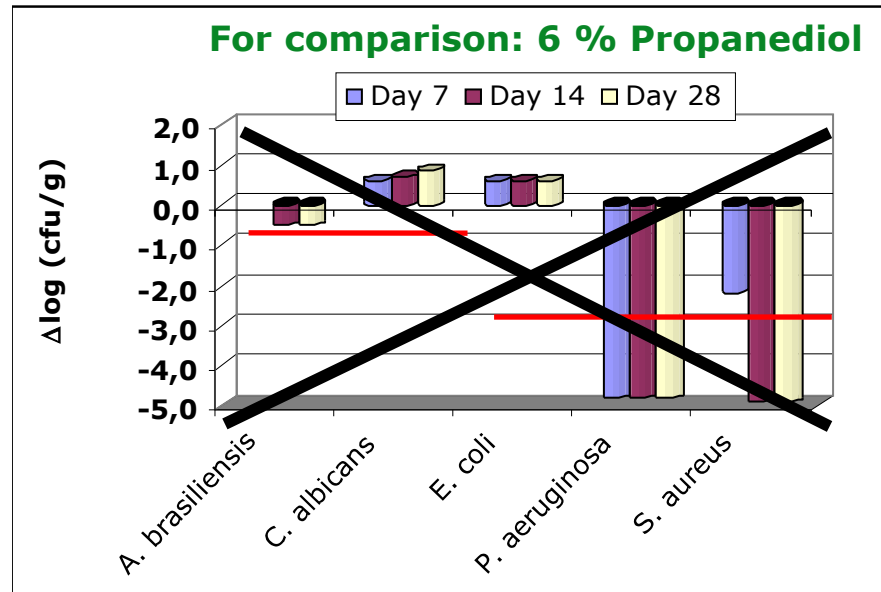
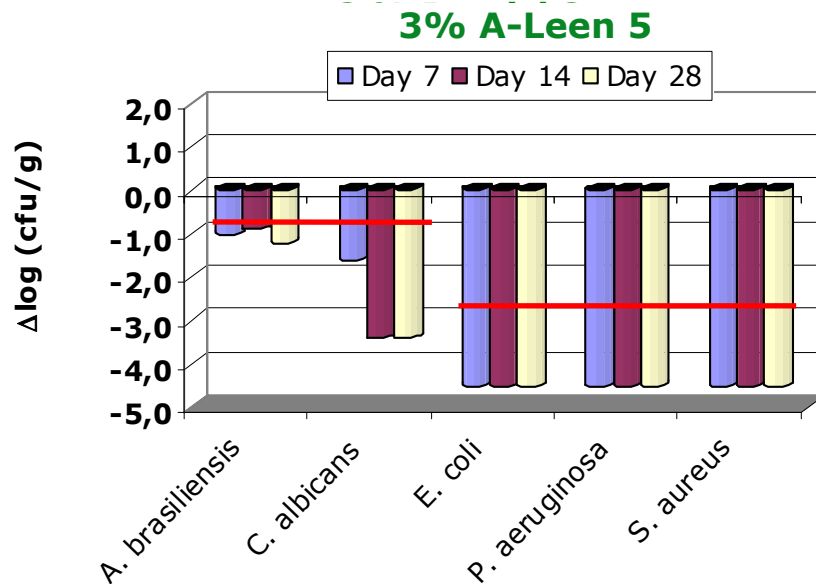
**MINASOLVE**  
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# A-Leen 5

## For comparison with Propanediol

O/W emulsion,  
protected by 3 % A-Leen 5, pH 5.6 or 6 % Propanediol, pH 5.3  
subjected to challenge test, according to ISO 11930

A.brasiliensis (Mould)  
C.albicans (Yeast)  
E.coli (Gram -)  
P. aeruginosa (Gram -)  
S.aureus (Gram +)



— ISO 11930 : reduction of germ count after 28 days (criteria A)



**A-Leen 5 is much more efficient  
than Propanediol**

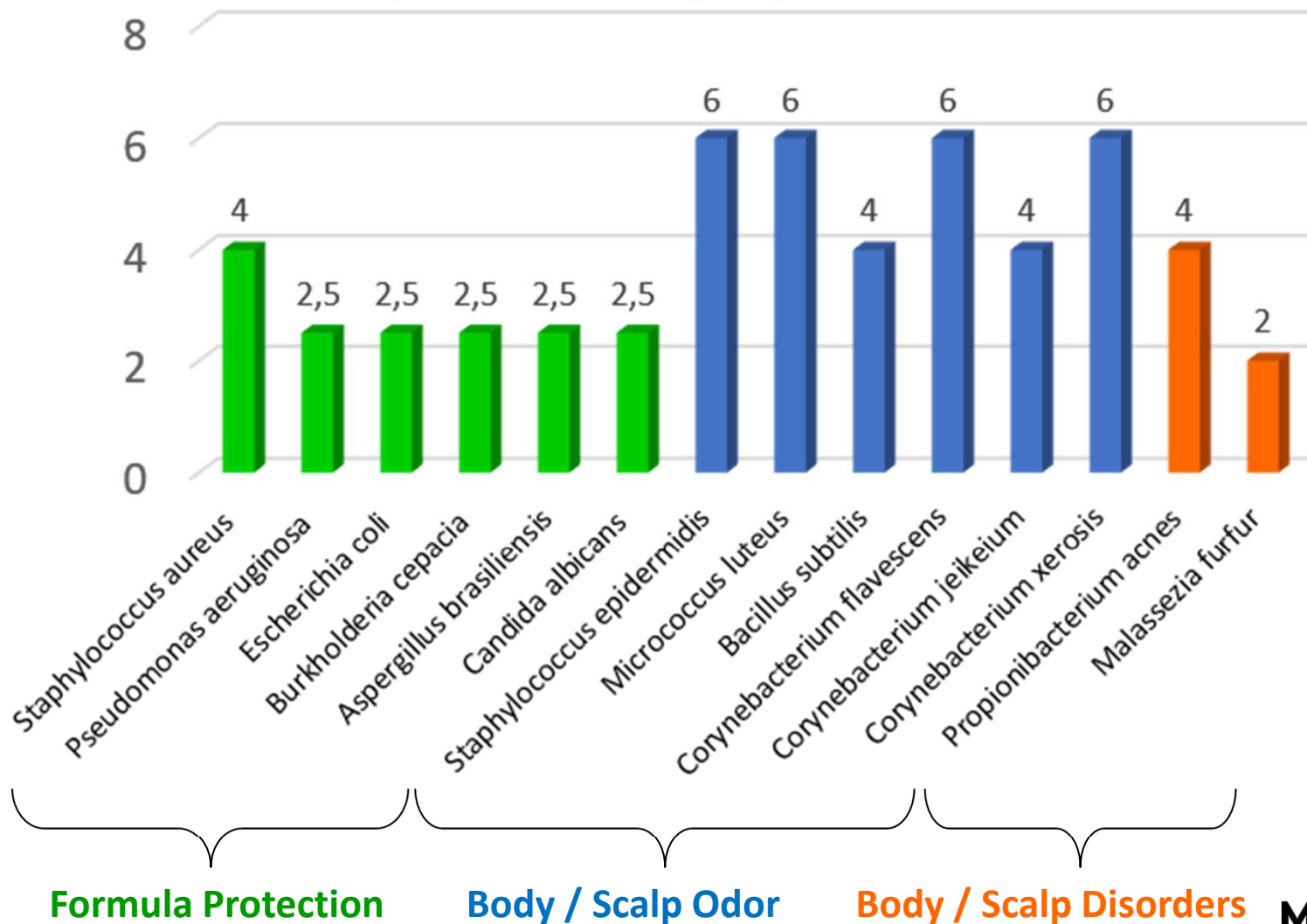
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# A-Leen 5

## MIC - Broad Spectrum Antimicrobial Effect

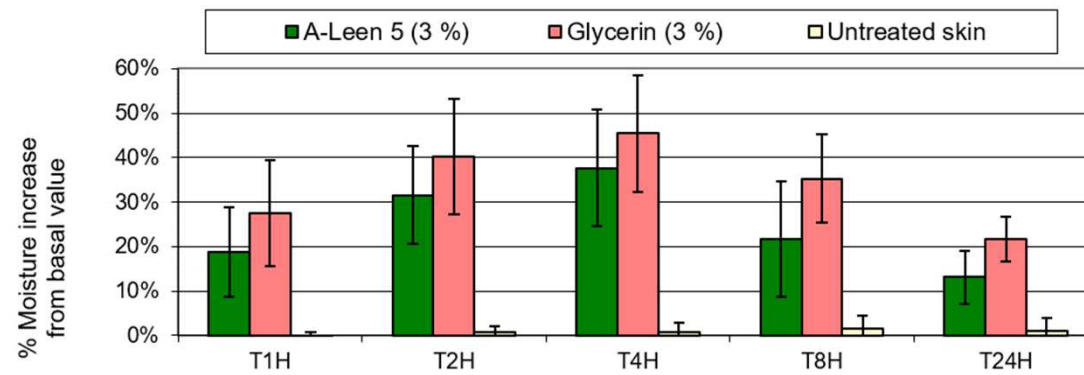
Minimum Inhibitory Concentrations (MIC) of A-Leen 5



# A-Leen 5

## Safe Moisturizer

Corneometry study, tested at 3 % as aqueous solution, by 12 volunteers



➡ Long lasting moisturizing effect, comparable to glycerin in aqueous solution

### HRIPT (Human Repeated Insult Patch Test)

#### HRIPT protocol :

Skin compatibility study and absence of allergenic potential, after repeated applications of the ingredients under occlusive conditions\*, over 36 days.

\*Patch material : Occlusive patch Finn Chamber standard

\*Within the focus group, about 30 % of the panel has a sensitive skin. After the test, nobody showed skin reaction

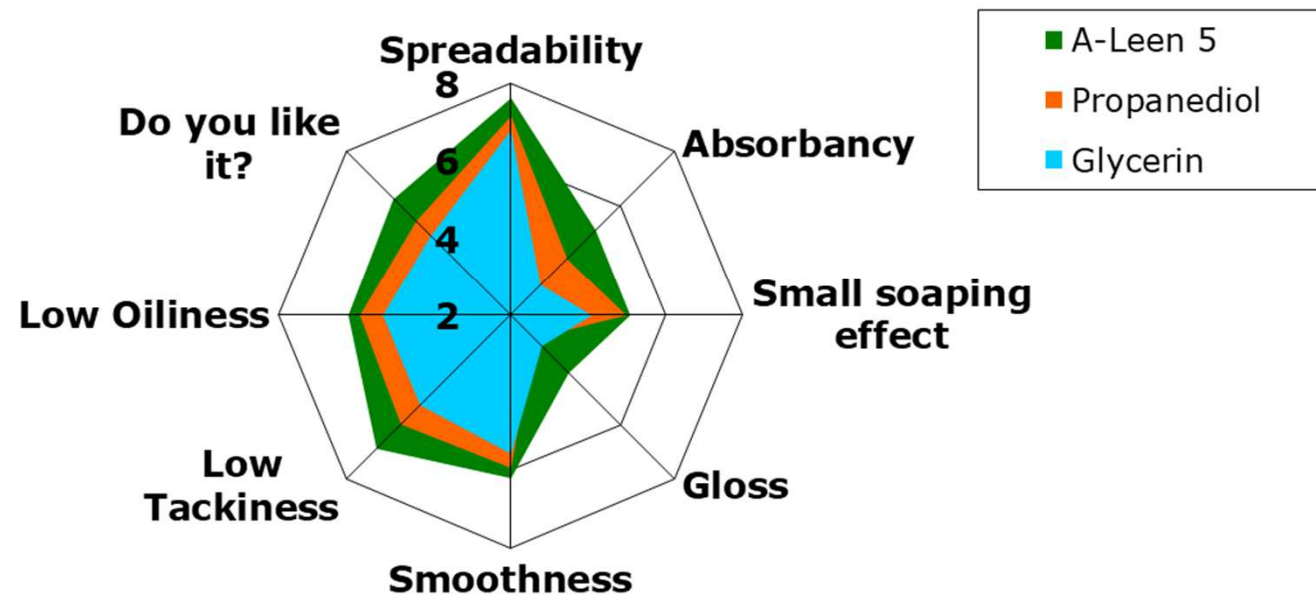
HRIPT	A-Leen 5
Number of subjects	101
Age	18-65
Type of skin	All types
Skin Phototype (Fitzpatrick)	I to IV
RESULT	<ul style="list-style-type: none"><li>- No irritative reaction</li><li>- Very good skin compatibility</li><li>- No allergic reaction</li></ul>

# A-Leen 5

## Good Sensory Profile



Consumer study,  
tested at 3 % in an O/W emulsion, by 23 volunteers



➔ Superior skin conditioning and in-use properties for A-Leen 5

# A-Leen 5

## Green Extraction Solvent

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- ✓ **A-Leen 5** is a **green solvent** from Renewable Resources
- ✓ Protic Polar solvent
  - ➡ Miscible with conventional solvents
- ✓ Miscible with water
  - ➡ Selectivity in hydrophilic compounds extraction
- ✓ High flash point (105°C)
  - ➡ Safe for handling
- ✓ High boiling point (206°C)
  - ➡ Low evaporation rate
- ✓ Preservative properties when used in water based formulations
  - ➡ Perfect candidate for cosmetic extracts
- ✓ INCI listed product for cosmetic application



**A-Leen 5** is a perfect candidate for  
**Extraction of cosmetic ingredients and**  
**In-situ preservation of extracts**

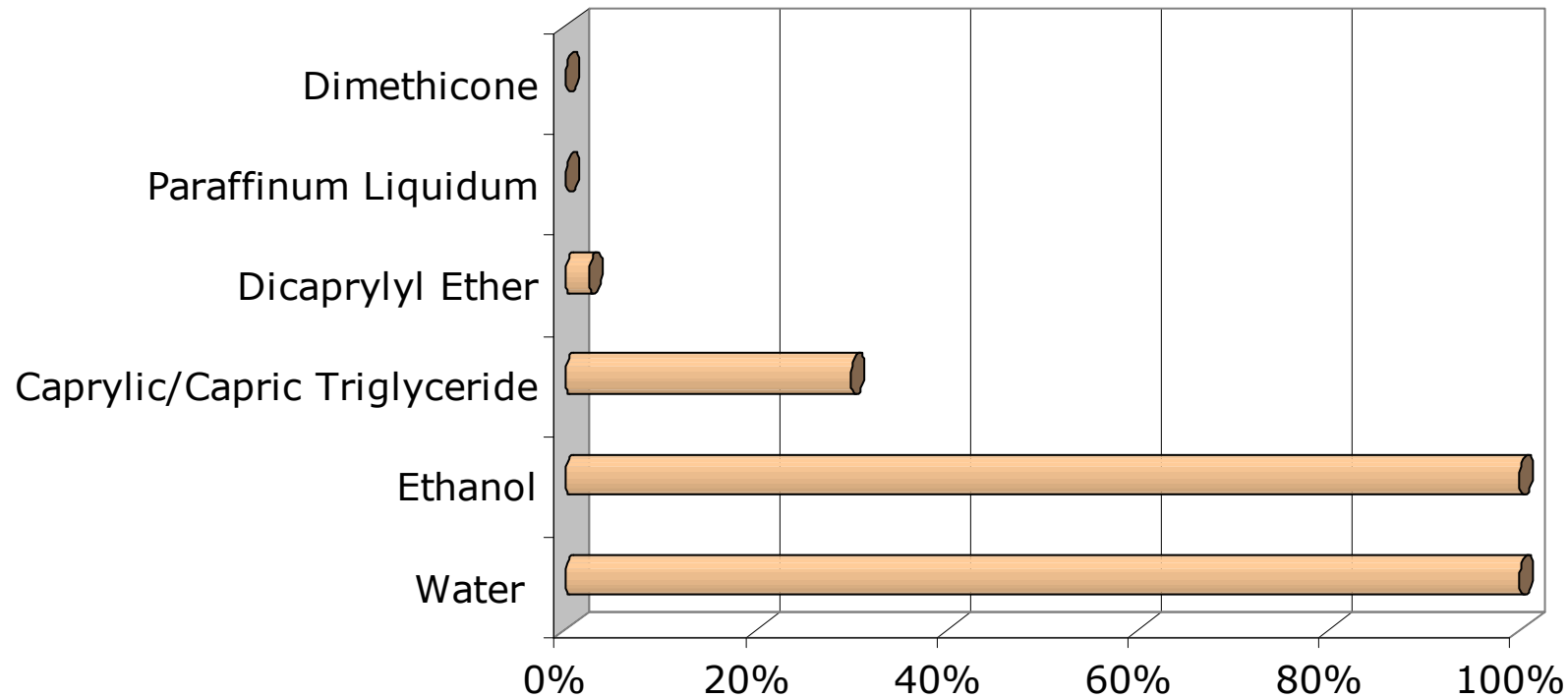


# A-Leen 5

## Green Extraction Solvent

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✓ A-Leen 5 is soluble in water and in polar oils:



clear solutions at ... % of A-Leen 5

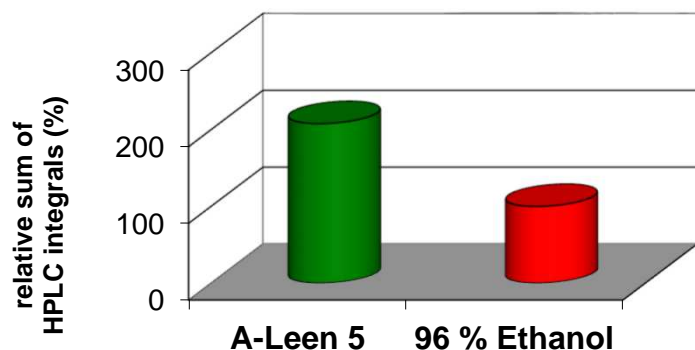
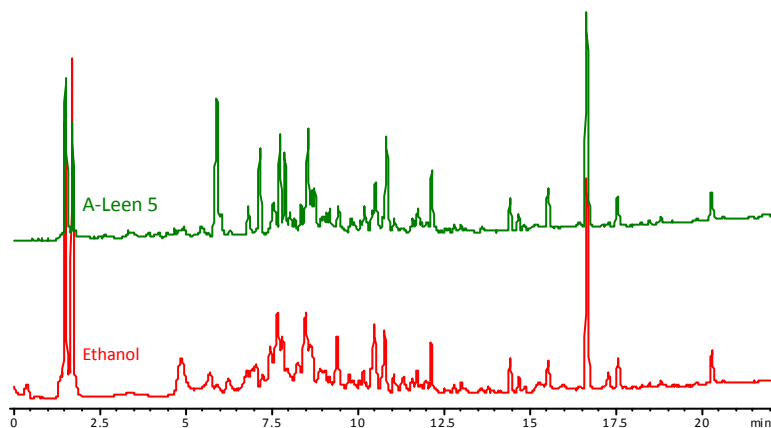
# A-Leen 5

## Green Extraction Solvent



*Chamomilla recutita* (Chamomile flower)

- 5 g of dried plant material, 25 g extraction solvent, 15 min at 75-80 ° C / HPLC analysis, RP C<sub>18</sub>, UV-detection at 210 nm



**Extract profiles are similar**  
**Extraction yield with A-Leen 5 is higher**

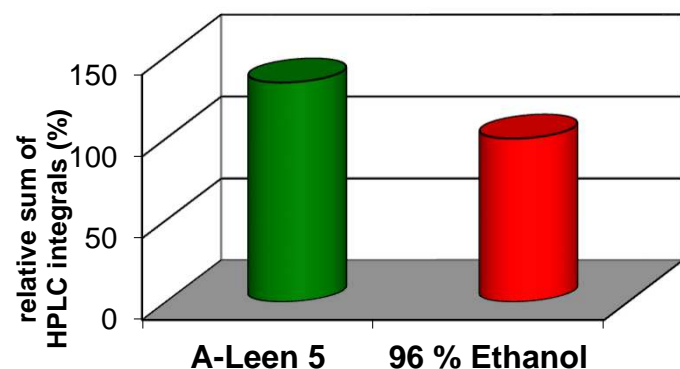
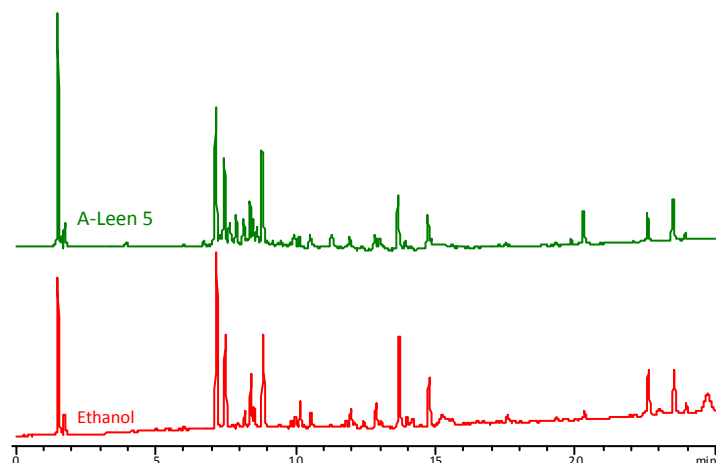
# A-Leen 5

## Green Extraction Solvent



*Mentha × piperita* (Peppermint leaf)

- 5 g of dried plant material, 25 g extraction solvent, 15 min at 75-80 ° C / HPLC analysis, RP C<sub>18</sub>, UV-detection at 210 nm



**Extract profiles are similar**  
**Extraction yield with A-Leen 5 is higher**

# A-Leen 5

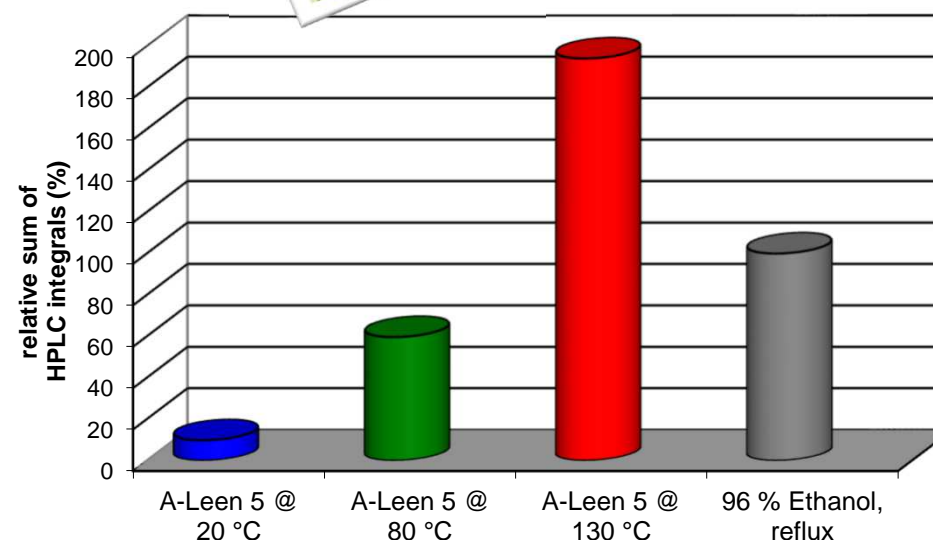
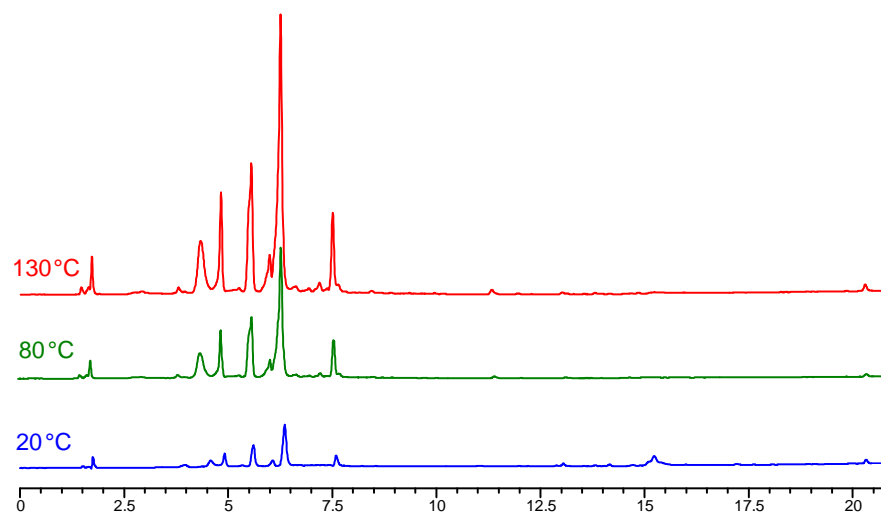
## Green Extraction Solvent



### Temperature influence

#### Green Tea

Extracted with Pentiol Green+™ at 20 ° C, 80 ° C, and 130 ° C.



- ➡ A-Leen 5 is suitable for high temperature extractions under normal pressure
- ➡ The extraction efficacy increases with higher temperatures



# A-Leen 5

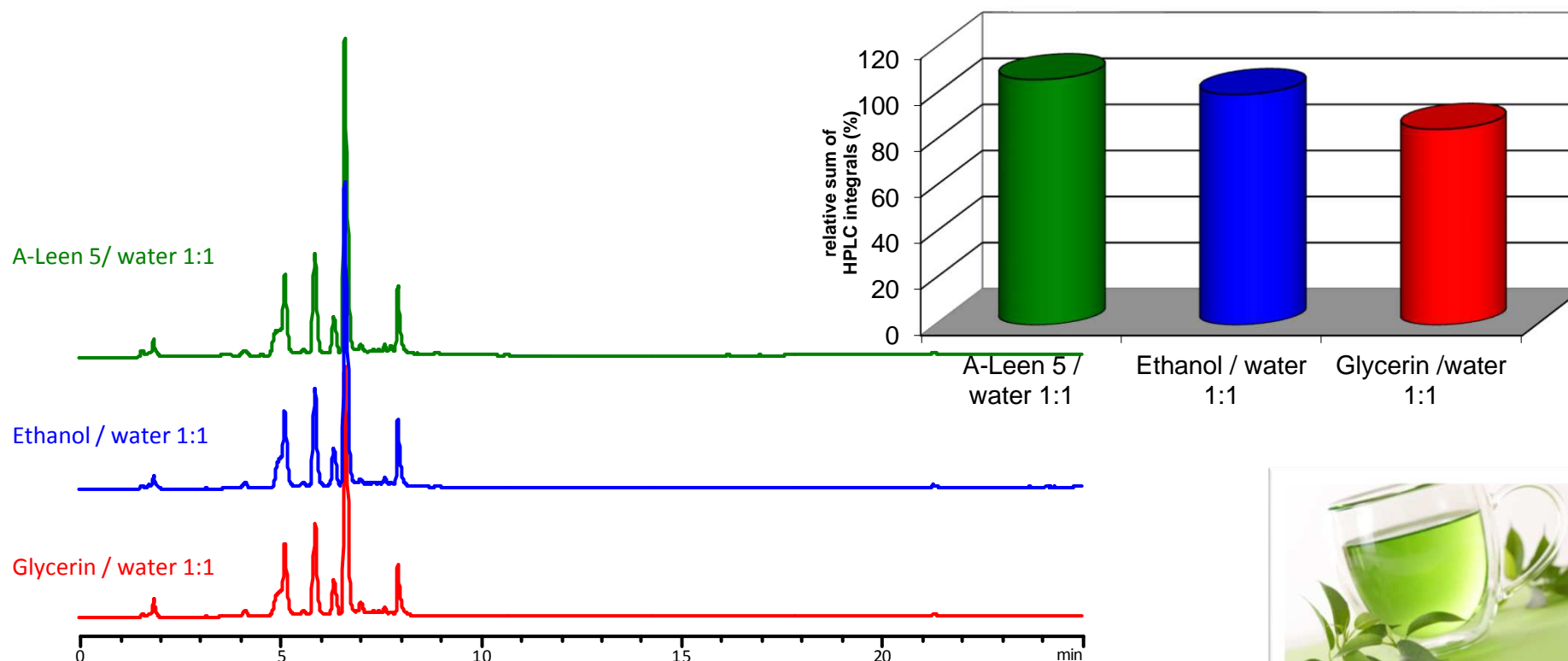
## Green Extraction Solvent



### Extraction with water

Green Tea, extracted at 70-80 ° C

with 1:1 mixtures of A-Leen 5/H<sub>2</sub>O, EtOH/H<sub>2</sub>O, and Glycerin/H<sub>2</sub>O.



➡ A-Leen 5 can also be mixed with water for effective extraction

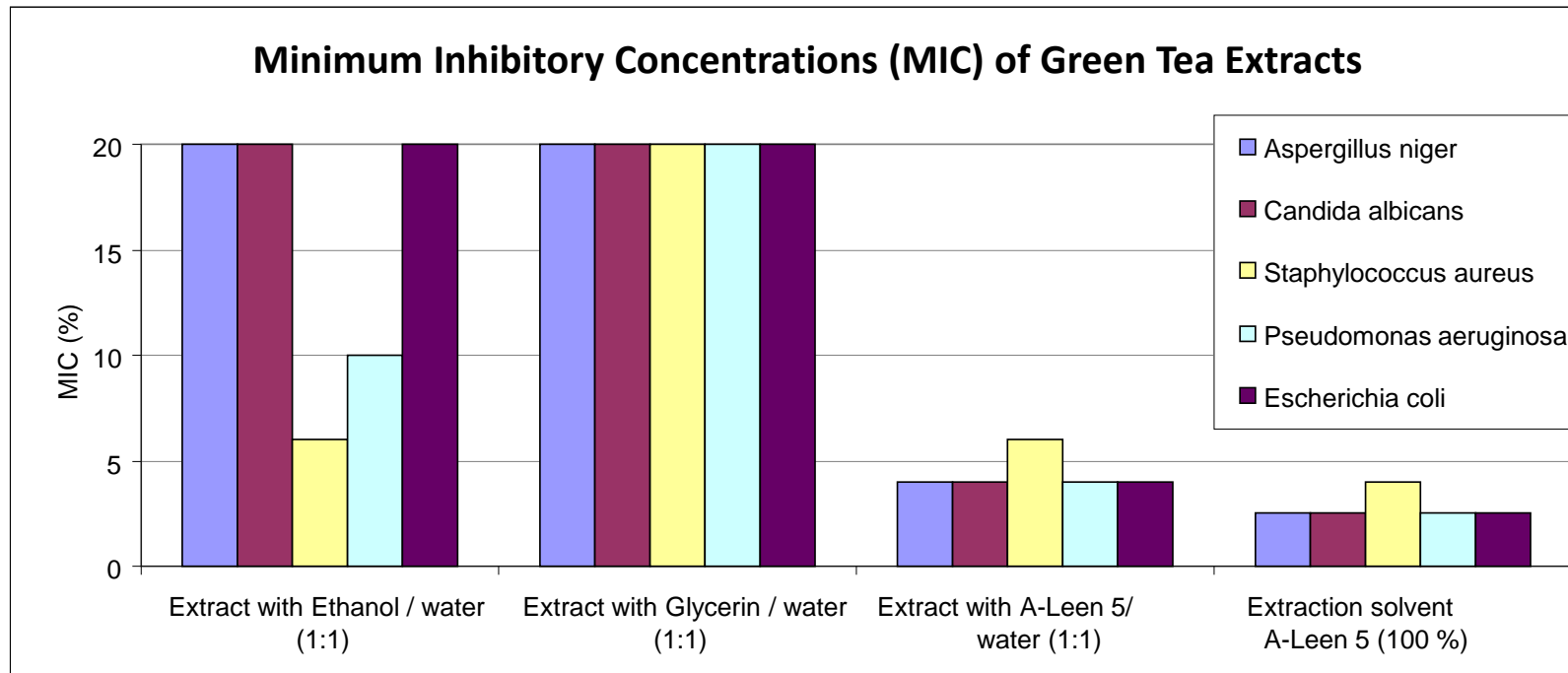


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# A-Leen 5 Green Extraction Solvent



## Pentylene Glycol Effect



➔ **Extracts with A-Leen 5 are self-preserved  
against microbial contamination**

# A-Leen 5

## Green Extraction Solvent



	BP	FP	Classification			
1,2-Pentanediol	206°C	110°C				
MeTHF	80°C	-11°C				
Acetone	56°C	-18°C				
Cyclohexane	80°C	-18°C				
Dichloromethane	40°C	-				
Ethyl Acetate	77°C	-4°C				
Hexane	69°C	-22°C				
Iso-Propanol (IPA)	83°C	12°C				
Methanol	65°C	12°C				

MINASOLVE chose to illustrate  
A-Leen 5  
by a range of « green »  
Wellbeing formulations

# A-Leen 5 Concepts

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Products combining performance and  
perfect accordance with the environment

**Wellbeing  
Body Oil**



**Wellbeing  
Hand Cream**



**Wellbeing  
Body Cream**



**Wellbeing  
Body Scrub**



# A-Leen 5

## Wellbeing Body Oil



### Cold manufacturing process:

1 – Stir phase A at 1000 rpm for 15 minutes.

### Properties, stability and microbiology:

Aspect : Clear yellow liquid

Stable during 3 months at 8° C, room temperature and 42° C, as well as during centrifugation for 1 hr at 20° C and 1500 g.

**Meets criteria A / ISO 11930.**

Phase	Raw Material (INCI Name)	%
A	<b>A-Leen 5</b> ( <i>Pentylene Glycol</i> )	<b>2.00</b>
	<b>Myritol 318</b> ( <i>Caprylic/Capric Triglyceride</i> )	21.65
	<b>Hazelnut Oil</b> ( <i>Corylus Avellana (Hazel) Seed Oil</i> )	20.00
	<b>Grape Seed Oil</b> ( <i>Vitis Vinifera (Grape) Seed Oil</i> )	19.70
	<b>Sesame Oil</b> ( <i>Sesamum Indicum (Sesame) Seed Oil</i> )	20.00
	<b>BergaCare FG5</b> ( <i>Ethylhexyl Palmitate (and) Ethylhexyl Stearate (and) Hydrogenated Olive Oil (and) Caprylic/Capric Triglycerides</i> )	16.00
	<b>DL-<math>\alpha</math>-Tocopherol (&gt;97%)</b> ( <i>Tocopherol</i> )	0.50
	<b>Perfume Celebration Fitness</b> ( <i>Parfum</i> )	0.15

# A-Leen 5

## Wellbeing Hand Cream



### Manufacturing process:

1- Disperse Xanthan Gum into the water at 800 rpm and mix until fully hydrated. Heat up to 75° C.

2- In a separate beaker, mix ingredients from phase B and heat up to 75° C. Add B to A once they have reached the same temperature. Stir at 2000 rpm for 10 minutes.

3- Cool down while stirring. Add phase C below 40° C.

4- Adjust pH and add buffer.

### Properties and stability and microbiology:

Aspect : Opaque white cream

pH : 5 - 6

Stable during 3 months at 42° C and room temperature.

**Meets criteria A / ISO 11930.**

Phase	Raw material (INCI Name)	%
A	<b>Water</b> ( <i>Aqua</i> )	75.5
	<b>Xanthan Gum PC</b> ( <i>Xanthan Gum</i> )	0.3
B	<b>Emulgade PL 68/50</b>	5.0
	( <i>Cetearyl Glucoside (and) Cetearyl Alcohol</i> )	
	<b>BergaCare FG5</b>	3.0
	( <i>Ethylhexyl Palmitate (and) Ethylhexyl Stearate (and) Hydrogenated Olive Oil (and) Caprylic/Capric Triglycerides</i> )	
	<b>Lipex Sheasoft</b>	2.0
	( <i>Butyrospermum Parkii (Shea) Butter</i> )	
	<b>Myritol 318</b>	5.0
C	( <i>Caprylic/Capric Triglyceride</i> )	
	<b>Sesame Oil</b>	5.0
	( <i>Sesamum Indicum (Sesame) Oil</i> )	
	<b>DL-α-Tocopherol</b> (>97%) ( <i>Tocopherol</i> )	0.1
	<b>Perfume Fireweed</b> ( <i>Parfum</i> )	0.1
D	<b>A-Leen 5</b> ( <i>Pentylene Glycol</i> )	2.0
	<b>E-Leen Green B</b>	1.5
	( <i>Pentylene Glycol (and) Water (and) Sodium Benzoate (and) Benzoic Acid</i> )	
	<b>Sodium Hydroxide</b> (10%)	qs
	( <i>Aqua (and) Sodium Hydroxide</i> )	
	<b>Buffer</b>	0.5
	( <i>Aqua (and) Citric Acid (and) Sodium Citrate</i> )	

# A-Leen 5

## Wellbeing Body Cream



### Manufacturing process - cold processing:

- 1- Prepare premix B and disperse into A.  
Heat up to 70 ° C. Stir at 400 rpm.
- 2- Heat phase C up to 70 ° C. Add C to A.  
Stir at 2000 rpm during 10 min. Cool down while stirring.
- 3- Add phase D below 40 ° C.

### Properties, stability and microbiology:

Aspect : Opaque ivory cream  
pH : 5 - 6

Stable during 3 months at 42 ° C and room temperature.

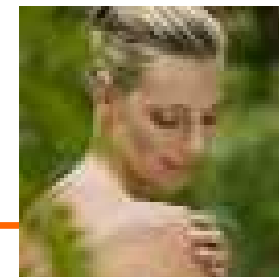
Meets criteria A / ISO 11930.

Phase	Raw material (INCI Name)	%
A	Water (Aqua)	72.0
B Premix	A-Leen 5 (Pentylene Glycol)	3.0
	Xanthan Gum PC (Xanthan Gum)	0.3
C	Emulium Kappa 2 (Candellila/Jojoba/Rice Bran Polyglyceryl-3 Esters (and) Glyceryl Stearate (and) Cetearyl Alcohol (and) Sodium Stearoyl Lactylate)	1.5
	Glyceryl Monostearate (Glyceryl Monostearate)	2.3
	TEGO Care PS (Methyl Glucose Sesquistearate)	1.2
	Jojoba Oil (Simmondsia Chinensis (Jojoba) Seed Oil)	5.0
	Almond Oil (Prunus Amygdalus Dulcis (Sweet Almond) Oil)	4.0
	Lipex Cocoasoft (Theobroma Cacao Butter)	3.0
	BergaCare FG5 (Ethylhexyl Palmitate (and) Ethylhexyl Stearate (and) Hydrogenated Olive Oil (and) Caprylic/Capric Triglycerides)	2.0
	Grape Seed Oil (Vitis Vinifera (Grape) Seed Oil)	4.0
	Beeswax (Cera Alba)	1.5
	Perfume Celebration Fitness (Parfum)	0.1
D	DL- $\alpha$ -Tocopherol (>97%) (Tocopherol)	0.1



# A-Leen 5

## Wellbeing Body Scrub



### Manufacturing process:

- 1- Stir phase A at 300 rpm for 5 minutes
- 2- Premix the Gum with Pentiol Green + and add to phase A under mixing
- 3- Add C to A+B under mixing. Heat up to 80 – 85° C while stirring at 700 rpm
- 4- Cool down at 40° C, add phase D then E. Stir at 2000 rpm for 10 minutes
- 5- Adjust pH to 4,50 with phase F

### Properties, stability and microbiology:

Aspect : Thick dark brown gel  
pH : 4,5+/-0,3

Stable during 3 months at 20 ° C and 42° C.  
**Meets criteria A / ISO 11930.**

Phase	Raw material	%
A	Water (Aqua)	84.85
	Sorbitol (Sorbitol)	6.00
B	<b>A-Leen 5 <sup>(1)</sup></b> <b>(Pentylene glycol)</b>	<b>3.00</b>
	Xanthan gum PC <sup>(2)</sup> (Xanthan Gum)	1.50
C	Carrageenan kappa (Carrageenan)	0.60
D	Coconut Exfoliator 500 <sup>(3)</sup> (Cocos Nucifera (Coconut) Shell Powder )	4.00
E	Perfume Purple Lilies <sup>(4)</sup> (Perfume)	0.05
F	Lactic acid, 90 % (Lactic acid (and) Aqua)	qs

# A-Leen 5

## Conclusion

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### A-Leen 5

### Biosourced & Odourless Pentylene Glycol



**COSMOS  
APPROVED**



- **Preservative booster**
- **Green formula protection**
- **Easy to use**
- **Emollient & moisturizer**
- **Extraction solvent**
- **Solubilizer**

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**Serving market leaders as well as emerging players**, we support our customers' efforts to improve the quality of life in the global community by :

- Improving our chemistry and operational excellence today
- Creating and innovating for tomorrow
- Driving our enterprises together to **go beyond expectations**



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