Personal Care
Sincerely Yours

Opulyn™ Opacifier

Sylvie DOULUT

Valbonne - 19th April 2011

Agenda

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- Product Line
- Features and Benefits
- Market overview
- Product Family & Application Area
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Value proposition

For formulators of economy to luxury toiletries (shower gels, shampoos, liquid soaps,..)

the Opulyn™ Opacifiers

offers the best way to opacify formulations with ease of use and cost-effectiveness

because Dow Personal Care's core competency in acrylates technology has lead to unique styrene/ acrylate and styrene/acrylamide polymer design

Opulyn™ product line

Presentation

Trade name:	pH	solids	Particle size	Ionicity
Opulyn ™ 301	2.05-2.5	40 %	170 nm	Anionic
Opulyn ™ 302 B	2.05-3.0	40 %	210 nm	Anionic
Opulyn ™ 303 B	2.05-3.0	40 %	250 nm	Nonionic
Opulyn ™ 305	2.05-2.5	40 %	300 nm	Anionic

All products < 50 cPs (Brookfield LV #1, 60 rpm, 25° C)

INCI names:

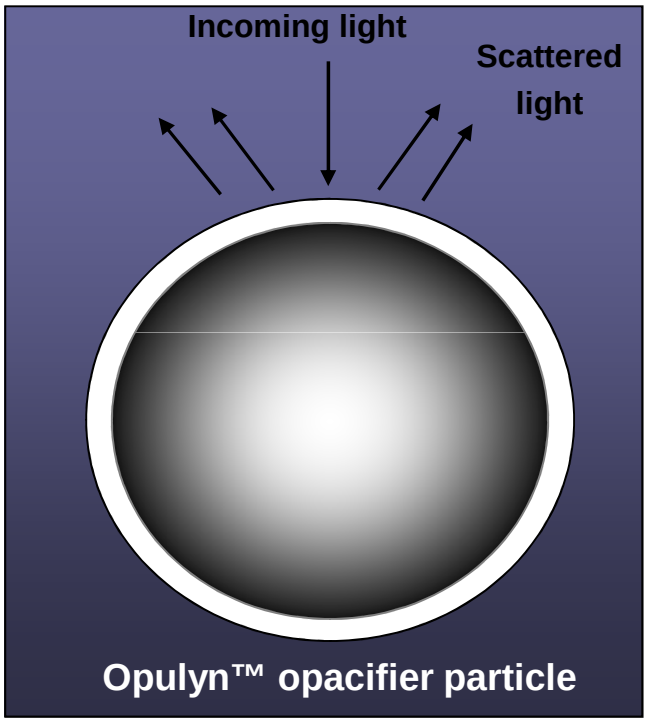
Styrene/Acrylates copolymer (Opulyn™ 301, Opulyn™ 302B)
Styrene/Acrylamide copolymer (Opulyn™ 303B)
Acrylates / PEG-10 Maleate / Styrene copolymer (Opulyn™ 305)

Features and Benefits

Opulyn™ Opacifier technology that modify the appearance of formulations through efficient light scattering.

- Effective at low use levels (0.1-1%)
- Impart a translucent to milky and/or lotionized appearance with uniform opacity to formulations
- Enable formulators to make sensory claims such as: "luxurious texture", "creamy formula", "rich feel"

OPULYN™ Opacifier Light Scattering Model



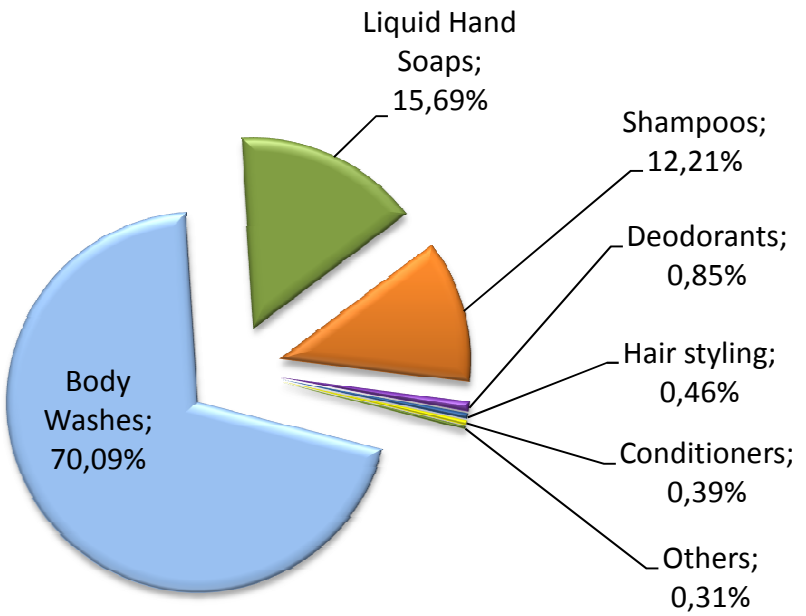
Opacifier Market Overview

Key Insight: Body washes is the key market for opacifiers

- New product launched over the past two years and containing opacifiers are mostly body washes & liquid hand soaps followed by shampoos
- Occurrence of opaque products in the new body washes launches has been stable over the past years (*2006-2011, Mintel source*)
- Dow is the market leader in Opacifiers

Opacifiers usage pattern among new products

Source: Mintel March 09-March11



Product Family & Application area

Critical ingredients/ parameters for opacifier stability:

- Betaines (0.5%-4%): cationic at low pH (below 5.5)
- Soaps (8-12%): Soap-based products are at high pHs (9-10) and high temperature during manufacturing required
- Cationic polymers (0.1%-0.5%):
  - cetrimonium chloride, polyquaternium-7, polyquaternium-10, guars
  - Many suppliers, various product types (differences in efficiency, in their compatibility with opacifiers for ex,….)
  - Critical compatibility issues with opacifiers, especially at low pHs
- pH: the lower the pHs the more critical for opacifier stability - the presence of Soft preservatives (benzoic or sorbic acid, …) brings formulations to pHs slightly below biological pH.
- Electrolytes : the higher the electrolyte concentration the more critical for opacifier stability.

Product Family & Application area

Top quality product (high foaming* – low irritation):

high betaine level + soft preservation (= low pH)

Ex: 7-10% SLES + ~3% betaine + …….+ 0.5-0.8% NaCl, pH 4.5-5.5

critical parameter for opacifier stability = high cationic character of the system.

Lower quality product (basic cleansing – less foaming**):

low betaine level => higher salt content needed to achieve viscosity target.

Ex: 5-8% SLES + 0-1% betaine +…… + 1.5-3% NaCl, pH > 6.0

critical parameter for opacifier stability = high level of electrolyte

(*: high foaming: high foam quality: creamy foam / fine bubbles
(**less foaming: lower foam volume or low foam quality: big bubbles)

Product Positioning

Typical compositions:

-SLES: 8%-10%

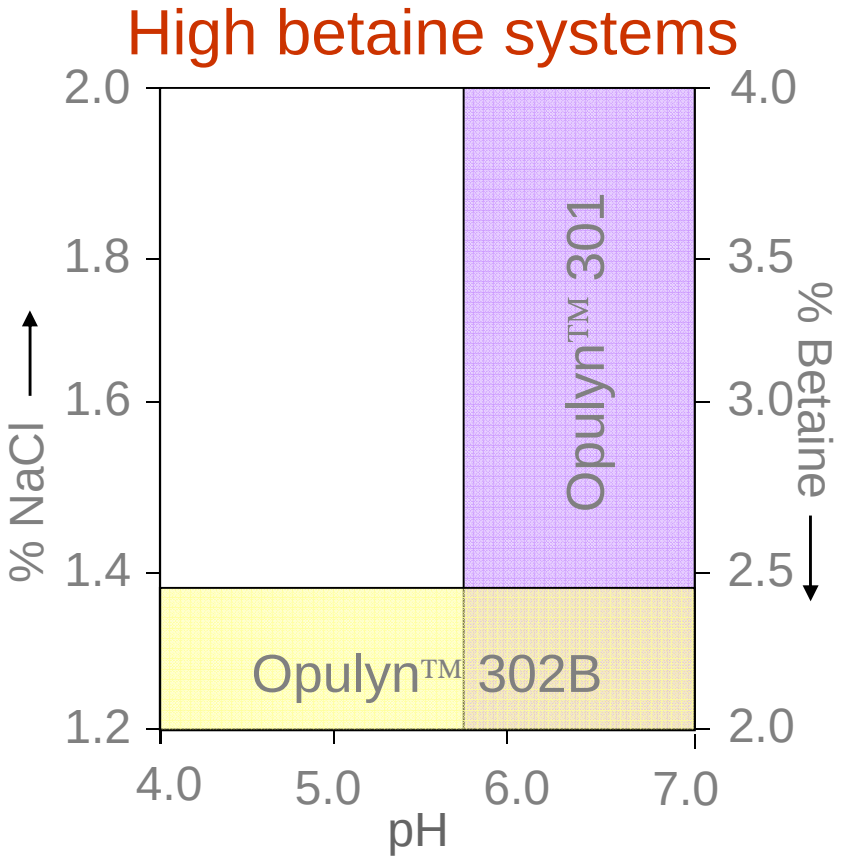
-CAPB: 2.0%-4%

-NaCl: 0.3%-2.0%

-opacifier: 0.5-1%

-preservative

-perfume



Opulyn™ 301: Whatever the betaine level, the %NaCl, but high pH (>5.5)
Opulyn™ 302B: Whatever the pH, but low %NaCl and “lower” betaine level
Opulyn™ 303B / Opulyn™ 305: not recommended at all

Product Positioning

Typical compositions:

-SLES: 5%-8%

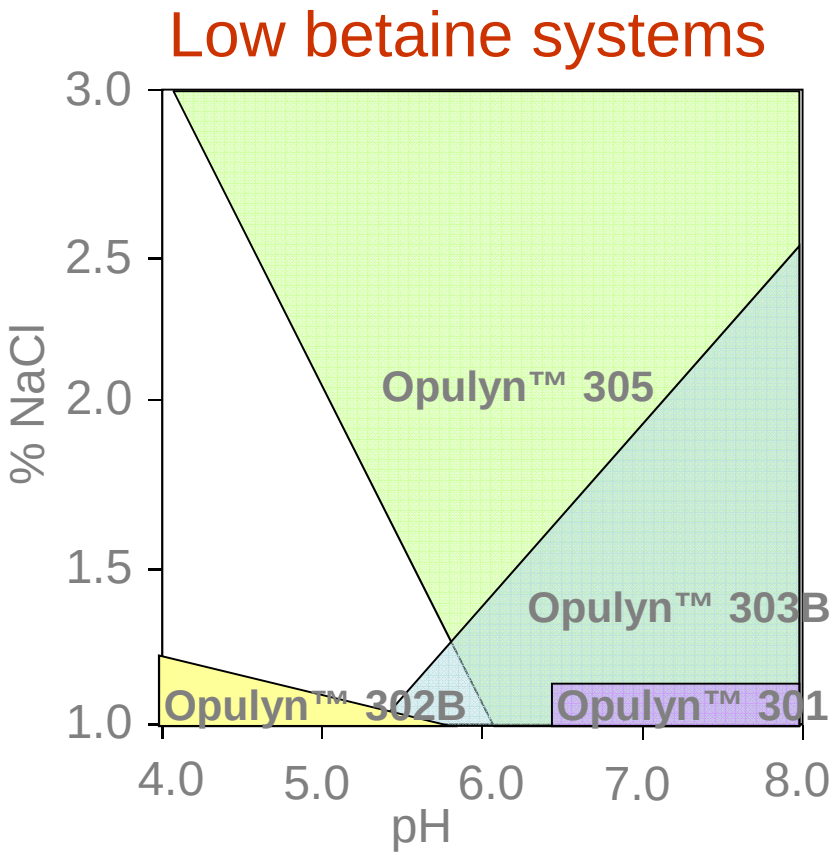
-CAPB: 0.2-1%

-NaCl: > 1.5%

-opacifier: 0.5-1%

-preservative

-perfume



Opulyn™ 305: highly recommended

Opulyn™ 303B: second choice product at higher pHs (pH 5.5)

Opulyn™ 301/ Opulyn™ 302B: not recommended at all

Product Positioning

Shower gel, shampoo, liquid hand soap (surfactant based)

Recommended opacifier will vary with:

- pH: <5.5, 5.4<>6.2 or >6.2
- betaine (amphoteric) level: low, intermediate or high
- NaCl (salt) level: <1.5% or >1.5%

	pH < 5.5			5.4 < pH < 6.2			pH > 6.0		
	low betaine	intermediate	high betaine	low betaine	intermediate	high betaine	low betaine	intermediate	high betaine
[NaCl] < 1.5	**305** 302 301	**302** 301	**302** 301	**305** 301 302	**301** **302** 305	**301** **302**	**305** 301	**301** 302	**301** 302
[NaCl] > 1.5	**305** 303	**303** 305 301	**301**	**305** 303	**305** 303 301	**301** 303	**305** 303	**303** 301	**301** 303

high betaine levels (high quality shower gels)
low betaine levels (liquid hand soaps)

Product Positioning

Positioning by end-use application

Recommended Applications	Opulyn™ 301	Opulyn™ 302B	Opulyn™ 303B	Opulyn™ 305
Bath and Shower Products	★★★★★	★★★★	★★★	★★★
Shampoos	★★★★★	★★★★	★★★	★★★
Cationic-containing Products	★★★			
Hair conditioners	★★★		★★★★★	
Liquid Soaps	★★★★	★★★		★★★★★
Solid Soaps	★★★★★	★★★		★★★

★★★★★ ***Preferred Choice***
★★★★ ***Recommended***
★★★ ***Recommended but formulation dependent***

Comments:

- Surfactant based-shower products, shampoos or liquid soaps: (SLES/betaine/…/ NaCl) - 4.5<pH<8.0, critical parameters: pH, betaine level, NaCl level and presence of cationics.
- Hair conditioners: (silicones/cetrimonium chloride/……), critical parameters: presence of other cationic.
- Soap based- shower products or liquid soaps: (soaps/SLES/(betaine)/…) – pH > 8.5, critical parameters: ionic strength (high KOH) and presence of cationics.

Product Positioning

Positioning by product

- **Opulyn™ 301:** Highly versatile opacifier for anionic surfactant-based systems. Best performance in slightly acid to moderate pH range. Tolerates moderate levels of inorganic electrolytes. **Recommended for shampoos, shower gels.**
- **Opulyn™ 302B:** Specifically designed for anionic surfactant-based systems across broad pH range and with low levels of inorganic electrolytes. Preferred choice for **systems with soft preservatives**, such as, shampoos, shower gels.
- **Opulyn™ 303B:** Specifically designed to enhance the opacity of cationic surfactant-based formulations, such as, **hair conditioners.**
- **Opulyn™ 305:** Designed for anionic-surfactant based systems with high levels of inorganic electrolytes across a broad pH range. Preferred choice for low betaine systems, such as, **liquid hand soaps**.
  (Not recommended for systems with quaternary ammonium derivatives or systems with amphoteric surfactants in acidic pH range)

Recommendations

Storage, handling and use recommendations

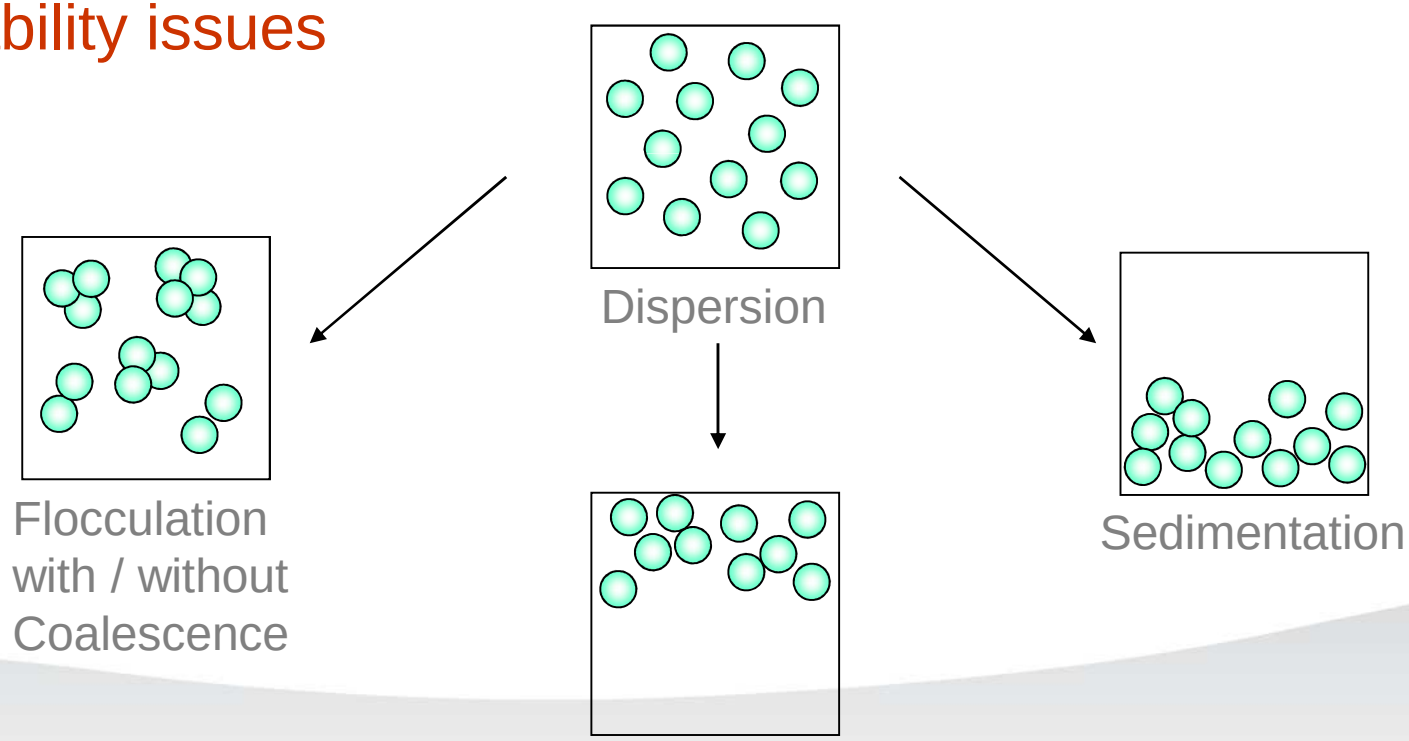
- Storage:
  - general brochure: +4° C / +40° C (MSDS: +4° C / +45° C)
- Equipment cleaning:
  - high pressure washing or appropriate cleaning solution (alkaline anionic / nonionic surfactant mixture)
- Order of addition:
  - Most of time can be added directly after initial water charge
  - Be aware that fatty acid neutralization requires high temperatures. In that case and/or in case of stability issues, opacifiers should be added diluted with product water (held out of the formulation) and added slowly with good agitation as the final component to the formulation (after pH adjustments, addition of dye, salt, perfume, etc.).

What can affect opacifiers stability and how?

Critical parameters that affect opacifier stability in various formulations:

- pH
- amphoteric surfactant level
- salt / electrolytes
- cationic polymers

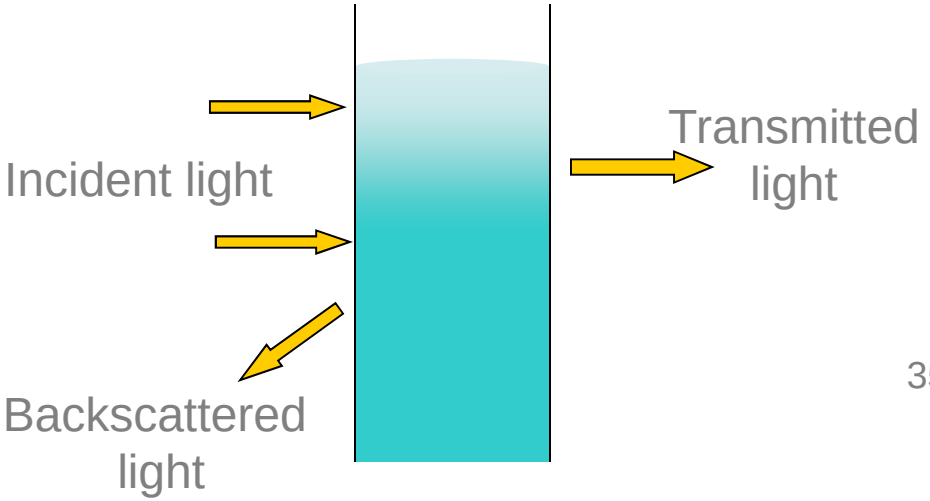
Stability issues



How to check opacifiers long term stability ?

Light scattering technique

Principle :



Equipment:

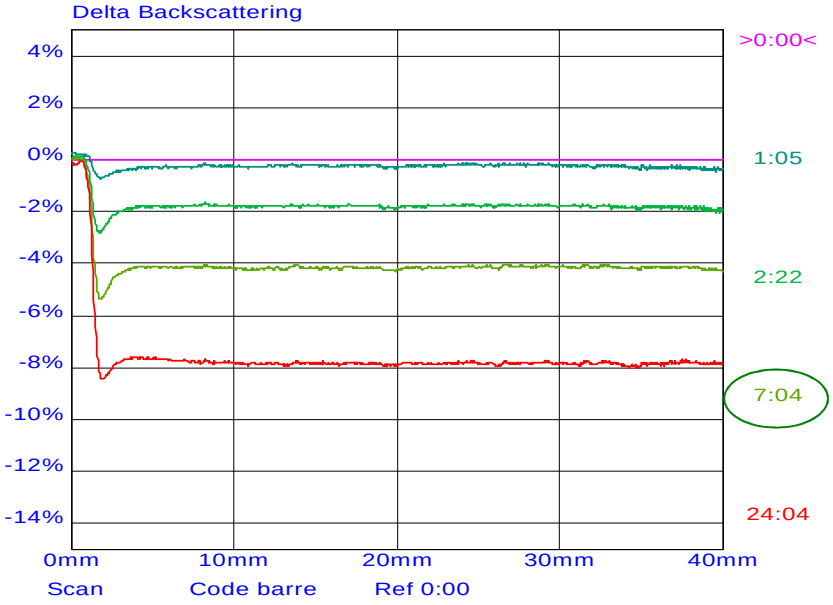
Scan identification / recognition

- The higher the backscattering (BS), the higher the opacity
- BS values vary with particle size (flocculation) and volume fraction (creaming or sedimentation)
- The lower the changes of BS all over the tube height, over time, the better the stability
- 4 to 10 times earlier evaluation compared to visual observation

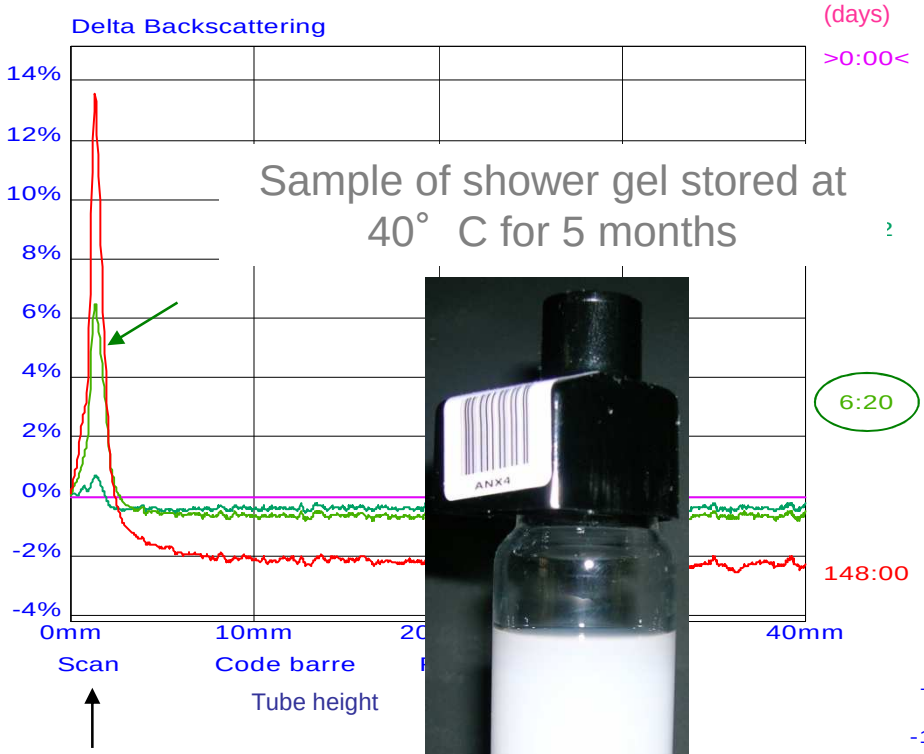
Technical Issues

Stability issue examples

example of (non stable) flocculation - 24 days study - 20℃ stability

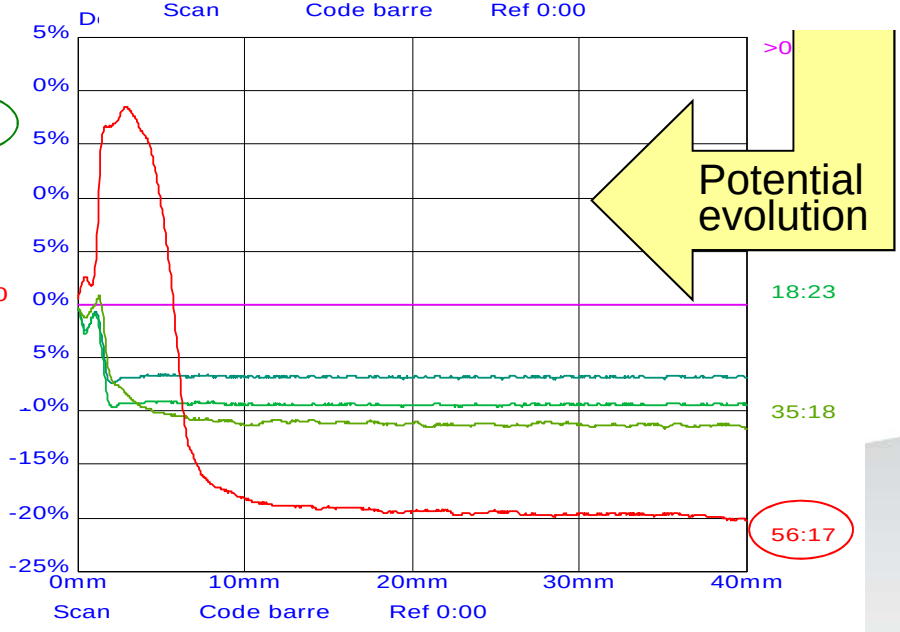


example of sedimentation - 148 days study -40℃ sta bility.lab



Sample of shower gel stored at 40° C for 5 months

Increase of BS in the low part of the tube = sedimentation



Regulations

Opulyn™ versus Acusol™ OP

- Opulyn™: specific trade name for personal care use
- Opulyn™ 30X: same polymer composition than Acusol™ OP30X
- Acusol™ OP302 and Acusol™ OP303 will change their preservation system and thus differentiate from Opulyn grades.
- microbiological specifications (present on CoA) only for Opulyn™ grades
- Global Cosmetic dossier available for all Opulyn™ grades incl:
  - global inventory status (Cf next slide)
  - cosmetic approvals
  - composition information
  - certifications
  - cosmetic approvals
  - specifications (CoA + analytical)
  - toxicological information

Regulations (Global Inventory Status)

	Australia	Canada	China	EU**	Japan	Korea	Philippines	US
Opulyn 301	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Opulyn 302B	Restrict.	Yes	No	Yes	Exempt	Yes	Yes	Yes
Opulyn 303B	Restrict.	Yes	Yes	Yes	Restrict.	Yes	Yes	Yes
Opulyn 305	Restrict.	Yes	Restrict.	Yes	Exempt	Yes	Yes	Yes

** Please Note: The EU status is the current status. It does not necessarily reflect the future status under **REACH**.

Yes: - The product is listed on the country inventory. There are no volume limit restrictions for sale in that country.

No: - The product is not listed on country inventory and cannot be sold into or manufactured with in the country.

Restrict.: - The product is limited in annual quantity allowed. All orders are blocked and submitted to Regulatory for approval.

Exempt: - The product is allowed if used in a cosmetic application.

Selling tools

Aculyns to stabilize Opulyns in specific conditions

For some specific conditions (high betaine levels, presence of cationics,…), ACULYN™ 28 or ACULYN™ 88 can be used as a primary or secondary thickening agent and greatly help solving stability issues.

=> **Royal Shower formulation**

(Aculyn™ 88, Opulyn™ 301 and Neolone™ PE, with PQ-10)
Creamy texture, smooth appearance, paraben-free

Remember:

- space is narrow (not efficient under every conditions with any PQ-10 concentration).

- further developments on going in Valbonne for a solution sheet

Royal Shower formulation

Phase	Trade Name	% Wt.	INCI Name	Supplier
A	Deionised Water	58.14	Water/Aqua	
A	Empicol® ESB-70 (70% Active)	17.14	Sodium Laureth Sulfate	Huntsman
B	**ACULYN™ 88**	**1.07**	**Acrylates/Steareth-20 Methacrylate Crosspolymer**	**The Dow Chemical Company**
B	Empigen® BSFA (30% active)	10.00	Cocamidopropyl Betaine	Huntsman
C	**UCARE™ Polymer LK**	**0.20**	**Polyquaternium-10**	**The Dow Chemical Company**
C	Deionised Water	8.00	Water/Aqua	
D	Sodium Hydroxide, 30%	0.20	Sodium Hydroxide	
E	**OPULYN™ 301**	**1.00**	**Styrene/Acrylates Copolymer**	**The Dow Chemical Company**
E	Deionised Water	3.00	Water/Aqua	
F	Citric Acid	0.04	Citric Acid	
G	Sodium Chloride	0.58	Sodium Chloride	
G	**NEOLONE™ PE**	0.55	**Methylisothiazolinone, Phenoxyethanol**	**The Dow Chemical Company**
G	Framboise Hibiscus G108 24594	0.08	Perfume/Parfum	Robertet
		100.00		

Processing Instructions:

1. Mix ingredients of Phase A until uniform.
2. Add ingredients of Phase B individually under stirring.
3. In a separate vessel, mix ingredients of Phase C.
4. Add Phase C to Phase A+B under stirring.
5. Increase the pH above 7.0 (do not exceed pH 11.0) by adding Phase D.
6. Add ingredients of phase E previously mixed.
7. Add ingredients of Phase F and G individually under stirring.
8. Adjust pH back to specification as required.

Selling tools

Brainshark :

Opulyn™ 305 : The product of choice for liquid hand soaps

Web Tool

Selling tools

Opulyn™ SMART FORMULATION Tool

The tool is:

- based on our expertise : T&SD and research projects
    - on application area
    - on critical ingredients for opacifier stability
- able to predict the stability of an opacifier by combining information for specific criteria (provided by the tool user).
- provide two solutions at most above a minimum level of confidence

application
Special Chem link

Competitive Landscape

Competitor	Trade names	Comments
Cognis	Euperlan	taking share from our Opulyn301 business. Have positioned their grade as easy to use (no pre-dilution required). Aggressive in Asia & EU.
Interpolymer	Syntran	Offers a range with a differentiated positioning as hR&H. Aggressive in Asia & EU.
Omnova	Lytron	Lytron was the old trademark of Morton (prior to R&H acquisition in 1999), mostly active in UK and NAR
Derypol	OPM	quite strong in Spain
Indulor	Indunal	very aggressive in Italy
EOC surfactants	Europacif	me-too approach, target medium & small customers
Synthron	Modarez	me-too approach, target medium & small customers

- Cognis & Interpolymer are building production capacity in Asia
- Evonik and ISP are indirect competitors with their pearlizing agents (EGDS,…)
- Dow is offering a range with differentiated grades in terms of performance
- Dow has developed a unique on-line tool, the **Opulyn™ Smart Formulation tool,** enabling customers to select the most appropriate grade for a given formulation. This tool can help to differentiate your recommendation versus competitors recommendation
- Dow has extensive formulation expertise with Opacifiers

Competitive Landscape

How to defend against Cognis arguments?

- "We are cheaper……":
  - Euperlan PCO contains a lower amount of polymer and a high level of nonionic surfactant (20%) => brings less opacity at same dosage.

    < 0.8% Opulyn 301 = 1% Euperlan PCO

- "Our product do not require to be diluted…":
  - In most cases, Opulyn 301 can be blended without dilution in the initial water charge

- "You have some stability issues with Opulyn 301…":
  - Liquid soap products: Euperlan PCO ~ Opulyn 301, but **recommendation: Opulyn 305**
  - Traditional shower products at low pHs: Euperlan PCO ~ Opulyn 301, but **recommendation: Opulyn 302B**
  - Higher quality products (higher betaine levels) at low pHs: Euperlan PCO outperforms Opulyn 301: **Opulyn PQG.**

Summary and conclusion

Who we are and what we have:

- Leading opacifiers supplier
- Great knowledge on application areas and chemical ingredients
- Good understanding of opacifiers market and how to formulate with opacifiers
- Unique expertise on critical parameters for opacifier stability

What we offer:

- Our technical support to customers:
  - lab application tests
  - Long term stability assessment
- Global supply

Personal Care
Sincerely Yours

Thank You