Does your formulation have enough backbone?

RAHN

Your partner for excellence

Hydrocolloids

The backbone of the formulation

Crucially significant for stability, elasticity and movement behaviour

Transparent gel

Spray

Lotion or cream

Cream-gel

Butter

Serum

Foam

Sorbet

Mousse

RAHN

Hydrocolloids

The backbone of the formulation

Effects that developers associate with hydrocolloids:

Thickening

Improvement in stability

Optimising skin feel

Regulating flow properties

refreshing

light

film-forming

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Hydrocolloids

The backbone of the formulation

Problems that developers associate with hydrocolloids:

Ion sensitivity

Long hydration time

Formation of ripples

Incompatibilities

stringy

sticky

slimy

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Hydrocolloids

The backbone of the formulation

The crucial factor is the specific knowledge about the individual hydrocolloids:

Right choice / combination

Right dosage

Right application / intended purpose

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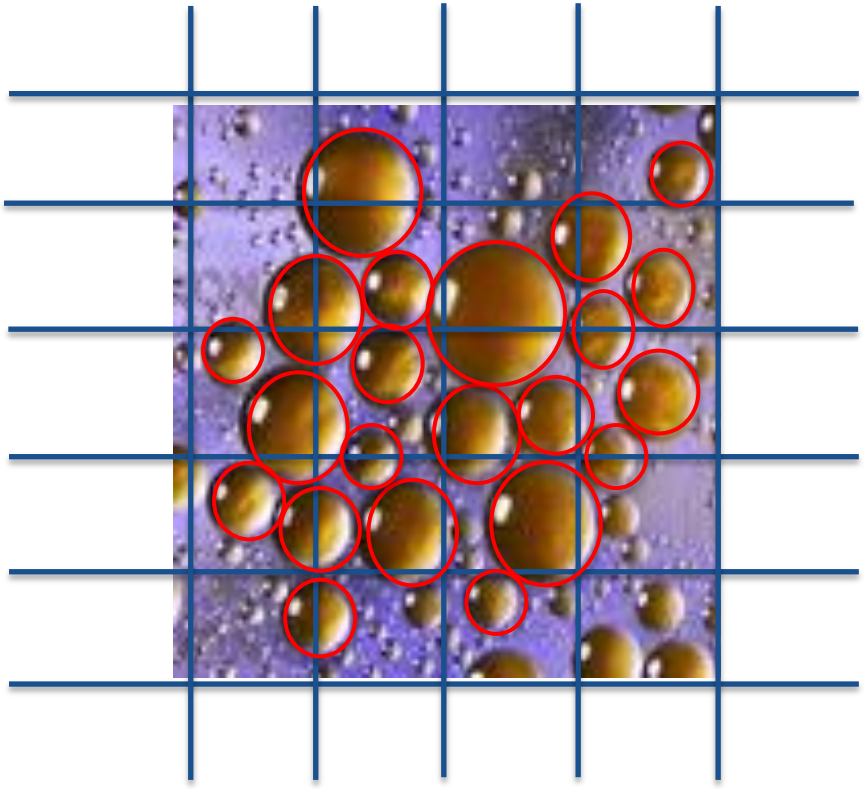
As stabilizer in o/w emulsions

1. Thickening of water phase
2. Stabilization of interface
3. Reduction in interfering effects

Thickening of outer phase through hydrocolloids

Emulsifier molecules occupy the interface



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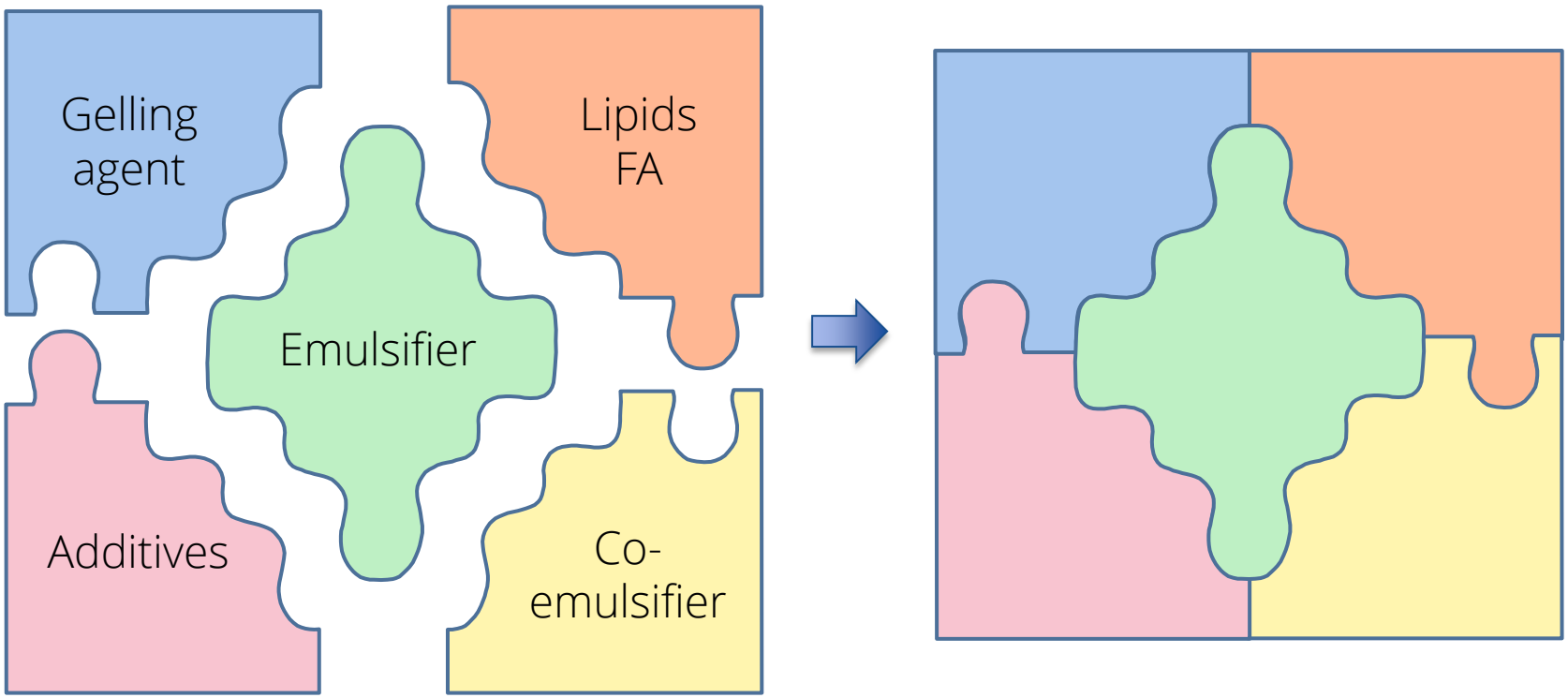
The components…



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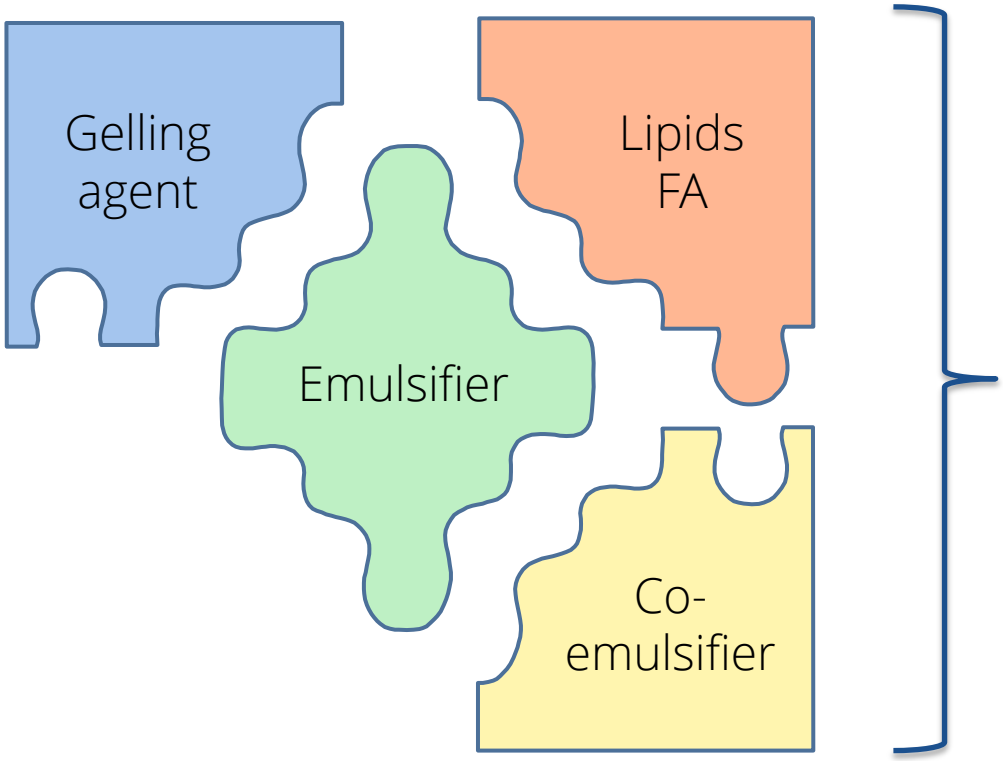
Composition of the emulsion



The interaction of gelling agent, emulsifier, fatty alcohol and co-emulsifier defines the consistency and the stability of the emulsion.

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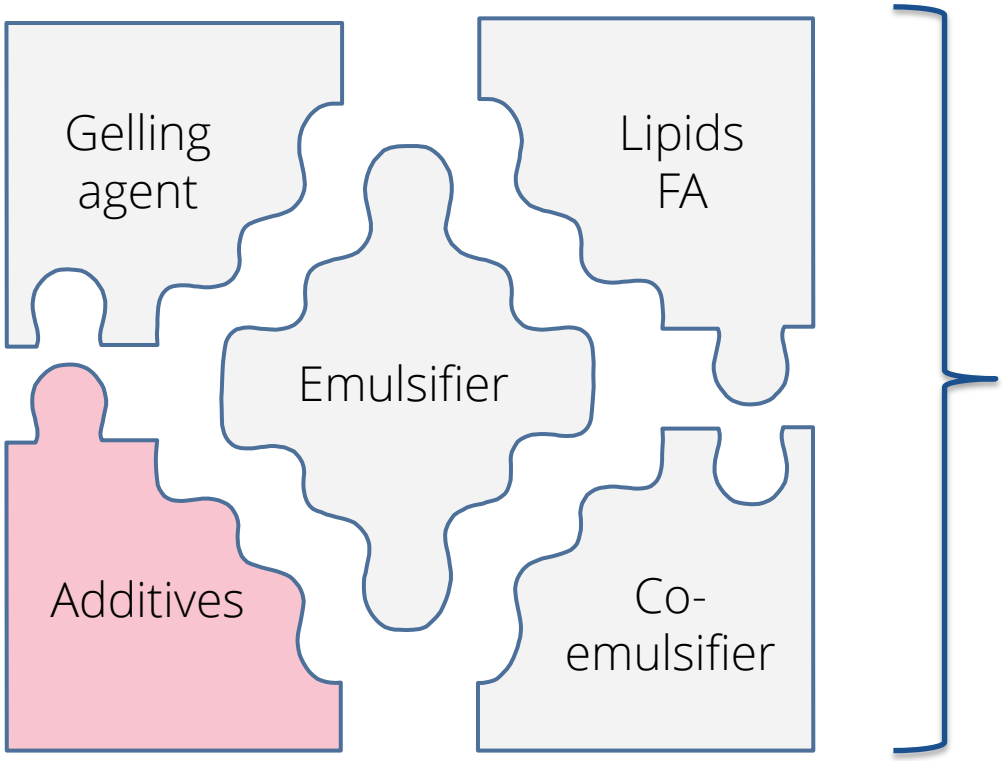
The potential composition of the emulsion



Additives such as fragrance, active ingredients or preservatives can disrupt the structure, consistency and stability of the emulsion by weakening the stabilizing components.

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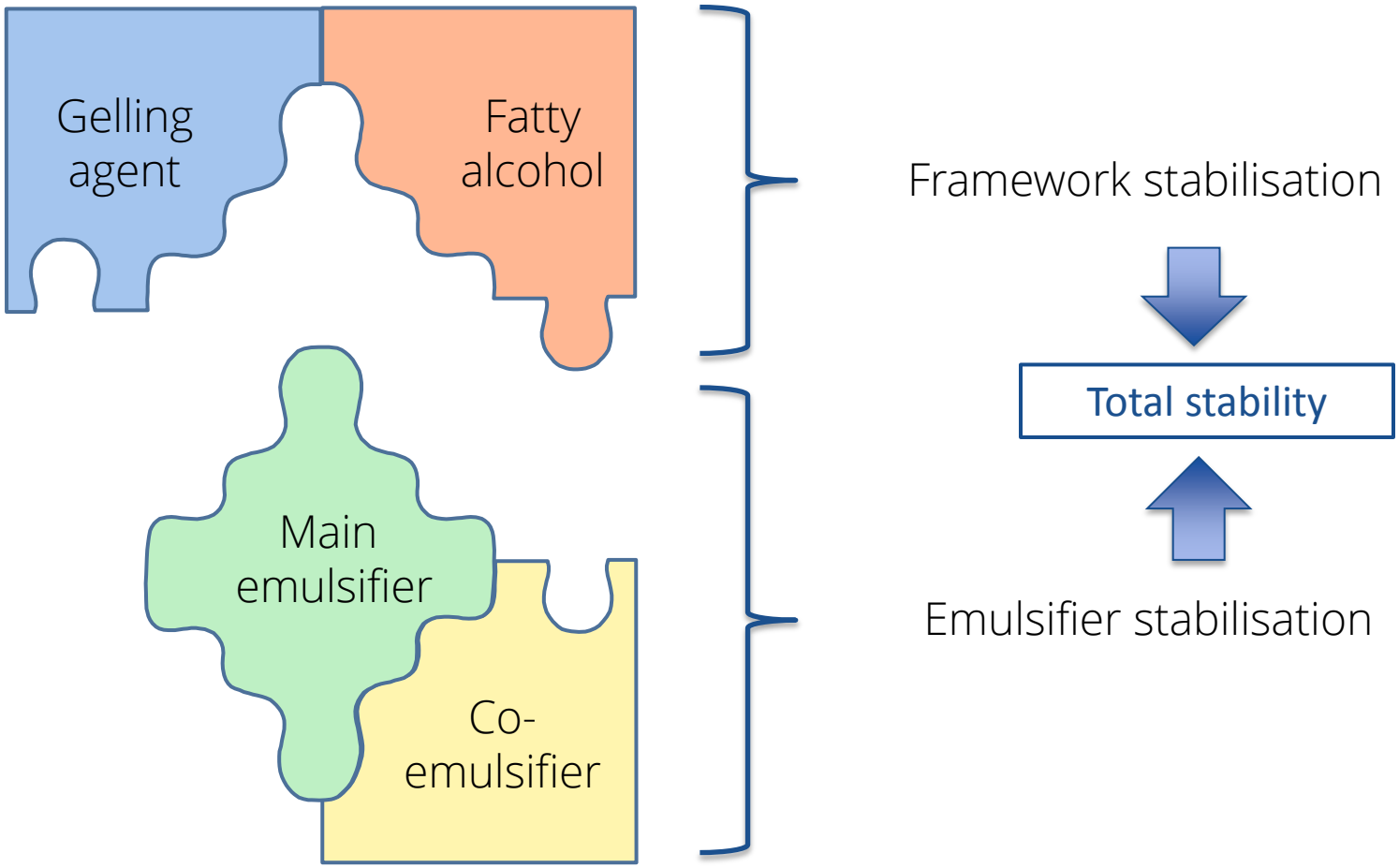
Stabilisers



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Stability improvement

with xanthan gum

Keltrol CG-SFT is my standard hydrocolloid for emulsions.

Molecule:	anionic polysaccharide, obtained by biotechnology
Dosage:	0.2-0.5%
pH-range:	3-12
Processing:	a) slowly add to water, stirring well b) pre-dispersion in water-free glycerol or glycol c) pre-dispersion in the oil phase (hot or cold)
Benefit:	good ionic compatibility very good improvement in thermal stability in emulsions
Risk:	interacts with cationic polymers (quats)

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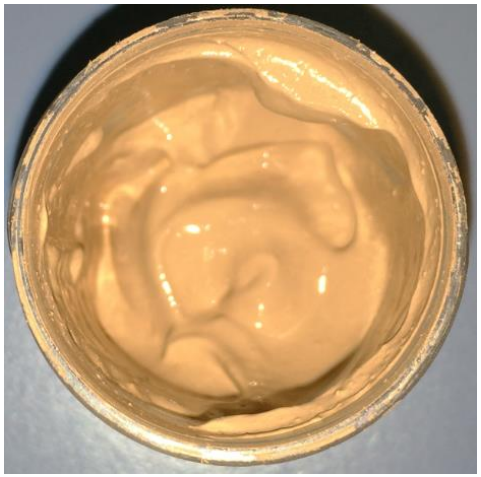
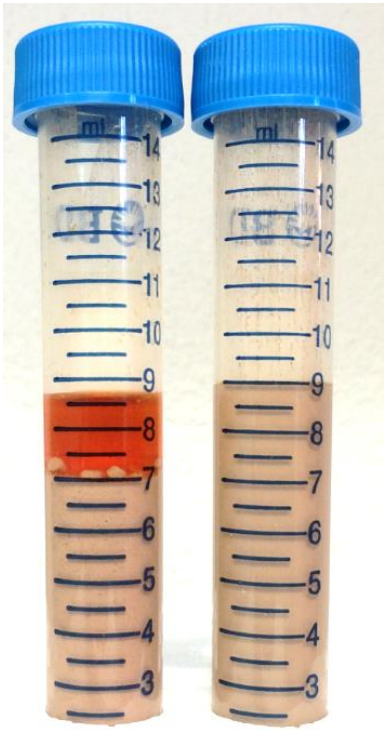
Stability improvement

with xanthan gum

Original



+ 0.2% Keltrol CG-SFT



Original / + 0.2% Keltrol

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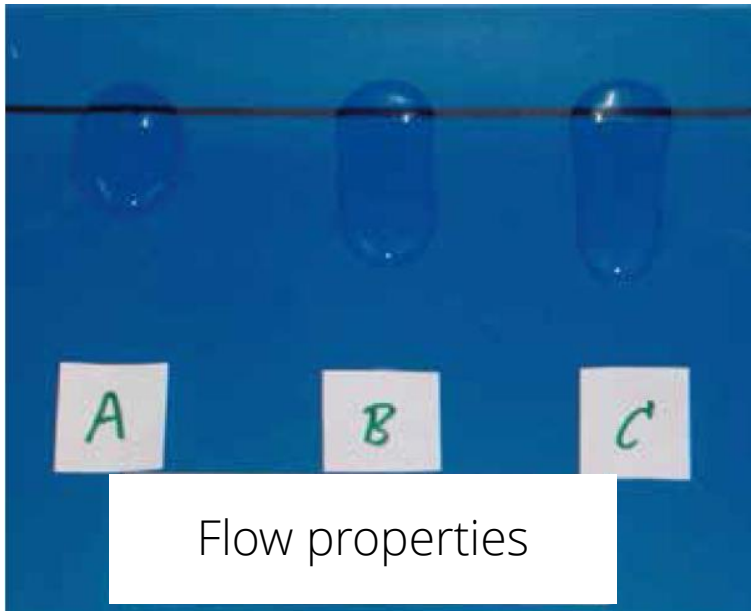
Combinations of hydrocolloids

Does that make sense?

Acrylates tend to be gelatinous substances while xanthan gum alone tends to be slimy. Combining the two results in harmonious flow properties and a wonderful texture with a very good stability network.



A = Gel base
B = Gel base + Keltrol CG-T
C = Gel base + Keltrol CG-SFT

Gel base:
Made with 0.25% Carbopol ETD2050,
neutralised with NaOH to pH value approx. 6.5

RAHN

Combinations of hydrocolloids

Does that make sense?

Dosage recommendations for the combination acrylate & xanthan gum to develop emulsifier-free stable o/w emulsions

Name	Carbopol ETD 2050	Carbopol ETD 2020	Pemulen TR-2	Keltrol CG-SFT
INCI	Carbomer	Acrylates /C10-30 Alkyl Acrylate Crosspolymer	Acrylates /C10-30 Alkyl Acrylate Crosspolymer	Xanthan Gum
Total A: 0.8%	0.40%			0.40%
Total B: 0.6%		0.40%		0.20%
Total C: 0.4%			0.20%	0.20%

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Can you add too much hydrocolloid?

Droplet size reduction

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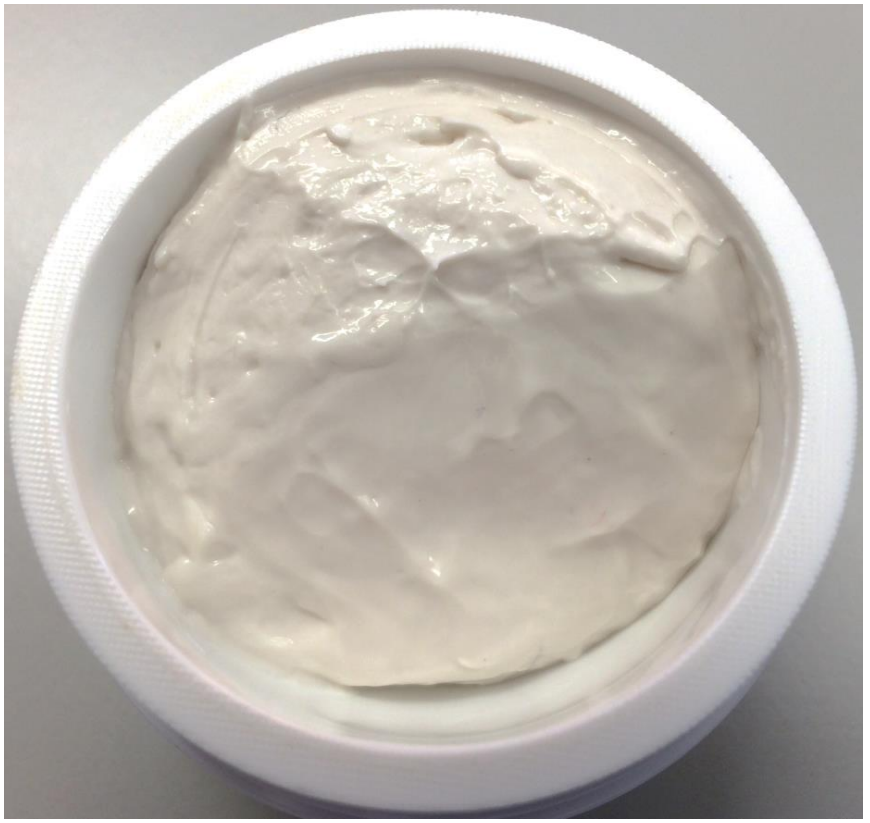
Can you add too much hydrocolloid?

An example of a product on the market where there was greater energy input in production than on a laboratory scale.

The product gets a texture like curd and is difficult to put on the finger.



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Emulsion stabilisation

with hydrocolloids only

Calming & Protecting Cream-Gel

St	Substance	INCI Name USA	% w/w	Manufacturer
1	Water demin.	Water	85.60	several
	Glycerin 85%	Glycerin, Water	4.00	several
2	Carbopol ETD 2020	Acrylates/C10-30 Alkyl Acrylate Crosspolymer	0.40	Lubrizol, US
3	Tegosoft CI	Cetearyl Isononanoate	2.50	Evonik Industries AG, DE
	Verstatil PC	Phenoxyethanol, Caprylyl Glycol	1.00	Dr. Straetmans, DE
	DEFENSIL®	Octyldodecanol, Echium Plantagineum Seed Oil, Helianthus Annuus (Sunflower) Seed Oil Unsaponifiables, Cardiospermum Halicacabum Flower/Leaf/Vine Extract, Tocopherol	5.00	RAHN AG, CH
	Fragrance	Fragrance	0.10	several
	Keltrol CG-F	Xanthan Gum	0.20	CP Kelco, US
4	NaOH solution 10%	Sodium Hydroxide, Water	1.20	several

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Emulsion stabilisation

with hydrocolloids only

Uniq Serum

St	Substance	INCI Name USA	% w/w	Manufacturer
1	Water demin.	Water	81.85	several
	Glycerin 85%	Glycerin, Water	3.00	several
	Fucocert	Water, Glycerin, Biosaccharide Gum-1, Sodium Levulinate, Sodium Anisate, Glyceryl Caprylate	3.00	Solabia, FR
	Citric Acid solution 10%	Citric Acid, Water	0.20	several
	Dermosoft 1388	Glycerin, Water, Sodium Levulinate, Sodium Anisate	3.50	Dr. Straetmans, DE
	Gamma-MAX	Sodium Polyglutamate	0.50	Bioleaders Corporation, KOR
2	UniqSens™ SFE System	Pectin, Xanthan Gum, Chondrus Crispus (Carrageenan)	1.25	CP Kelco, US
	Dermofeel Sensolv	Isoamyl Laurate	1.50	Dr. Straetmans, DE
3	Ethanol 94% denat.	Alcohol, Water	5.00	several
	Fragrance	Fragrance	0.20	several

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Emulsion stabilisation

with hydrocolloids only

Ageless Eye Serum

St	Substance	INCI Name USA	% w/w	Manufacturer
1	Water demin.	Water	84.20	several
	LIFTONIN®-XPRESS	Hydroxypropyl Methylcellulose, Pullulan, Porphyridium Cruentum Extract	2.00	RAHN AG, CH
2	Optigel WX	Bentonite, Xanthan Gum	1.00	BYK Chemie GmbH, DE
	Optigel CL	Magnesium Aluminum Silicate	4.00	BYK Chemie GmbH, DE
	Solagum AX	Acacia Senegal Gum, Xanthan Gum	0.30	several
3	TEGO Pep 4-17	Tetrapeptide-21, Glycerin, Butylene Glycol, Water	5.00	Evonik Industries AG, DE
4	Verstatil PC	Phenoxyethanol, Caprylyl Glycol	1.10	Dr. Straetmans, DE
	Eldew PS-203R	Phytosteryl/Octyldodecyl Lauroyl Glutamate	0.20	Ajinomoto, JP
5	Citric Acid solution 10%	Citric Acid, Water	2.20	several

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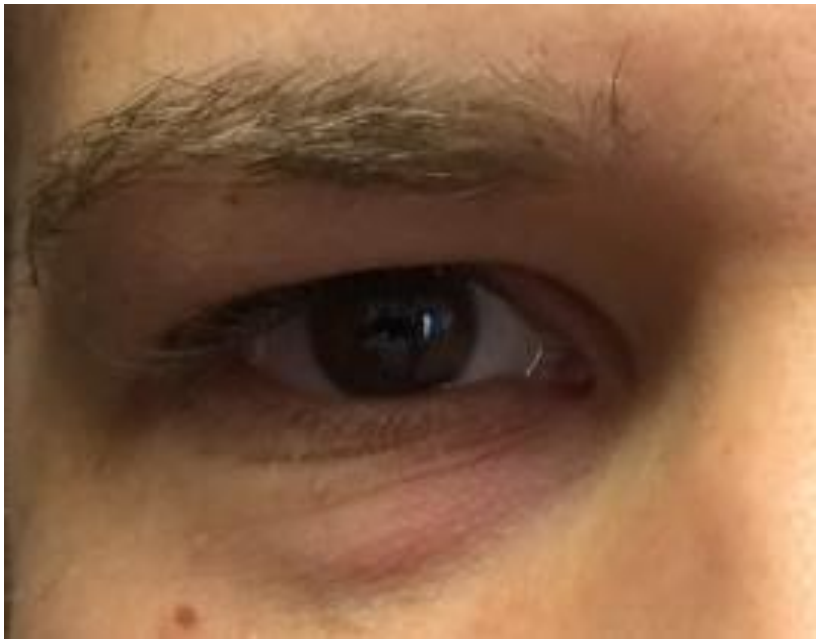
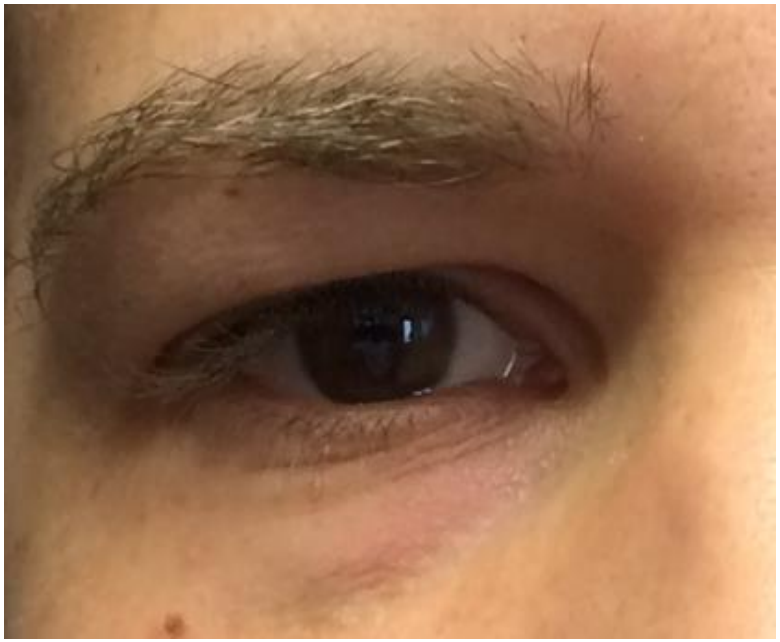
Ageless Eye Serum

Photo iphone; male, 35 years



Before application



5 min after application

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Ageless Eye Serum

Photo iphone; male, 45 years

Before application

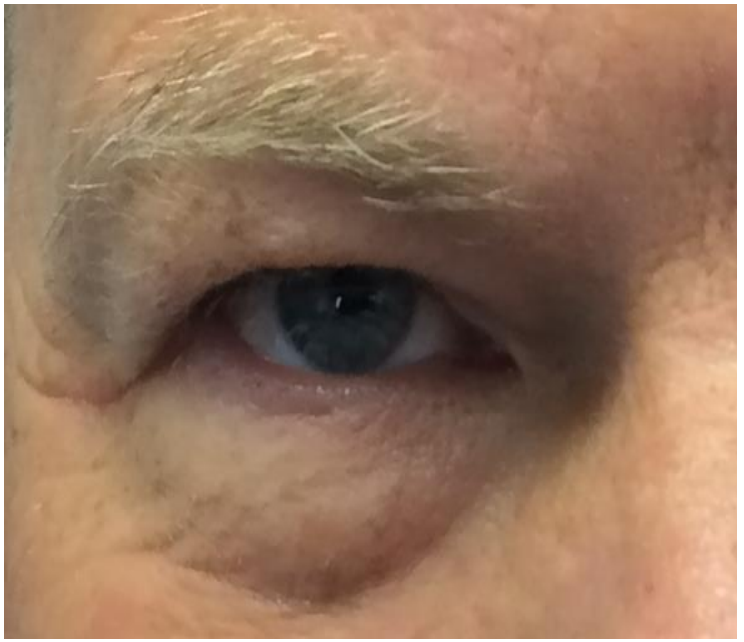
5 min after application

RAHN

Ageless Eye Serum

Photo iphone; male, 55 years

Before application



5 min after application

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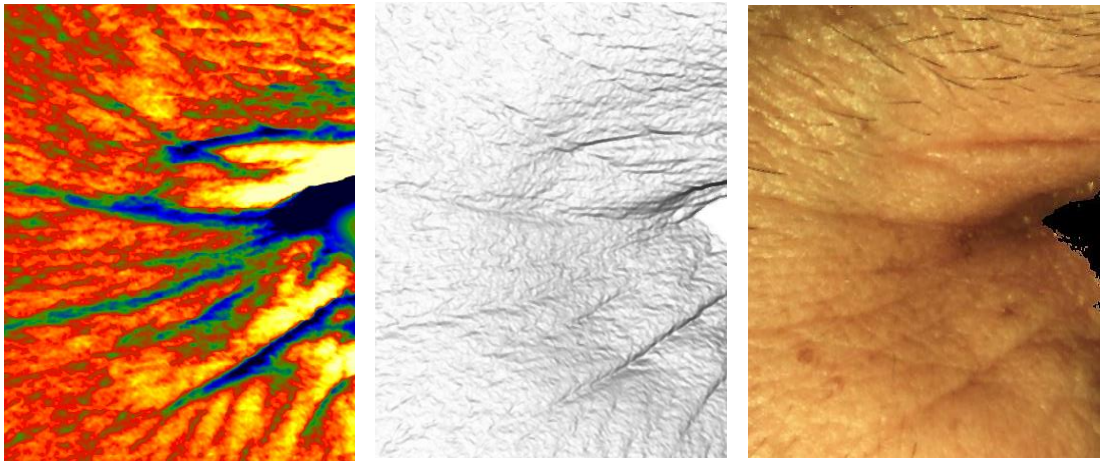
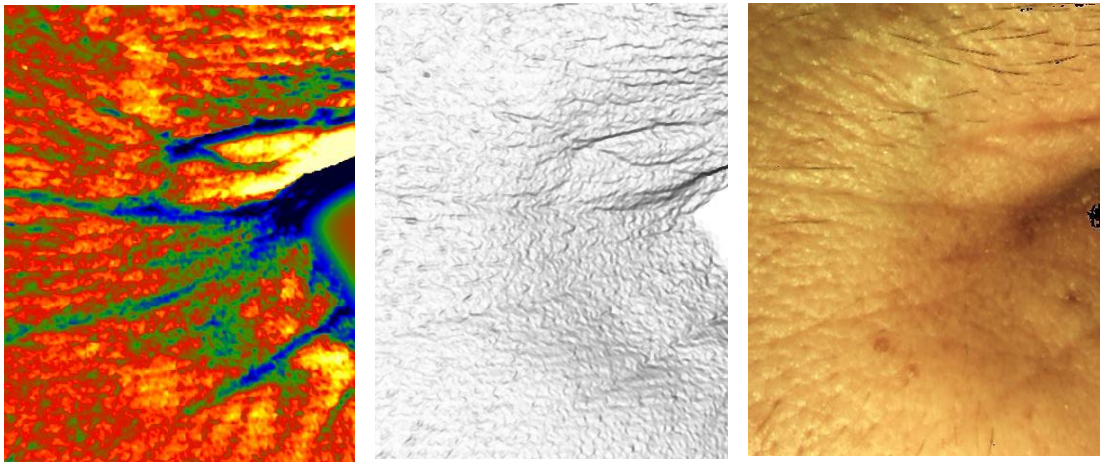
Ageless Eye Serum

Primos 3D wrinkle measurement, male 45 years



Before application



30 sec after application

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Emulsion stabilization

with hydrocolloids and only a little emulsifier

Detox Face Primer

St	Substance	INCI Name USA	% w/w	Manufacturer
1	Water demin.	Water	83.75	several
	Glycerin 99.5%	Glycerin, Water	1.00	several
	Sodium Sulfite	Sodium Sulfite	0.10	several
	Silkgel	sr-Spider Polypeptide-1, Water, 1,2-Hexanediol, Caprylyl Glycol	5.00	AMSilk GmbH, DE
	Amisoft HS-11P(F)	Sodium Stearoyl Glutamate	0.20	Ajinomoto, JP
2	UniqSens™ SFE System	Pectin, Xanthan Gum, Chondrus Crispus (Carra-geenan)	1.25	CP Kelco, US
	Keltrol CG-SFT	Xanthan Gum	0.25	CP Kelco, US
	Dermofeel Sensolv	Isoamyl Laurate	2.50	Dr. Straetmans, DE
3	Sensual Flower	Fragrance	0.30	Aromatic Flavours & Fragrances Europe Ltd., GB
	Dermosoft OMP	Methylpropanediol, Caprylyl Glycol, Phenylpro-panol	3.50	Dr. Straetmans, DE
4	PROTEOLEA®	Glycerin, Water, Levan, Decyl Glucoside, Olea Europaea (Olive) Leaf Extract, Phenethyl Alco-hol, Zizyphus Jujuba Seed Extract, Citric Acid, Ascorbic Acid	2.00	RAHN AG, CH
5	Citric Acid solution 10%	Citric Acid, Water	0.15	several

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Thickener with sensory benefit

Chondrus Crispus

To reduce the stickiness of formulations or to improve the finish of butter formulas (less of a breaking effect), a carrageen - the Genuvisco CG-131 – can be very helpful.

Molecule:	anionic polysaccharide from red algae
Dosage:	0.05-0.2% in emulsions for sensory effect 0.5-1% in shower emulsions for stability and viscosity 1.5-2% in firm gel formulations (hot filling)
Benefit:	Delivers a slippery film (sensory effect) can also be used as an aid for shaving
Risk:	When salt is added, it thickens to a pudding-like consistency

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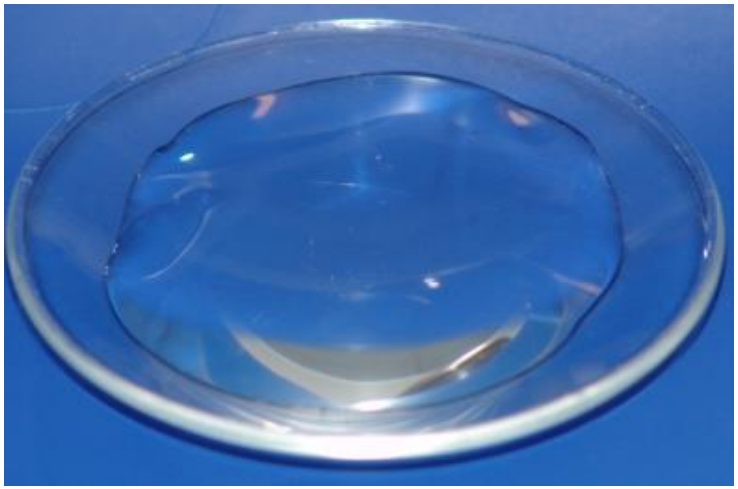
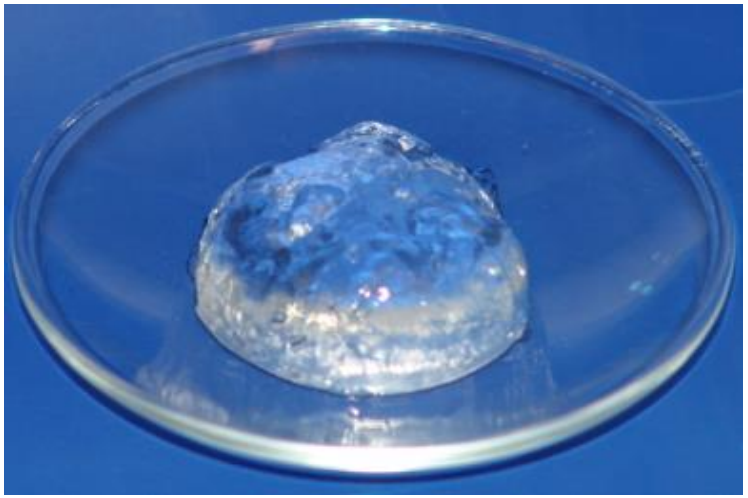
Thickener with sensory benefit

Chondrus Crispus

Typical structural behaviour following addition of salt



2% CG-131 in water



1% CG-131 in water
+0.5% NaCl

Genuvisco in use

Chondrus Crispus

Natural Shower Emulsion

St	Substance	INCI Name USA	% w/w	Manufacturer
1	Water demin.	Water	44.50	several
	Dermosoft 1388 ECO	Glycerin, Water, Sodium Levulinate, Sodium Anisate	3.00	Dr. Straetmans, DE
2	Genuvisco CG-131	Chondrus Crispus (Carrageenan)	1.00	CP Kelco, US
	Keltrol CG-SFT	Xanthan Gum	0.30	CP Kelco, US
3	Amisoft ECS-22W	Disodium Cocoyl Glutamate	20.00	Ajinomoto, JP
	Plantacare 2000 UP	Decyl Glucoside, Water	7.00	BASF, DE
	Sunflower Oil, organic	Helianthus Annuus (Sunflower) Seed Oil	17.00	All Organic Trading GmbH, DE
	Virgin Prunus Oil	Prunus Domestica Seed Extract	3.00	Laboratoires Expan-science, FR
	Dermofeel MT 70 non-GMO	Tocopherol, Helianthus Annuus (Sunflower) Seed Oil	0.20	Dr. Straetmans, DE
4	Water demin.	Water	2.00	several
	Citric Acid 100%	Citric Acid	2.00	several

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Genuvisco in use

Chondrus Crispus

All Natural Shower Jelly

St	Substance	INCI Name USA	% w/w	Manufacturer
1	Water demin.	Water	21.00	several
	Glycerin 85%	Glycerin, Water	25.00	several
	Dermosoft 1388 ECO	Glycerin, Water, Sodium Levulinate, Sodium Anisate	3.00	Dr. Straetmans, DE
	Citric Acid solution 10%	Citric Acid, Water	9.00	several
2	Genuvisco CG-131	Chondrus Crispus (Carrageenan)	2.00	CP Kelco, US
3	Plantacare 2000 UP	Decyl Glucoside, Water	20.00	BASF, DE
4	Amisoft CS-22	Sodium Cocoyl Glutamate, Disodium Cocoyl Glutamate, Water	20.00	Ajinomoto, JP

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Keeping particles in suspension

A genuine gellan gum – fluid gel has a low viscosity and can therefore be sprayed. It can keep particles in suspension and shows stabilizing properties without building viscosity.

<u>The following points are relevant for such a fluid-gel:</u>

- The gellan gum dosage should not be too high (otherwise unstable)
- A small quantity of ions promotes the strength of the gel network, the most effective are divalent salts with calcium or magnesium

GUIDELINE FORMULATION

INGREDIENT	CONCENTRATION (%)
KELCOGEL®	0.05
Calcium chloride dihydrate (15% solution)	0.50
Deionised water	94.95

Stir the water and sprinkle in the gellan gum powder, heat to 80°C
Slowly add the calcium chloride solution
Stop stirring and allow to cool
Stir gently to break down the weak gel structure that has formed
Add the particles that are to be suspended in the fluid gel

Keeping particles in suspension

	X	Y
Water demin.	87.30	86.80
Trisodium Citrate	0.10	0.10
Kelcogel CG-LA	0.10	0.10
Glycerin 99.5%	2.00	2.00
Ethanol	10.00	10.00
$CaCl_2$ solution 15%	----	0.50
Cosmospheres RT-S	0.50	0.50

Keeping particles in suspension

X = without Ca^{2+} Y = with Ca^{2+}

The calcium-activated formation of a gel network is immediately visible due to the temporary fixation of the air bubbles.

RAHN
Your partner for excellence

Keeping particles in suspension

X = without Ca^{2+}

Y = with Ca^{2+}

Peeling agents or effect beads can also permanently be kept in suspension in this way.

Gellan Gum: from fluid gel to ice cube

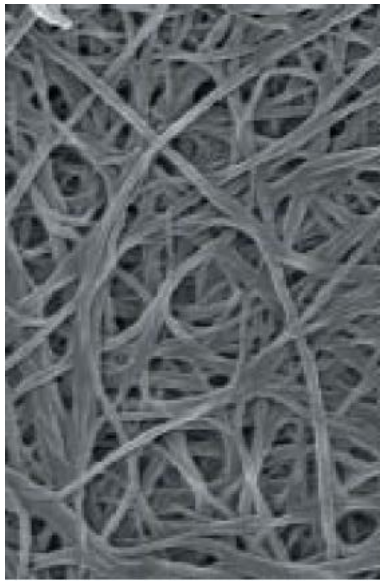
Kelcogel CG-LA 0.04%

Kelcogel CG-LA 0.80%
Kelcogel CG-HA 0.02%

Backbone for oily formulations?

GP-1 / EB-21

GP-1 Dibutyl Lauroyl Glutamide
EB-21 Dibutyl Ethylhexanoyl Glutamide



EB-21 EB-21/GP-1=1/1 GP-1

Total concentration of Gelatinization Agent 1%
Oil : Liquid Paraffin

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Backbone for oily formulations?

GP-1 / EB-21

Red Fusion Fragrance Stick

St	Substance	INCI Name USA	% w/w	Manufacturer
1	GP-1	Dibutyl Lauroyl Glutamide	2.40	Ajinomoto, JP
	EB-21	Dibutyl Ethylhexanoyl Glutamide	1.60	Ajinomoto, JP
	Eutanol G	Octyldodecanol	20.00	BASF, DE
2	Panalane H-300E	Hydrogenated Polyisobutene	15.00	Vantage Personal Care, US
	Panalane L-14E	Hydrogenated Polyisobutene	19.00	Vantage Personal Care, US
	Eldew SL-205	Isopropyl Lauroyl Sarcosinate	5.00	Ajinomoto, JP
	Tegosoft TN	C12-15 Alkyl Benzoate	20.00	Evonik Industries AG, DE
3	Eldew PS-203	Phytosteryl/Octyldodecyl Lauroyl Glutamate	7.00	Ajinomoto, JP
	Red Fusion	Fragrance	10.00	Aromatic Flavours & Fragrances Europe Ltd., GB

RAHN

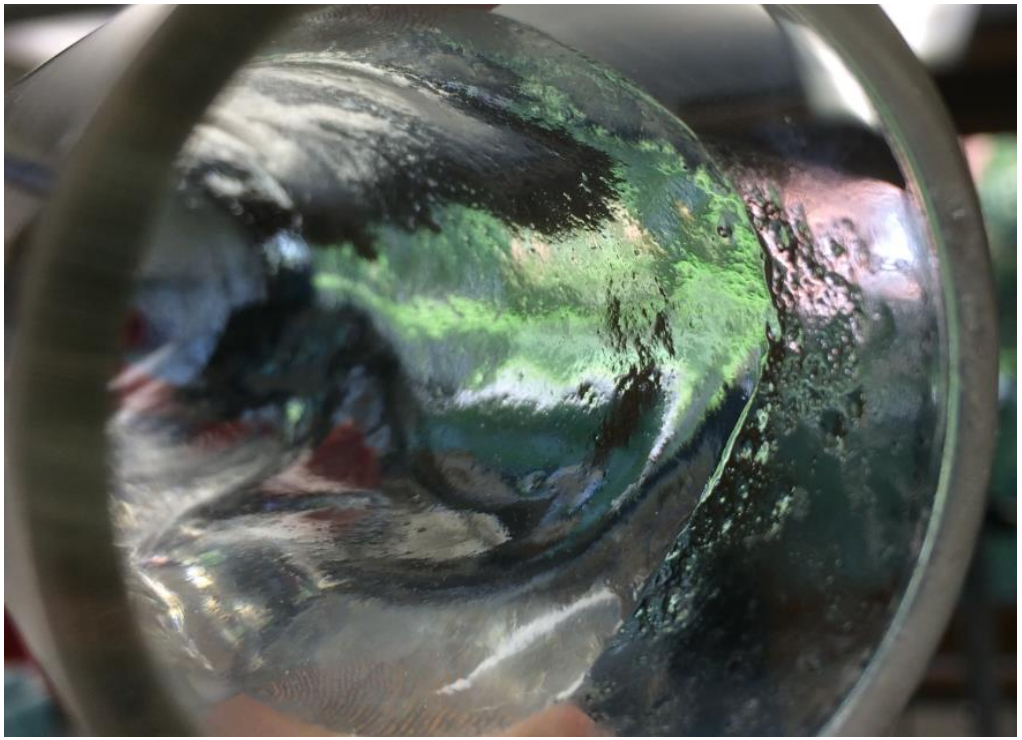
For optical effects

Sorbet or mousse

A hyaluronic acid crosspolymer is particularly suitable if you wish to imitate a sorbet or mousse look.

Dosage: 1-5%

Photo:
Hyalu-Cage System®
50:50 with water
homogenised in
glass container.



RAHN

For optical effects

Sorbet or mousse

Non-Stop Moisture Sorbet

St	Substance	INCI Name USA	% w/w	Manufacturer
1	Water demin.	Water	61.25	several
	Uvinul MS 40	Benzophenone-4	0.10	BASF, DE
	Dermosoft OMP	Methylpropanediol, Caprylyl Glycol, Phenylpro-panol	4.00	Dr. Straetmans, DE
	Sanolin Patent Blue V8501 0.2% Solution	Water, CI 42051	0.20	Clariant, DE
	Glycerin 85%	Glycerin, Water	4.00	several
2	Carbopol Ultrez-20	Acrylates/C10-30 Alkyl Acrylate Crosspolymer	0.90	Lubrizol, US
3	L-Arginine solution 10%	Water, Arginine	9.00	Ajinomoto, JP
4	Water demin.	Water	10.00	several
	Keltrol CG-SFT	Xanthan Gum	0.05	CP Kelco, US
	Genuvisco CG-131	Chondrus Crispus (Carrageenan)	0.05	CP Kelco, US
5	Cremophor CO-60	PEG-60 Hydrogenated Castor Oil	0.40	BASF, DE
	Refreshing Energy	Fragrance	0.05	Aromatic Flavours & Fragrances Europe Ltd., GB
6	Water demin.	Water	5.00	several
	Hyalu-Cage System	Water, Pentylene Glycol, Sodium Hyaluronate Crosspolymer	5.00	I.R.A. Istituto Ricerche Applicate S.R.L., IT

RAHN

Hydrocolloids

The backbone of the formulation

Crucially significant for stability, elasticity and texture behaviour

Thickening Stability Feel

Optics Effectiveness

Many thanks for your attention!

RAHN