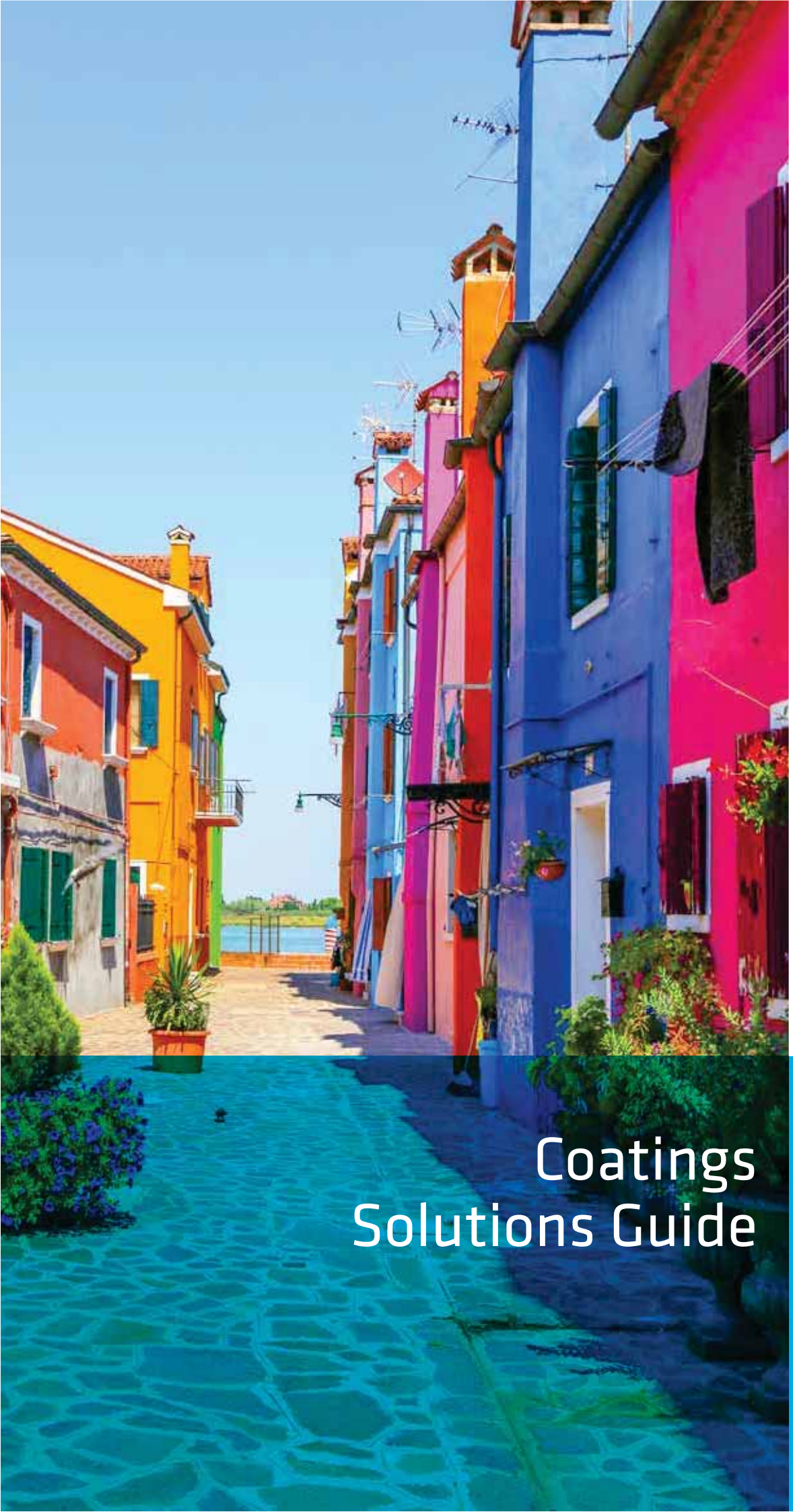


SOLVAY

asking more from chemistry®

Coatings Solutions Guide

Solvay's Philosophy

Innovation fueled by market needs

Solvay's Research & Innovation process relies on a clear understanding of the challenges coatings' formulators encounter, to deliver unique solutions to ever more demanding end-customers. Solvay's laboratories are strategically located across Asia, Europe, Latin America, and the USA , to translate regional as well as global trends into formulation challenges which our formulators can tackle, with Solvay's comprehensive and diverse portfolio of ingredients and chemistries at their disposal.

Talent, Culture & Engagement

At Solvay, we believe our teams are the catalyst for change, inspired by fresh thinking and teamwork to continue to lead the way in pioneering technologies that ask more from chemistry. The talents of our people, their commitment combined with a passion for innovation are a key success driver to achieve our vision: more than designing solutions for customers, we are inventing a new model for sustainable chemistry.

Commitment to Sustainability

Throughout its history, the social and environmental responsibility has always guided Solvay's value creation. As a lever for growth, Solvay Way integrates social, societal, environmental and economic aspects into the company's management and strategy. Everyday, relying on the expertise of its men and women, the Group strives to achieve ever more with less - fewer risks, fewer resources and less waste - in order to deliver more solutions to face global challenges. This approach ensures a sustainable value creation shared by all the Group's stakeholders.

Leading position as a supplier in the coatings industry

Solvay holds a unique and leading position among chemical suppliers in the coatings industry: our comprehensive product portfolio, built and completed over the years through a constant series of acquisitions, offers the widest range of several functional chemicals. Essential to the creation of coatings formulations, our diverse surfactants and polymers, combined with the expertise of our teams, bring high-value alternatives to formulators in constant need of innovative solutions. Solvay is uniquely positioned around the world to serve the coatings market, by providing technical and commercial support through its global footprint.

Solvay, your preferred partner in creating innovative Coating products

Innovation driven by Consumers' Needs

Our network of R&I, tech-support and regulatory experts helps you create new formulations designed to meet specific consumer benefits and claims.

From concept to formulation, from the lab to production, from regulatory registration to product launch, Solvay is your partner every step of the way.

Introduction Your Coatings Solutions Provider

Solvay is a leading specialty chemical and advanced material company, implementing innovative, sustainable, value-creating solutions for its customers.

More than 150 years of rich history and strong expertise

30,000 talented & dedicated employees

Locations in 53 countries to serve customers around the globe

Solid revenues with € 10.9 billion net sales in 2016

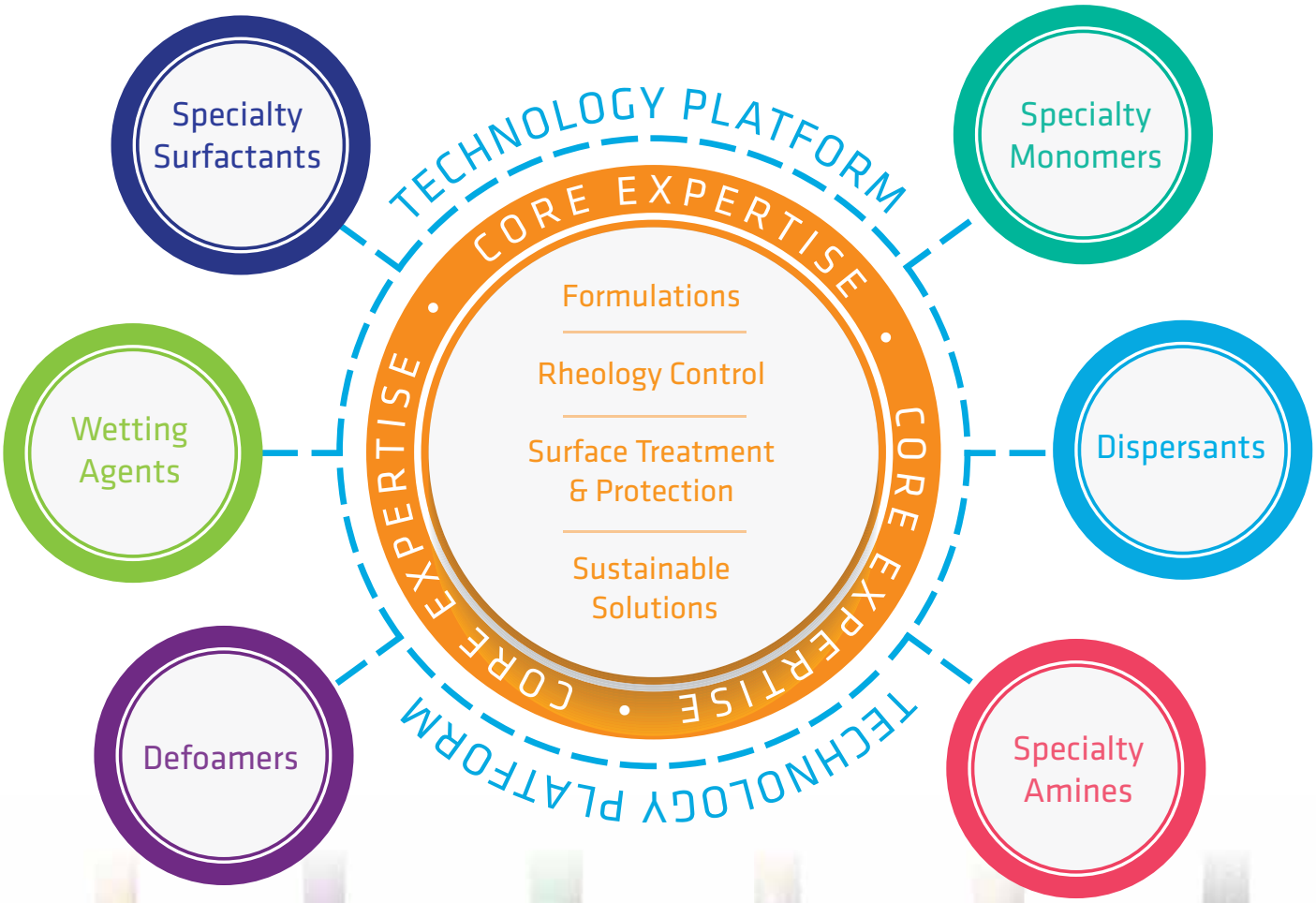
Technology leadership to deliver innovations

Wide range of sustainable chemistries

More than 40 years of experience creating high-performance, sustainable solutions in the Coatings market

Introduction

Solvay Novecare technology & expertise enable us to modify & stabilize surfaces in the paint / substrates



Introduction We Grow Across the Globe

Cytec acquisition expands Solvay's coatings portfolio of specialty additives and surfactants

Solvay's growth strategy is designed to provide customers with superior service and flexible solutions. Solvay's acquisition of Cytec further expands the company's specialty additives and surfactants portfolio with Aerosol®, high-performance agents for the coatings industry.

Available in a range of physical forms, these surfactants are supreme wetting agents and are considered as an industry standard. Some key properties include quick migration to the interface, reduction in surface tension, and increased absorbency and penetration. Some grades act as foaming agents and have excellent lubricating properties. They fall into several categories, including diester sulfosuccinates, monoester sulfosuccinates, and sulfosuccinamates.

Applications include foamed insulation, carpet backing, cement, wallboard, printing ink, latex systems, paint, and more.

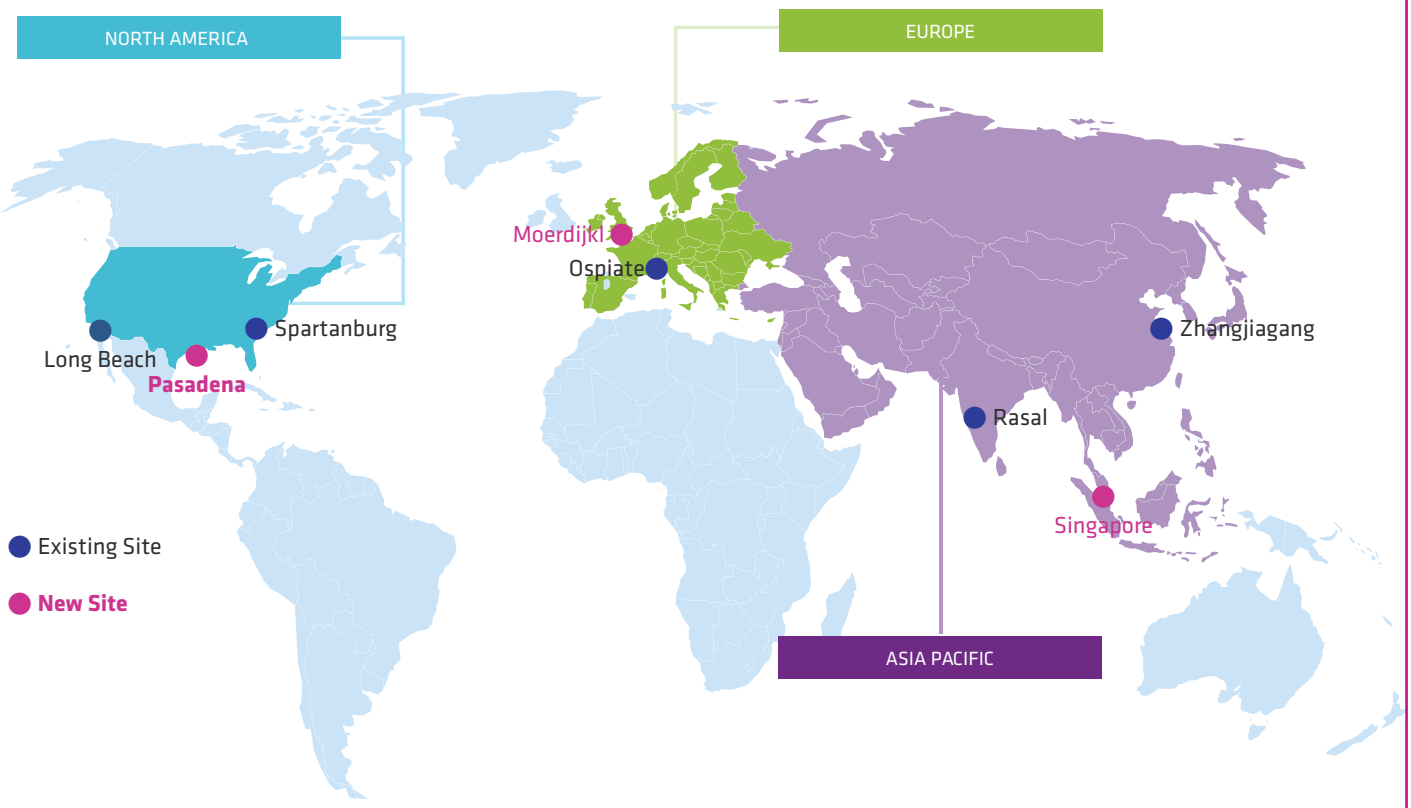
Introduction

Expanded alkoxylation footprint securing a reliable, sustainable and long-term source of surfactants for the coatings market

Solvay's growth strategy is designed to provide customers with superior Solvay Novecare's latest investment to expand its surfactant footprint, complements the alkoxylation sites in the United States, Italy, India and China.

The three new on-pipe alkoxylation facilities in: Pasadena, Texas, Moerdijk, Netherlands, and Jurong Island, Singapore, provide a secure, reliable and long-term source to answer the regional and global growing demand for specialty surfactants.

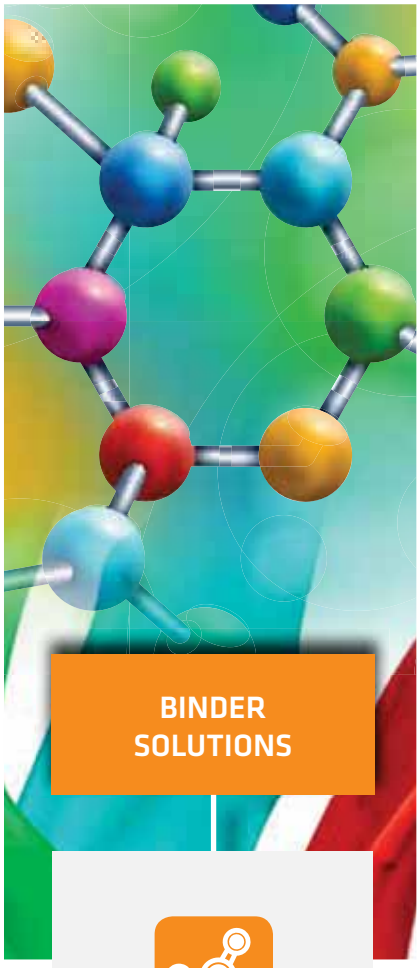
3 New Alkoxylation on-pipe sites



Introduction

Solvay Provides Comprehensive Solutions to Build your Coatings

Solvay Novecare develops a comprehensive portfolio of solutions for highly demanding paints and coatings formulations used for architectural and industrial coatings. Thanks to an extensive know-how, a state-of-the-art equipment and highly committed experts we provide tailored formulations that meet the latest and most stringent environment regulations.



BINDER SOLUTIONS

- Particle size control
- Adhesion
- Scrub resistance
- Water resistance
- Stain resistance
- Block resistance
- Eco-friendly solutions

COLOR SOLUTIONS

- Tint strenght
- Stability over time
- Broad compatibility
- Water resistance
- Eco-friendly solutions

PERFORMANCE SOLUTIONS

- Indoor air quality
- Odor control
- Aesthetics
- Workability
- Freeze-thaw stability
- Eco-friendly solutions

Introduction

Solvay Novecare offers innovative and sustainable solutions to boost your coatings performance across various markets

Architectural & Decorative

Coatings for homes, office and commercial spaces, portable buildings, curbs, fields and lawns

Adhesives

Pressure sensitive adhesives, Construction

Industrial

Coatings applied on Wood, Metal, Plastics, Films

Inks

Graphic arts: Liquid and Paste Inks

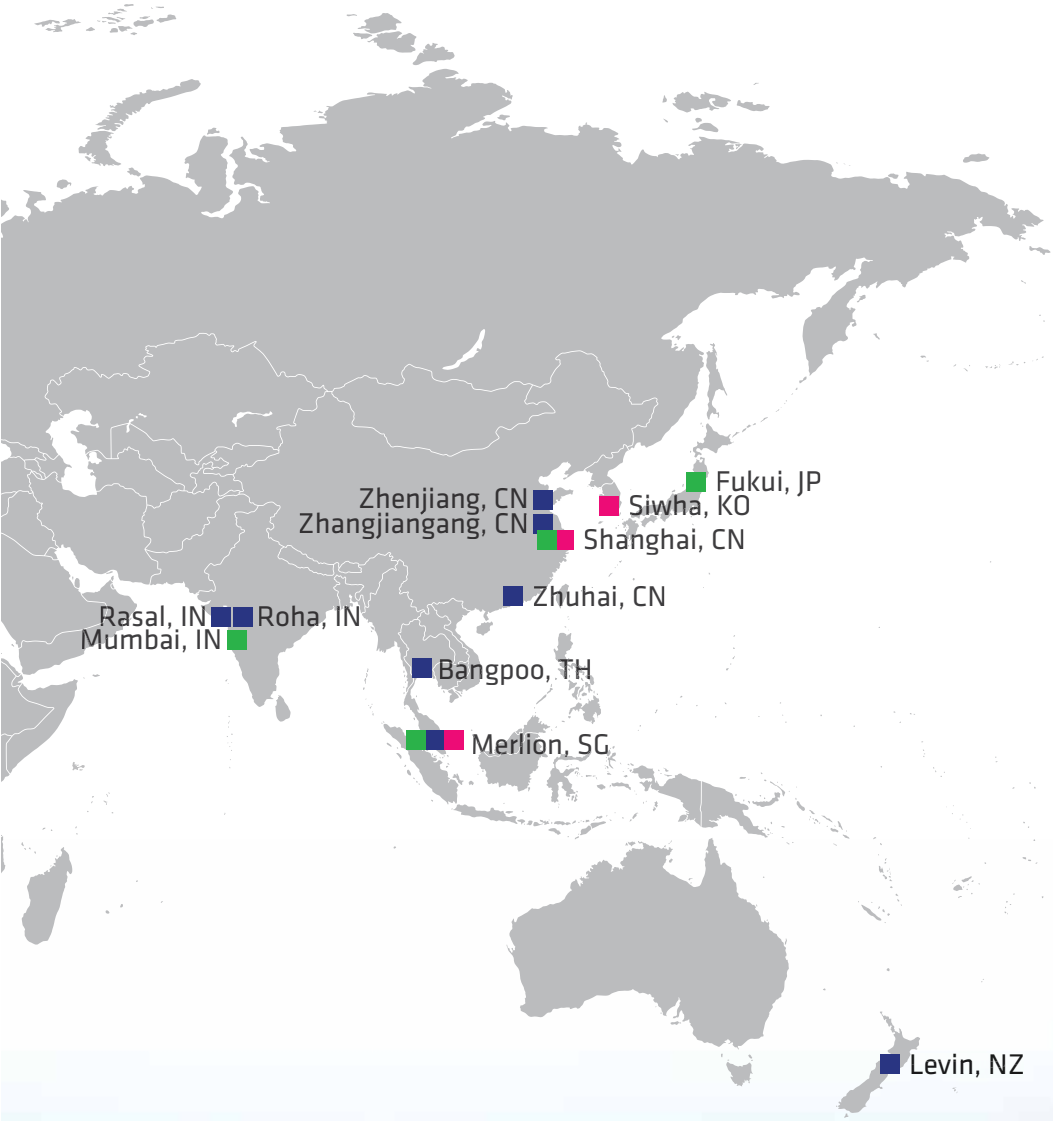
Special Purpose

Field applied coatings: Automotive refinish, Marine, Bridges, Ports

Introduction Your Global Expert

Solvay is uniquely positioned to serve the Coatings market by providing technical and commercial support through its global footprint.

Your Global Expert



- Coatings Manufacturing Sites
- Technical Centers
- Research Centers
- Joint Laboratories

Introduction

Coatings Market Trends Drive our Innovation

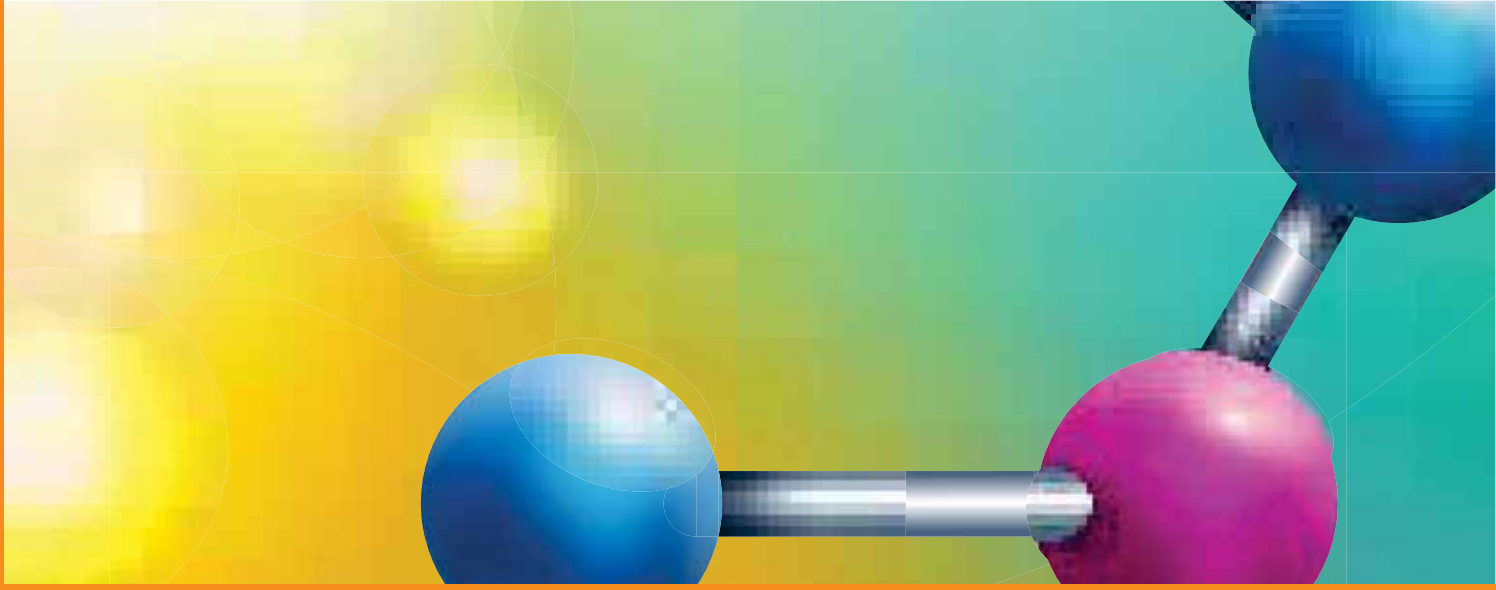
At Solvay, we leverage our core chemistries to formulate innovative and sustainable solutions that meet market demands

Macro-economic and Socio-economic factors	**Limited natural resources** **Climate change**	**Urbanization**
End-user needs	Zero VOC Ecolabel APE-free and heavy metal-free solutions Cost performance Fewer coating layers One coat hide Multi-substrate paints	Scrub, Stain, dirt pickup, block resistance Improved adhesion Low Odor Depolluting No Surfactant leaching

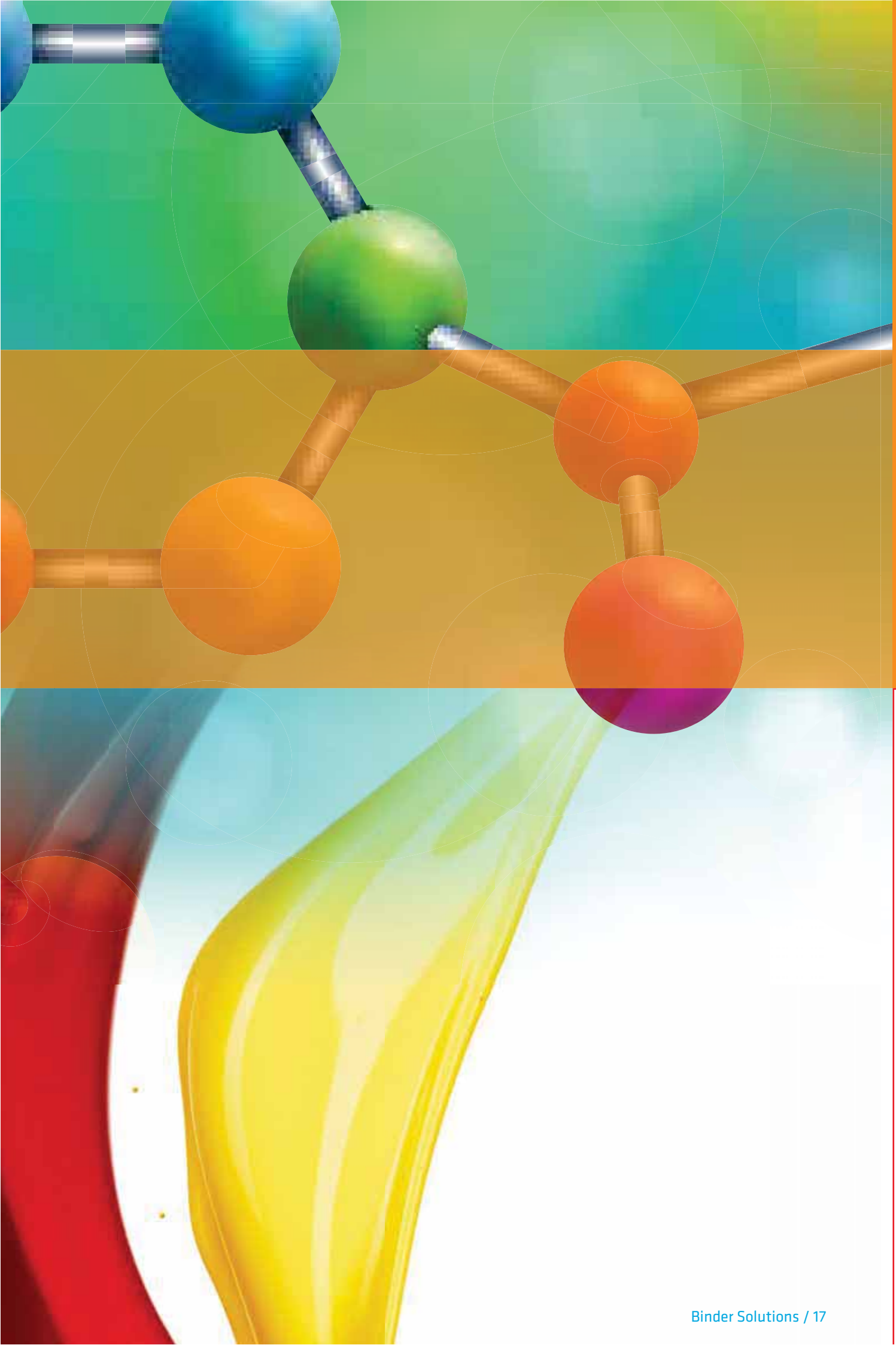
Globalization

Global regulatory compliance
Product availability
Reduce formulation complexity
Multifunctional additives

- As the industry continues to convert to more environmentally friendly, cleaner and healthier paints and coatings, customers are looking for ways to enhance the performance of their low to zero VOC free paints.
- Solvay Novecare has been working very closely with its customers in designing products to solve customer's unmet needs for binders, colorants and performance by offering solutions such as APE- & VOC-free, odor-free products including emulsifiers, specialty adhesion monomers, wetting agents & dispersants, odorless coalescents, defoamers, amine intermediates and new multi-functional additives such as freeze-thaw and open-time extenders to enhance overall paint performance.
- Solvay Novecare offers a broad range of sustainable solutions for coating customers in binders, colorants and performance of their coating systems. Whether seeking to improve emulsion stability, adhesion to difficult substrates, enhancement of film hardness or flexibility, improve pigment wetting and dispersion, better color acceptance and workability, or simply demand higher film performance, such as high scrub, stain or water resistance, open-time or freeze-thaw improvement, Solvay Novecare has the solution.



Binder Solutions



Binder Solutions

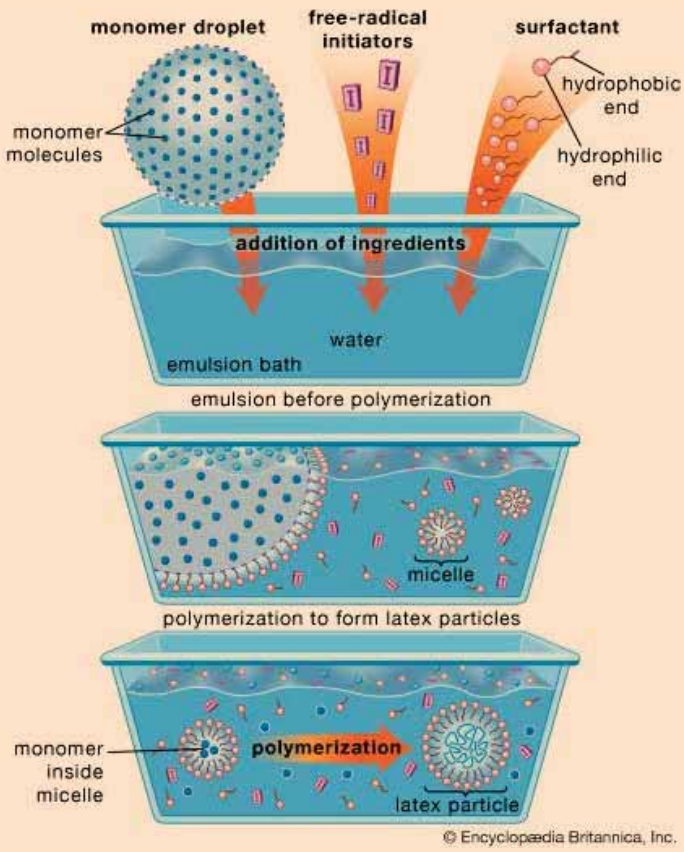
Emulsion Polymerization

As the industry continues to convert to more environmentally friendly, cleaner and healthier paints and coatings, customers are looking for ways to enhance the performance of their low to zero VOC free binder systems to comply with both regulatory and their application requirements.

Solvay Novecare offers solutions to customer's current and future needs in variety of Binder systems including acrylics & styrene acrylics, vinyl acrylics, vinyl acetate ethylene, polyvinyl chloride, styrene butadiene , alkyd and epoxy emulsions.

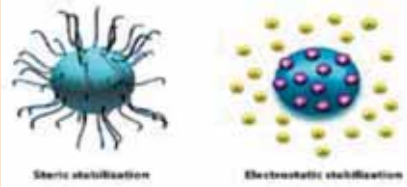
Solvay Novecare is a global leader on surfactants and specialty monomers in serving emulsion polymer market, enabling the conversion to water- based systems with specialty surfactants and monomers. Understanding the surface chemistry and having the right building blocks to offer effective, tailored solutions that can further boost the performance of a variety of coatings. APE & VOC free products including ABEX, Rhodafac®, Rhodapex® and Aerosol® surfactant solutions, as well as Sipomer® PAM, WAM and COPS series of specialty adhesion monomers to help solve customer's unmet needs, such as water resistance, scrub resistance, adhesion, corrosion resistance, stain resistance, blocking resistance.

Emulsion Polymerization Process



Selection Criteria of Emulsifiers

- Particle size control
- Mechanical stability
- Low or no coagulum
- Shelf life stability
- Temperature stability
- No Foaming
- Freeze Thaw Stability
- Ease of processing
- Performance requirements
- Rheology modifier



Depending on application, chemical stability has also a considerable practical importance during formulation. Anionic surfactants provide electrostatic stabilization and such latexes exhibit good stability in formulations containing low and moderate salt concentration. However, latexes made with only anionic emulsifier are not stable at high electrolyte concentration and it is recommended to utilize nonionic surfactants to enhance stability

Water resistance and anti-corrosion improvement
Rhodafac® RS 610E, Rhodafac® RS 710E

Rhodafac® improves water resistance of latex

Rhodafac® aid in Corrosion Inhibition

Key features

- Excellent primary emulsifiers for all types of binders (Acrylic, SA, VA, VAE)
- Average charge from 1.5 % phm (if used alone in pure Acrylics)
- Good particle size control (around 120 - 150 nm), good mechanical stability even used as sole emulsifier

Key benefits

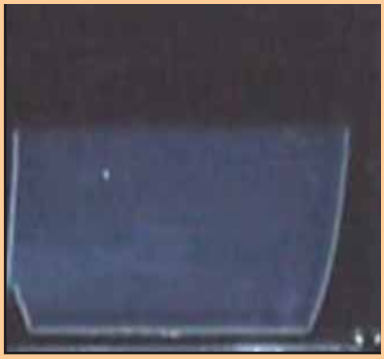
Superior performance of latex using Rhodafac® in coating applications

- Water resistance
- adhesion improvement
- Better anticorrosion
- Improved Color acceptance
- Better gloss
- Scrub resistance

Water Resistance Improvment

Reduction of water adsorption in clear coats

Film after exposure to water (All-acrylic latex)

Latex based on Rhodafac Emulsifier	Latex based on Standard Sulfate Emulsifier
	

Polymer films, 150 micron, after 72 hrs immersion in water

Anticorrosion improvement

Immediately after immersion in a 0.5 % solution in water

After 10 days in a 0.5 % solution in water

Nonionic	Rhodafac® RS 610E	Rhodafac® RS 610A25E	Sulfate Salt	Sulfonate Salt	Water	Air

Binder Solutions

Water Resistance
Aerosol® EF-800

Key features

- Highly efficient as sole emulsifier and in combination with other surfactants
- Functional at low concentrations: 0.5 - 2%
- very suitable in Vinyl Acrylics, Acrylics, Styrene Acrylics & Styrene Butadiene;
- Highly suitable in systems with high amounts of water soluble monomers

Key benefits

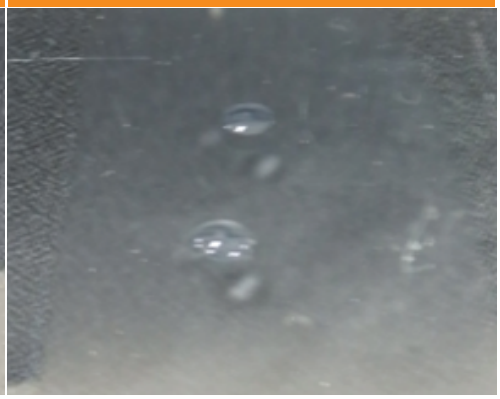
- Good particle size control
- Good mechanical and electrolytic stability
- Can achieve high solid content (> 60%)

Water absorption test

Styrene – acrylic MFFT: < 5°C

	Market leading product	Latex made with Aerosol® EF-800
Water absorption	34%	2.3%

Water whitening test

Market leading product	Latex made with Aerosol® EF 800
	

Water resistance improvement by using Aerosol® EF-80

Market leading product turned white around 20 minutes.
No defects after 1:00 hr later with latex made with Aerosol® EF 800.

Small Particle size
Abex® 2005

Specially formulated APE-free anionic emulsifier suitable for making extremely small particles in all acrylic and styrene acrylic latexes systems.

Key features

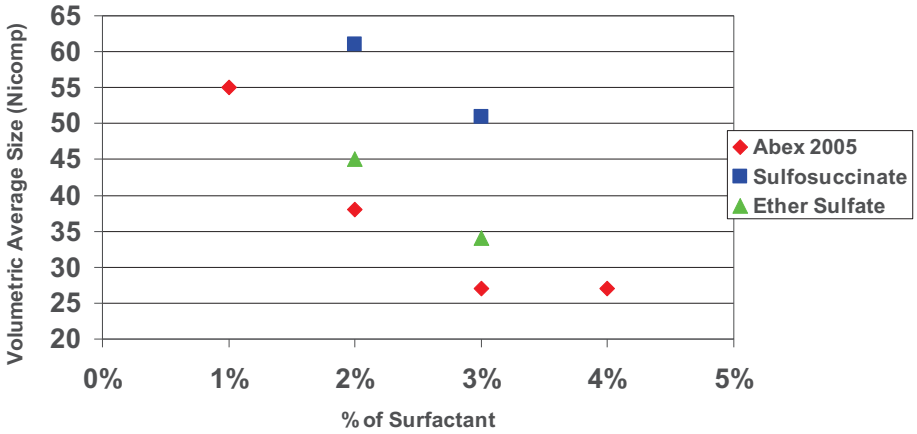
- Anionic emulsifier
- Recommended for Acrylics & Styrene Acrylics

Key benefits

- Provide excellent particle size control
- Provide exceptional clean reaction with minimum grit issues
- Provide excellent emulsion stability
- Excellent mechanical stability
- APEO Free

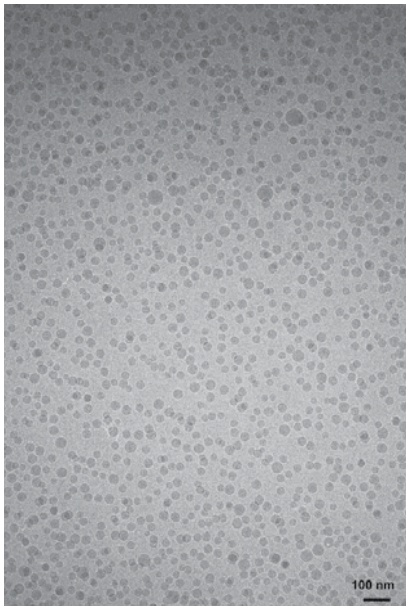
Abex® 2005 surfactant provides smaller particle size latex

Effect of surfactant amount on particle size



Pure acrylic MMA/BA/MAA: 52 / 47 / 1 - Solid content: 35%

Cryo-TEM picture of latex made with Abex® 2005



Softer acrylic latexes with Tg = 5 °C - MMA / BA / MAA : 49 / 50 / 1 - Average Particle Size (4% Abex 2005): 30-35 nm

Binder Solutions

Stability Improvement
Aerosol® EF-810

Key features

- Suitable for PVAc, Vinyl Acrylics, Acrylics and Styrene-acrylics systems
- Funcional alone or in combination with other surfactants.
- Efficient at low concentrations: 0.5 - 2%

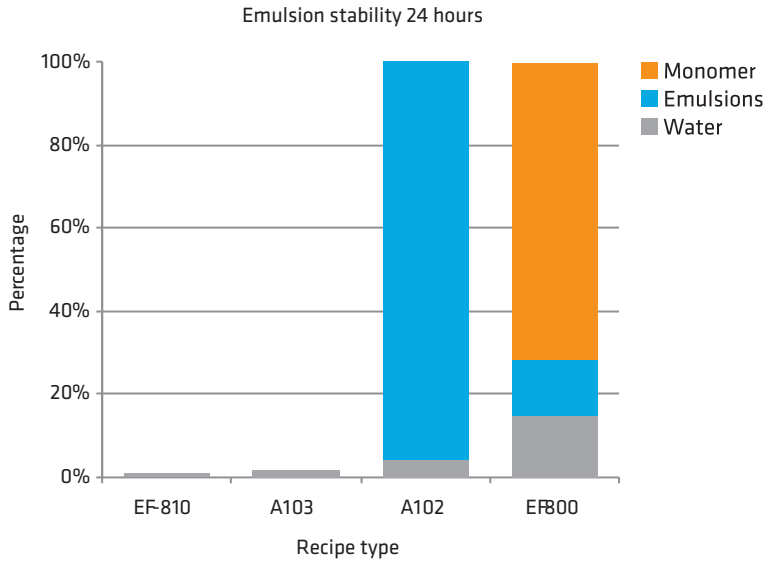
Key benefits

- Very fine particle size
- Excellent mechanical stability
- Excellent pre-emulsion stability
- Highly suitable for skin contact applications like Textile & Nonwovens

Acrylic emulsion

- After 4 hours 100% pre-emulsion stability for Aerosol® EF-810, Aerosol® EF-800, A-103 and A-102=
- After 24 hours Aerosol® EF-810 outperforms the other three surfactants

Aerosol® EF-810 demonstrates better pre-emulsion stability than benchmark



Monomer composition: BA/MMA/MAA 51.7/47.2/1.1
Surfactant level: 1.5 phm

Stability Improvement
Abex® 2535, Abex® 2545

Abex® 2535 or Abex® 2545 provide stability when post added to Vinyl Acrylic binders

Key features

- APE free stabilizers
- Excellent chemical stability
- Commonly post added

Key benefits

- Mechanical stability improvement
- Calcium Stability improvement
- Freeze thaw stability improvement
- Performances less affected by pH variations

Post addition	None	Abex® 2535 or 2545
% BOTM Post-Added	0	0.5
Mechanical Stability (mins)	< 5	> 5
Freeze/Thaw Stability	0	5
Calcuim Ion Tolerance (5%)	Fail	Pass

Vinyl/Acrylic Latex Mechanical Stability Test

With Abex® 2535 or Abex® 2545 PASS	Without Abex® 2535 or Abex® 2545 FAIL
	

Vinyl Acrylic Latex – CaCl2 Test

With Abex® 2535 or Abex® 2545	Without Abex® 2535 or Abex® 2545
	

Binder Solutions

All Acrylic & Styrene Acrylic Polymers

Solvay Novecare offers a wide range of emulsifiers and specialty monomers to acrylic and styrene acrylic latex polymer manufacturing. Our APE and VOC-free anionic emulsifiers provide exceptional particle size control while nonionic surfactants provide excellent stability to latexes.

Sipomer line of specialty monomers provide enhance performance for waterborne applications.

Purpose	Product	Customer Benefits	Usage Level (BOTM)
APE-free Emulsifier	Abex® 2005 Abex® 2005MBA	Designed for Nano size latex	0.5 – 2.0
	Rhodapex® LA-40S Rhodapex® LA-120S Rhodapex® LA 300* Rhodapex® LA 300SB Rhodapex® AB/20 Rhodapex® AB/20M Rhodapex® BSA* Rhodacal® A246 MBA	Primary anionic emulsifier range to meet a wide range of customers needs. Calcium stability, water resistance and other properties can be fine tuned by changing EO length, counter ion and hydrophobe type. Highly effective anionic surfactants providing good emulsion stability and particle size control	0.5 – 2.0
	Rhodafac® RS-610 Rhodafac® RS-610E Rhodafac® RS-710 Rhodafac® RS-710E	Enhanced water resistance, blocking resistance, higher gloss , color acceptance and flash rusting resistance, and suitable to be used as a sole emulsifier	1.0 – 2.0
	Rhodafac® RS 610 A25 Rhodafac® RS 610 A25E	Pre-neutralized (ammonium salt) phosphate ester with all the mentioned benefits described above	1.0- 2.0
	Abex® 18S	Coatings and PSA adhesives	1.0 – 2.0
	Aerosol® A-102 Aerosol® EF-810 Aerosol® EF-800	Anionic and non-ionic in one structure, highly effective and particle size control. Outstanding compatibility with cations, Higher gloss.	1.0 - 2.0
	Aerosol® MA-80* Aerosol® MA-80 I* Aerosol® MA-80 E	In customer benefits use description - Effective in all monomers systems. Yield complete conversion, coagulum free latexes with good mechanical stability. Imparts good adhesion on porous substrates.	
	Aerosol® 18P Aerosol® 22-N	Excellent acid and alkali stability. Nano latex systems.	1.0 - 2.0
Co-Emulsifier	Rhodasurf® 6530 Abex® 2535 Abex® 2545 Rhodasurf® TLA 3040*	APE free nonionic emulsion stabilizers which are widely used in combination with anionic surfactants. Non ionic emulsifiers can be added during polymerization and post addition. These co emulsifiers can improve freeze thaw stability, mechanical stability, calcium stability, less foaming tendency and performance is less affected by reaction pH variations.	1.0 – 3.0
Specialty Monomer	Sipomer® PAM-100 Sipomer® PAM-200 Sipomer® PAM-600 Sipomer® PAM-4000	Phosphate monomers used for improving the adhesion on metal, glass and concrete substrates; Sipomer PAM-600 can also be used as polymerizable surfactant.	1.0 – 2.0
	Sipomer® WAM* Sipomer® WAM II Sipomer® WAM E W 50*	Effective wet adhesion monomer for wood, aged alkyd and leather substrates.	0.5 – 1.0
	Sipomer® COPS-1	Provides latex stability at a reduced surfactant level, improves freeze thaw and mechanical stability.	0.5 -1.0
	Sipomer® COPS-3 Sipomer® PAM-5000	Enhanced scrub resistance for high PVC paint	1.0 – 2.0

*Check availability with your Solvay's regional representative

Vinyl Acrylic, Vinyl VEOVA & VAE Polymers

Solvay Novecare offers a wide range of emulsifiers and specialty monomers for Viny Acrylic, VEOVA and VAE latex polymer manufacturing.

Our phosphate ester anionic emulsifiers provide improved properties while nonionic surfactants provide excellent stability to latexes.

Sipomer line of specialty monomers provide exceptional stability, wet adhesion and scrub resistance.

Purpose	Product	Customer Benefits	Usage Level (BOTM)
APE-free Emulsifier	Rhodafac® RS-610 Rhodafac® RS-610 E Rhodafac® RS-710 Rhodafac® RS-710 E	Enhanced water resistance, blocking resistance, higher gloss, color acceptance and flash rusting resistance, and suitable to be used as a sole emulsifier.	1.0 – 2.0
	Rhodafac® RS 610 A25 Rhodafac® RS 610 A25E	Pre-neutralized (ammonium salt) phosphate ester with all the mentioned benefits described above.	1.0 – 2.0
	Abex® 2020*	Specially formulated with both anionic and nonionic components and suitable for being used as a sole emulsifier. Provides excellent latex stability.	2.0 – 3.0
	Rhodapex® LA 40S Rhodapex® LA-120S Rhodapex® LA-300SB Rhodapex® TR-2030S	Primary anionic emulsifier range to meet a wide range of customers needs. Calcium stability, water resistance and other properties can be fine tuned by changing EO length, counter ion and hydrophobe type. Highly effective anionic surfactants providing good emulsion stability and particle size control.	2.0 – 3.0
	Abex® 23S	High solid sodium salt of ether sulfate (60 %) suitable as sole emulsifier. Provides effective particle size control and enhanced latex stability.	1.0 - 2.0
	Abex® JKB STD Rhodapex® AB20 Rhodapex® AB20 (U)*	Ammonium salt of aliphatic based ether sulfate suitable as sole emulsifier providing the stable pre-monomer emulsion and enhanced water resistance.	1.0 – 2.0
	Aerosol® A-102 Aerosol® EF-810	Effective monoester sulfosuccinates having outstanding compatibility with cations, higher gloss and particle size control.	1.0 – 2.0
	Aerosol® MA-80* Aerosol® MA-80 I* Aerosol® MA-80 E	Provides good mechanical stability and good adhesion onto porous substrates.	1.0 – 2.0
Co-Emulsifier	ABEX® 2535 ABEX® 2545 Rhodasurf® 6530 Rhodasurf® TLA 3040*	APE free nonionic emulsion stabilizers which are widely used in combination with anionic surfactants. Non ionic emulsifiers can be added during polymerization and post addition. These co emulsifiers can improve freeze thaw stability, mechanical stability, calcium stability, less foaming tendency and performance is less affected by reaction pH variations.	1.0 – 3.0
Specialty Monomer	Sipomer® WAM* Sipomer® WAM E W50*	Effective wet adhesion monomer for wood & aged alkyd substrates.	0.5 – 1.0
	Sipomer® COPS-1	Provides latex stability at a reduced surfactant level, improves freeze thaw and mechanical stability.	0.5 – 1.0
	Sipomer® COPS-3 Sipomer® PAM 5000	Enhanced scrub resistance for the high PVC paint.	1.0 – 2.0

*Check availability with your Solvay's regional representative

Binder Solutions

Styrene Butadiene Emulsion Polymers

Solvay Novecare offers a wide selection of emulsifiers and stabilizers for styrene butadine latex polymer manufacturing.

Our APE and VOC free emulsifiers provide exceptional particle size control while nonionic surfactants provide excellent stability to latexes.

Purpose	Product	Customer Benefits	Usage Level (BOTM)
Emulsifier	Rhodapex® LA40S Rhodacal® A246L	Highly effective APE free anionic surfactants providing good emulsion stability and particle size control.	0.5 – 2.0
	Aerosol® MA-80* Aerosol® MA-80 E	Good Mechanical stability in paper coating applications. Co-emulsifier together with DS-4, DSB & SLS (Rhodapon® LS)Larger particle size in construction applications (200 nm).	0.5 - 2.0
	Aerosol® A-196 97	Good water resistance in paper coating application.	0.5 - 2.0
	Aerosol® EF-800	Good particle size control and ecofriendly alternative.	0.5 - 2.0
	Aerosol® IB-45	In customer benefits use description: Imparts good mechanical stability of latexes.	0.5 - 2.0
Stabilizer	Rhodasurf® TLA 3040* Rhodasurf® TLA 4050* Abex® 2535	APE free nonionic stabilizers which provides additional stability to polymer dispersion. These co emulsifiers can improve freeze thaw stability, mechanical stability, calcium stability, less foaming tendency and performance is less affected by reaction pH variations. Mentioned properties can be fine tuned by changing EO length and hydrophobe type.	1.0 – 3.0

*Check availability with your Solvay's regional representative

Alkyd Emulsion / Dispersion Polymers

Solvay Novecare offers a wide selection of emulsifiers and stabilizers for Alkyd Emulsion/Dispersion polymer manufacturing.

Our APE and VOC free emulsifiers provide exceptional particle size control while nonionic surfactants provide excellent stability to latexes.

Purpose	Product	Customer Benefits	Usage Level (BOTM)
Emulsifier	Rhodapex® LA 300* Rhodapex® LA 300SB Rhodapex® LA 120S Rhodapex® AB/20 Rhodapex® AB/20M	Sole emulsifiers which provide excellent emulsion stability.	0.5 -2.0
	Rhodacal® DS-4 Rhodacal® DS-4AP* Rhodacal® DSB Soprophor® 4D384	Anionic emulsifiers to be used in combination with nonionic emulsifiers.	0.5 – 2.0
Stabilizer	Rhodasurf® TLA 3040* Rhodasurf® TLA 4050* Abex® 2535	APE free nonionic stabilizers providing additional stability to polymer dispersions.	1.0 – 3.0

*Check availability with your Solvay's regional representative

Binder Solutions

PVC / Plastics Emulsion and ABS Emulsion Plastics

We offer specialty selection of emulsifiers for PVC and ABS emulsion/ polymer manufacturing.
Aerosol sulfosuccinate emulsifiers provide exceptional particle size control and facilitate polymer isolation.

PVC / Plastics Emulsion

Purpose	Product	Customer Benefits	Usage Level (BOTM)
Emulsifier	Rhodapon® SLS*	Effective particle size control.	0.5 - 1.5
	Aerosol® OT-75 Aerosol® OT-75 E	Good heat resistance – less yellowing (SLS/OT combination is usual).	0.5 - 1.5
	Aerosol® TR-60* Aerosol® TR-60 I* Aerosol® TR-70* Aerosol® TR-70 E	Used in suspension polymerization as co-emulsifier.	0.5 - 1.0
	Aerosol® MA-80* Aerosol® MA-80 I* Aerosol® MA-80 E	Effective particle size control. Facilitates polymer isolation from latex -controlled coagulation in post processing stage.	0.5 – 1.0

*Check availability with your Solvay's regional representative

ABS Emulsion Plastics

Purpose	Product	Customer Benefits	Usage Level (BOTM)
Emulsifier	Rhodapon® SLS*	Effective particle size control.	0.5 - 1.5
	Aerosol® OT-75 Aerosol® OT-75 E	Good heat resistance – less yellowing (SLS/OT combination is usual).	0.5 - 1.5
	Aerosol® TR-60* Aerosol® TR-60 I* Aerosol® TR-70* Aerosol® TR-70 E	Used in suspension polymerization as co-emulsifier.	0.5 - 1.0
	Aerosol® MA-80* Aerosol® MA-80 I* Aerosol® MA-80 E	Effective particle size control. Facilitates polymer isolation from latex -controlled coagulation in post processing stage.	0.5 – 1.0

*Check availability with your Solvay's regional representative

Pressure Sensitive Adhesives (PSA) Emulsions

Solvay Novecare offers a carefully selected a range of emulsifiers and stabilizers for pressure sensitive adhesive latex manufacturing.

Our APE and VOC free emulsifiers provide exceptional particle size control while nonionic surfactants provide excellent stability to latexes.

Our specialty monomer, Sipomer B-CEA provides excellent adhesion, flexibility and peel strength.

Purpose	Product	Customer Benefits	Usage Level (BOTM)
Emulsifier	Rhodapex® LA 300* Rhodapex® LA 300SB Rhodapex® AB/20 Rhodapex® AB/20M Abex® 18S	Highly effective to reduce particle size and provide excellent emulsion stability	0.5- 1.0
	Rhodacal® DS-4 Rhodacal® DSB	Provide good balance between cohesion and adhesion	0.5- 1.0
	Aerosol® EF-800	High solids emulsion with low viscosity and broad particle size	0.1 - 1.0
	Aerosol® A 102 Aerosol® EF 810	Anionic and non-ionic stabilization in one structure, highly effective	0.1 - 1.0
	Aerosol® OT Aerosol® GPG Aerosol® GPG-E	Provide additional wetting properties	0.1 - 1.0
Stabilizer	Rhodasurf® TLA 3040* Rhodasurf® TLA 4050*	APE non ionic stabilizers which provide additional stability to polymer dispersions. These emulsifiers can improve freeze thaw stability, mechanical stability, calcium stability, less foaming tendency and performance is less affected by reaction pH variations.	1.0 - 3.0
Monomer	Sipomer® B-CEA	Provides enhanced adhesion and stability without hardening polymer film. Suitable for emulsion and solution polymerization as well as UV curable system	1.5 - 5.0
	Sipomer® PAM 100 Sipomer® PAM 200 Sipomer® PAM 600	Phosphate monomers used for improving the adhesion on metal, glass and concrete substrates; Sipomer® PAM-600 can also be used as polymerizable surfactant.	1.0 - 2.0

*Check availability with your Solvay's regional representative

Pressure Sensitive Additives (PSA)

Our specialty additives are designed to offer PSA formulators to enhance the performance of their adhesives. Aerosol® wetting agents provide excellent substrate wetting while lowering the surface tension of the system. In addition, Solvay offers a wide range of defoamers for PSA formulations.

Purpose	Product	Customer Benefits	Usage Level
Wetting Agent	Aerosol® OT Aerosol® GPG Aerosol® GPG-E	Outstanding dynamic wetting agent with very low dynamic surface tension. Migrates to the interface rapidly.	0.2 - 1.0
	Aerosol® WA-300	Optimized hydrophilic-lipophilic balance. Imparts outstanding wetting characteristics. Improved mechanical stability and lower foam. Minimal impact on adhesive viscosity, grit and coagulum.	0.2 - 1.0
	Aerosol® MA-80* Aerosol® MA-80 I* Aerosol® MA-80 E	Good dynamic wetting properties with higher water solubility compared to OT. Generates low and unstable foam.	0.2 - 1.0
	Aerosol® LF-4	Designed for use when good dynamic wetting is required and low unstable foam.	0.2 - 1.0
Defoamer	Rhodoline® DF 642NI*	High efficiency defoamer.	0.5 - 1.0

*Check availability with your Solvay's regional representative

Anionic Surfactants

Type	Product	Customer Benefits
Alkyl Sulfates	Rhodapon® LS 92RNB*	For emulsion polymerization of vinyl, vinylidene chloride, styrene and acrylic monomers, surfactant of choice for SBR and acrylic frothing.
	Rhodapon® UB-WX*	
	Rhodapon® LX 28RLB*	
	Rhodapon® UB 15*	
Ether Sulfates	Rhodapex® AB/20 Rhodapex® AB/20M	APE free, virtually perform very effective to all monomers.
	Rhodapex® CO 436 Rhodapex® CO436 E	Excellent emulsifier for all acrylic, styrene acrylic, SBR and vinyl latex.
	Rhodapex® CM 30*	Excellent emulsifier for all acrylic, styrene acrylic, SBR and vinyl latex.
	Rhodapex® LA40S Rhodapex® LA40S Z*	Excellent emulsifier for all acrylic, styrene acrylic, SBR and vinyl latex.
	Rhodapex® LA120S Rhodapex® LA120S Z*	Excellent emulsifier for acrylate homo and copolymers, vinyl acetate copolymers and styrene acrylate copolymers.
	Rhodapex® LA 300* Rhodapex® LA 300SB	Excellent emulsifier for acrylate homo and copolymers, vinyl acetate copolymers and styrene acrylate copolymers.
	Rhodapex® BSA*	Excellent emulsifier for all acrylic, styrene acrylic, SBR and vinyl latex.
	Rhodapex® TR/2030-S	Excellent emulsifier for all acrylic, styrene acrylic, SBR and vinyl latex.
	Rhodapex® ES 3007*	Excellent emulsifier for all acrylic, styrene acrylic, SBR and vinyl latex.
	Rhodapex® ES 4006*	Low foaming, F/T stable, Excellent emulsifier for all acrylic, styrene acrylic, SBR and vinyl latex.
Phosphate Esters	Rhodafac® PE-510*	Very effective primary emulsifiers for vinyl acrylic, acrylics and styrene acrylic latexes having films with clarity and corrosion inhibition as well as heat, light and PH stability.
	Rhodafac® RE-610 Rhodafac® RE-610 E	
	Rhodafac® RS-410	APE free Phosphate Ester surfactants having the same features as the above Aromatic Phosphate Ester surfactants.
	Rhodafac® RS-610 Rhodafac® RS-610 E	
	Rhodafac® RS-610A25 Rhodafac® RS-610A25 E	
	Rhodafac® RS-710 Rhodafac® RS-710 D Rhodafac® RS-710 E Rhodafac® RS-710E30	
Sulfonates	Rhodacal® A-246/LR* Rhodacal® A-246MBA Rhodacal® A-246 L	High effective emulsifier for acrylic, styrene acrylic latexes.
	Rhodacal® LDS-25/AP*	Emulsifiers widely used in the polymerization of styrene/butane, vinyl chloride and acrylic polymers; generate fine particle size latex.
	Rhodacal® DS-4AP Rhodacal® DS-4	
	Rhodacal® DSB	Effective primary emulsifier for SBR, PVC, all acrylic, styrene acrylic and E/PVC latex.
	Rhodacal® SSA/R*	High foaming surfactant for emulsion polymerization and etc.
	Rhodacal® LSS-40M/RL*	High foaming surfactant for pigment, rubber, and etc.

*Check availability with your Solvay's regional representative

Binder Solutions

Anionic Surfactants

Type	Product	Customer Benefits
Sulfosuccinate	Aerosol® TR-70* Aerosol® TR-70 E	Excellent wetting, rewetting and levelling agent. Also good emulsifying and dispersing properties. Has very low dynamic surface tension, and migrates to interfaces very rapidly. Used to reduce surface tension and to increase absorbency and penetration. Aerosol® OT also has some antistatic and softening properties.
	Aerosol® GPG-E	General purpose grade of Aerosol® OT.
	Aerosol® LF-4	Wetting, dispersing, levelling, and emulsifying agent specially designed for applications requiring good dynamic wetting with low and unstable foam generation.
	Aerosol® WA 300	Excellent wetting agent designed for use in the production of pressure sensitive adhesives (PSA). Product is functional at low concentrations and has a high flash point.
	Aerosol® MA-80* Aerosol® MA-80 I* Aerosol® MA-80 E	Good dynamic wetting properties with unstable foam generation. Emulsifying, dispersing and solubilizing agent. High electrolyte stability.
	Aerosol® A-196 40*	Imparts high surface tension, high filler loading capacity, good mechanical stability and reduced water sensitivity. Excellent low foaming surfactant. Produces dispersions with excellent electrolytic stability. Liquid at approximately 40°C.
	Aerosol® A-196 97	Flaky solid form of Aerosol® A-196 40 with same features and benefits.
	Aerosol® EF-800	Versatile, APE free, primary or sole emulsifier enabling easy design of new latexes while meeting regulatory requirements. Can reduce the number of raw material required, simplifying formulations. Also highly effective, functioning at low concentrations. High tolerance for water-sensitive monomers.
	Aerosol® EF-810	Versatile, APE free primary or sole emulsifier. Highly effective, functions at low concentrations, making it extremely cost effective. The product imparts outstanding pre-emulsion stability, giving robust reaction kinetics, high conversions and minimizes final latex grit and coagulum in emulsion polymerization reactions. High tolerance for water-sensitive monomers.
	Aerosol® A-102 Aerosol® A-102 E	Excellent APE free primary emulsifier for acrylic, styrene acrylic, vinyl acrylic and EVA latexes. Imparts both steric and charge stabilization giving systems with very good electrolytic and mechanical stability. Excellent acid stability and low surface and interfacial tension values make it a useful stabilizer/dispersant in a variety of aqueous systems. Good tolerance for cationic surfactants and polyvalent cations. Non-dermatitic.
	Aerosol® IB-45	Very hydrophilic surfactant which is extremely efficient wetting agent in high concentrations of electrolytes. Imparts good electrolyte and mechanical stability. Used as emulsifier for Styrene, Styrene-Butadine latexes.
	Geropon® SBN-A102W*	Effective for making small particle size latex. Good wetting agent.
	Geropon® DES-30*	
	Geropon® SBN-103W*	
	Geropon® SBN-643*	
	Geropon® CYA/X*	
Sulfosuccinamate	Aerosol® 18P	Emulsifying, dispersing, and foaming agent exhibiting good stability in acid and alkali solutions. Also has excellent lubricating properties.
	Aerosol® 22N	Surfactant combining high hydrophilic and hydrophobic moieties with excellent acid and alkali compatibility. Emulsifier, dispersant and hydrotrope solubilizer. Non-dermatitic.

*Check availability with your Solvay's regional representative

Nonionic Surfactants

Type	Product	Customer Benefits
Aliphatic Alcohol Ethoxylates	Rhodasurf® BC-420*	APE free emulsifiers with different HLB for making all acrylic, styrene acrylic and vinyl acrylic latexes. The selection of the appropriate balance for specific monomer system could provide very effective performance as co-stabilizers to increase mechanical or calcium ion stability in latexes.
	Rhodasurf® BC-610*	
	Rhodasurf® BC-720*	
	Rhodasurf® BC-8509*	
	Rhodasurf® ON-870 Rhodasurf® ON-870 E	
	Rhodasurf® ON-877*	
	Rhodasurf® 6530	
	Rhodasurf® 2870	
	Rhodasurf® TR/15-40	
	Rhodasurf® TR 20-80	
	Rhodasurf® TR2525	
	Rhodasurf® TR 40-70	
	Rhodasurf® 870/H-20	
	Rhodasurf® ROX	
	Rhodasurf® B1	
	Rhodasurf® B7/89	
Alkylphenol Ethoxylates	Igepal® CA-210*	Versatile nonionic widely used in emulsion polymerization and paint applications to improve color compatibility and shelf life stability. The products are mainly used as co-emulsifier or post stabilizer to improve freeze-thaw stability and calcium ion stability. The products with 20 or more moles of Ethylene Oxides can also be used as primary emulsifier for vinyl acetate and vinyl acrylate polymerization.
	Igepal® CA-630	
	Igepal® CA-860*	
	Igepal® CA-887*	
	Igepal® CA-897	
	Igepal® CO-430*	
	Igepal® CO-520	
	Igepal® CO-530	
	Igepal® CO-619*	
	Igepal® CO-630	
	Igepal® CO-640*	
	Igepal® CO-660*	
	Igepal® CO-710*	
	Igepal® CO-720*	
	Igepal® CO-730	
	Igepal® CO-790*	
	Igepal® CO-850*	
	Igepal® CO-859*	
	Igepal® CO-880	
	Igepal® CO-887	
	Igepal® CO-897	
	Igepal® CO-977*	
	Igepal® CO-987*	
	Igepal® CO-997	
Block Copolymers	Antarox® L-61* Antarox® L-62* Antarox® L-64*	Low foaming surfactant.
	Antarox® BL-225/W*	Efficient wetting agent above 32°C for PSA and paints.
	Antarox® BL-240/W*	Performance as Antarox® BL225, with higher water solubility.

*Check availability with your Solvay's regional representative

Binder Solutions

Specialty Emulsifiers and Nonionics
Abex® line

Type	Product	Customer Benefits	Usage Level (BOTM)
Specialty Emulsifiers	Abex® 18-S	APE- free emulsifier. Suitable for acrylics and vinyl acrylics.	2.0 – 3.0
	Abex® 23-S	High solid APE- free emulsifier. Versatile applications.	1.0 – 2.0
	Abex® JKB	APE- free emulsifier. Versatile applications.	1.0 – 2.0
	Abex® 2005 / 2005 MBA	APE- free emulsifier. Nano size emulsifier for acrylics and styrene acrylics.	1.0 – 2.0
	Abex® 2020*	APE-free. Suitable for being used as a sole emulsifier. Provides excellent latex stability for Vinyl acrylics, vinyl veova and acrylics	2.0 – 3.0
	Abex® 2115-A*	APE- free emulsifier. Suitable for acrylics, vinyl acrylics and styrene acrylics.	1.0 – 2.0
	Abex® 8018*	APE- free emulsifier. Nano size emulsifier for acrylics and styrene acrylics	1.0 – 2.0
	Apex 26-S*	APE containing emulsifier. Suitable for acrylics and v inyl acrylics.	1.5 – 2.5
	Abex® 33-S*	APE containing emulsifier. Designed for PVC resins.	1.0 – 2.0
	Abex® EP-100*	APE containing emulsifier. Nano size emulsifier for acrylics and styrene acrylics.	1.0 – 2.0
	Abex® EP-110	APE containing emulsifier. Versatile applications	1.0 – 2.0
	Abex® EP-120	APE containing emulsifier. Suitable for acrylics and vinyl acrylics.	1.0 – 2.0
	Abex® EP-120 Na	APE containing emulsifier. Suitable for acrylics and vinyl acrylics	1.0 – 2.0
	Abex® VA-50	APE containing emulsifier. Suitable for being used as a sole emulsifier. Provides excellent latex stability for Vinyl acrylics, Vinyl Veova and Acrylics	2.0 – 3.0
Nonionics	Abex® 2515	APE-free nonionic surfactant providing the improved latex stability.	1.0 – 2.0
	Abex® 2525/40	APE-free nonionic surfactant providing the improved latex stability.	1.0 – 2.0
	Abex® 2535	APE-free nonionic surfactant providing the improved latex stability; APE-free alternative for NP/OP-40 & 50.	1.0 – 2.0
	Abex® 2545	APE-free nonionic surfactant providing the improved latex stability; APE-free alternative for NP/OP-40 & 50.	1.0 – 2.0

*Check availability with your Solvay's regional representative

Binder Solutions

Binder Solutions

Specialty Monomers

Sipomer®s are very efficient. In most application, addition of 0.5 to 3% of these monomers deliver significant performance and bring functionality to your polymers.

By leveraging our diverse chemistry platforms, Solvay designs solutions adapted to both monomer systems and formulation performance. Whether your formulation is waterborne, solventborne or you seek support in transitioning towards waterborne, Sipomer® will deliver in the following properties:

From Technology to Solutions

Process
- Clean EP process
- Improved mechanical, thermal & salt stability
- Limit foaming

Surface Properties
- High scrub
- Gloss
- Low water sensitivity
- EZ clean
- Scratch resistance

Adhesion
- Wet adhesion
- Metal & inorganic
- Wood
- Interaction with pigments

Mechanical Properties
- Tg depletion
- Tg increase
- Peel strength

"So little delivers so much"
Sipomer® Series

Sipomer PAM series specialty monomers provide exceptional adhesion to variety of substrates such as metals, glass, concrete and inorganic substrates while improving scrub and color development of paints, coatings, adhesives and inks.

- Sipomer® PAM 100
- Sipomer® PAM 200
- Sipomer® PAM 600
- Sipomer® PAM 5000

Polymerizable Stabilizers

Sipomer® COPS and Sipomer® AES series specialty monomers provide excellent mechanical, thermal and salt stability while decrease the need in surfactants.

Sipomer® COPS products are polymerizable surfactants and will help improve water resistance and provide exceptional scrub resistance in waterborne high PVC paint systems.

- Sipomer® COPS-1
- Sipomer® COPS-3
- Sipomer® AES 100

Wet Adhesion, Alkyd / Wood Adhesion

Sipomer® WAM series specialty monomers are designed to enhance the wet adhesion, wet scrub and solvent resistance in a wide range of polymer systems.

- Sipomer® WAM
- Sipomer® WAM II
- Sipomer® WAM E W50

Resin Modifiers

Sipomer® IBOA

Designed for Radiation curing applications
- Improves toughness, chemical and abrasion resistance
- Reactive Diluent

Sipomer® IBOMA

- Improves toughness, chemical and abrasion resistance
- Easily incorporated in resins

Sipomer® ß-CEA

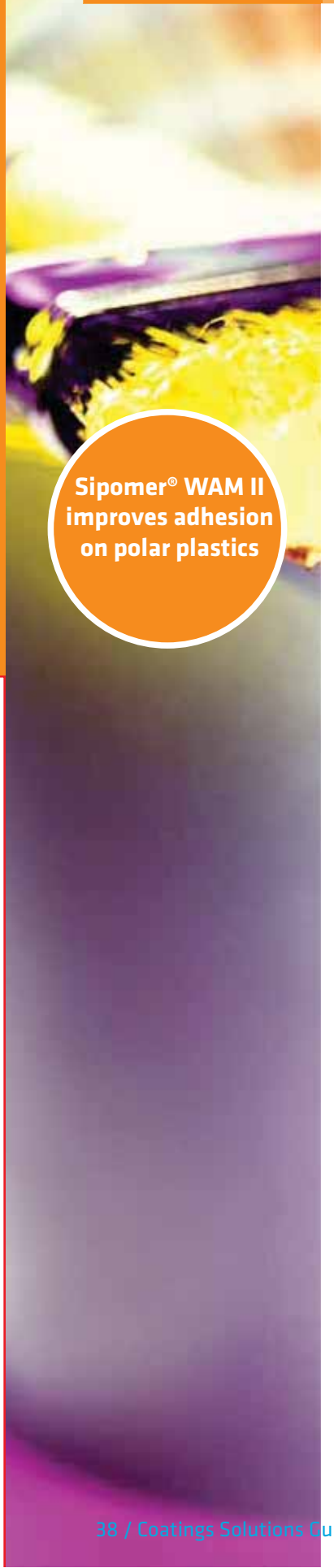
Designed for Adhesives application
- Lowers Tg
- Improves adhesion

Rheology Monomers are designed for HASE thickeners

- Sipomer® BEM
- Sipomer® SEM 25
- Sipomer® HPM series

Binder Solutions

Wet Adhesion Monomers
Sipomer ® WAM series



Sipomer® WAM II improves adhesion on polar plastics

Key features

- Broad applicability
- For all Acrylic, Styrene Acrylic, Vinyl Acrylic
- Ease of incorporation
- Low dosage level : 1.0% (BOTM)
- High reactivity
- Not flammable

Key benefits

- Improved adhesion to alkyds solvent-borne paints.
- Improved adhesion on polar plastics
- Resulting binder can be blended as adhesion additive

Adhesion on polar plastics

Introduction of 1,2% of Sipomer® WAM II in Acrylic system

ASTM Test		PET
24h immersion	Control	0B
	Sipomer® WAM II (1,2 %)	4B

Adhesion is evaluated according to ASTM D3359 test: 0B – poor adhesion; 5B – perfect adhesion

Wet Adhesion on aged solvent borne alkyd

Wet Adhesion Test Results
43% PVC paint

Paint prepared with Sipomer® WAM II passed 2,000 cycles of scrub
→ Showed excellent wet adhesion

Metal Adhesion
Sipomer ® PAM 100, PAM 200, PAM 600

Key features

- Effective in a wide range of polymer systems : All-acrylic, Styrene/ acrylic, VEOVA/Acrylic, Vinyl VEOVA, Polyurethane (Via acrylic polyols))
- Effective in a wide variety of substrates (Aluminum (plain and chromated), Cold rolled steel, Zinc phosphated steel, Iron phosphated steel, Galvanized Steel, Stainless steel, Glass, concrete
- Easy to incorporate
- Small amount required (1%-4% BOTM)

Key benefits

- Improved adhesion to metals
- Reduction of number layers in coating systems
- Ability to shift from solvent borne to waterborne systems

Sipomer® PAM in various resins by either emulsion or solution polymerization.

	Sipomer® PAM-100	Sipomer® PAM-200	Sipomer® PAM 600	Sipomer® PAM-5000
EMULSION POLYMERIZATION				
> Industrial Coatings / Architectural Paints / Adhesive / Inks Applications	Sipomer® PAM-100 can be added to the monomer feed in acidic form or to a separate feed in neutralized form.	Due to its surfactantcy properties, Sipomer® PAM-200 may generate problems such as secondary nucleation.	Due to its surfactantcy properties, Sipomer® PAM-200 may generate problems such as secondary nucleation.	Sipomer® PAM 5000 is perfectly suited to be used in monomer mix
> You want to minimize or or eliminate the primary surfactant.	*Reduce the total amount of surfactant needed *cannot be used as a primary surfactant.	Reduce drastically the use of surfactant or may be used as the sole surfactant in emulsion polymerization.	Reduce drastically the use of surfactant or may be used as the sole surfactant in emulsion polymerization.	*Reduce the total amount of surfactant needed *cannot be used as a primary surfactant.
> You want to stabilize a pre-emulsion without any conventional surfactant.	Not Surface active	Sipomer® PAM-200 may be used as a sole emulsifer to stabilize pre-emulsion.	Sipomer® PAM-200 may be used as a sole emulsifer to stabilize pre-emulsion.	Not Surface active
SOLUTION POLYMERIZATION				
> Water soluble	Sipomer® PAM-100 is more hydrophilic and totally soluble in water when neutralized.	Due to poor solubility in water, using Sipomer® PAM-200 may lead to micellar polymerization.	Water Soluble	Water Soluble
> Solventborne (Polyacrylate Polyols...)	Sipomer® PAM-100 can be used to make resins but might have compatibility issues with some polymers.	Sipomer® PAM-200 is soluble in a broad range of monomers and solvents.	Not suitable for solvent-borne systems	

Best Possible Not suitable

Binder Solutions

Metal Adhesion
Sipomer ® PAM 100

Key features

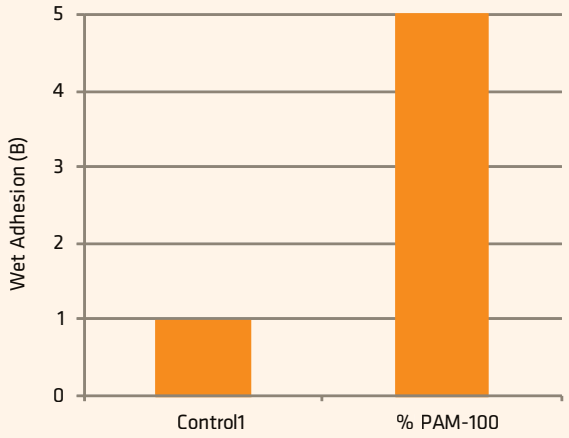
- Specialty monomer
- Adhesion promotor : from 1% BOTM
- Co Stabilizer from 0,5 %

Key benefits

- Improve adhesion on stainless stell, aluminium, iron phosphate ester, zinc phosphate steel,electrogalvanized steel,

Wet Adhesion on Steel

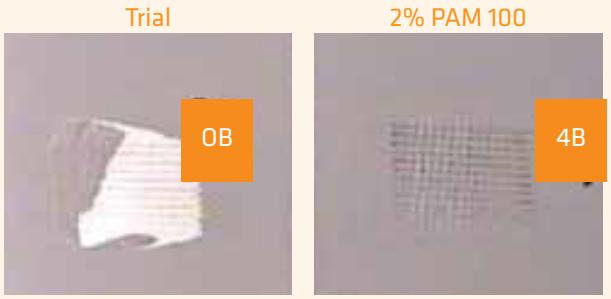
Low PVC paint on Zn phosphate steel: cross hatch test after 24h water immersion



Sipomer® PAMs improve paint wet adhesion on Zn phosphate steel

Wet Adhesion on Aluminium

Low PVC paint on aluminium: cross hatch test after 24h water immersion



Sipomer® PAMs improve wet adhesion on Aluminium

Metal Adhesion
Sipomer ® PAM 200

Key features

- Small amounts required (1% – 4% phm)
- Fully compatible with any organic solvent
  - Easy incorporation in different resin systems
  - Compatible with multiple technology approaches (SB, WB & UV)

Key benefits

- Improved adhesion to metals
- Reduction of number layers in coating systems
- Ability to shift from solvent borne to waterborne systems

Adhesion Data in 2K Polyurethane Solventborne Systems SIPOMER® PAM-200 can significantly improve the dry and wet adhesion on both aluminum and cold-rolled steel. SIPOMER® PAM is used to make acrylic polyols.

COLD-ROLLED STEEL						
IMMERSION HOURS	DRY	2	4	8	24	48
Control	5B	4-5B	2B	0B	0B	0B
1% PAM	5B	2B	2B	1B	0B	0B
4% PAM	5B	5B	5B	5B	4-5B	4-5B

Adhesion is evaluated according to ASTM D3359 test: 0B – poor adhesion; 5B –perfect adhesion

Influence of Sipomer® PAM 200 on metal Adhesion of paint based on Styrene Acrylic latex

	PAINT-BASED ON S/A LATEX WITH 1%		PAINT-BASED ON S/A CONTROL LATEX	
	CROSSHATCH RESULTS AFTER WATER IMMERSION		CROSSHATCH RESULTS AFTER WATER IMMERSION	
	24 hrs	520 hrs	24 hrs	520 hrs
> Cold-rolled steel	5B	5B	4B	2B
> Iron phosphate steel	5B	5B	1B	1B
> Zinc phosphate steel	3B	3B	0B	0B

Adhesion is evaluated according to ASTM D3359 test: 0B – poor adhesion; 5B – perfect adhesion

Sipomer® PAM 200 improves Adhesion on Metal both in solvent borne or waterborne system

Sipomer® PAMs helps to strongly improve corrosion resistance in SB Coatings

Modified Polyols for better Corrosion

Modified Polyols for better Corrosion Resistance	
Salt spray test on CRS after 1000 hours 2K solvent borne PU	
	
Control	2% PAM-200

Binder Solutions

Adhesion and Much More....
Sipomer® PAM 600

Sipomer® PAM 600 is a low viscosity and easy to handle Functional Phosphated Monomer that improves adhesion on aluminum, cold steel and glass substrates and may be used as a sole emulsifier to stabilize pre-emulsion.

Key features

- Easy to handle
- Easy to incorporate
- Can be used as sole surfactant respecting some recommendation (particle size 170 nm)
- Can be used in combination with a conventional surfactant to guarantee easier processing & reduces size of particle (100nm)

Key benefits

- Could work as polymerizable surfactant
- No or less conventional surfactant needed
- Less defects linked to surfactants as surfactant leaching and water sensitivity
- Excellent adhesion to metal
- Improve adhesion on glass & concrete
- Low water absorption
- Improved corrosion resistance
- Good stability

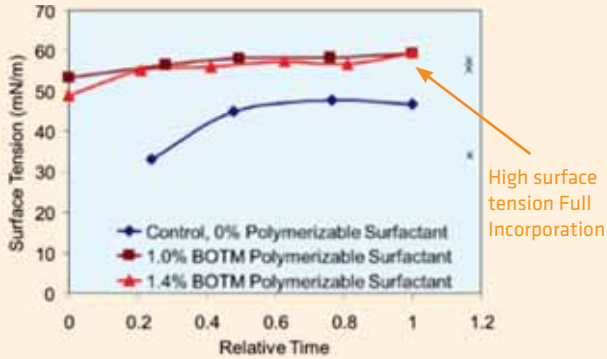
Property	Sipomer® PAM-600
Appearance	Clear Liquid
pH	5.0 – 6.0
Solids, %	58.0 – 61.0
MEHQ, ppm	2000 min
Viscosity, cPs	500 max

Adhesion and Much More....
Sipomer® PAM 600

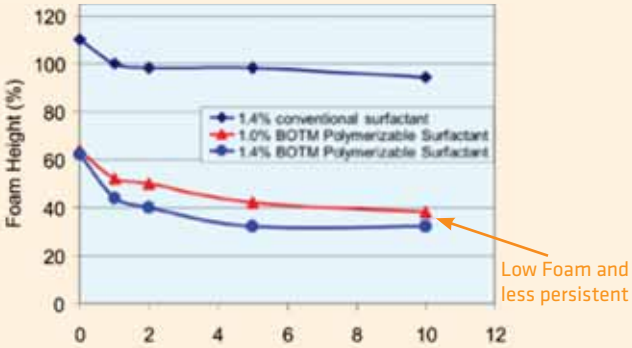
Specificities of the Sipomer® PAM 600 can be used as sole Surfactant

- PAM 600 has to be added to the kettle for the seed nucleation just before the initiator, when the kettle charge is already at the right temperature.
- Monomer emulsion stability has to be case by case evaluated and stirring may be needed.
- It is possible to achieve latexes with particle size 170-200 nm.
- Sipomer® PAM 600 as a polymerizable surfactant allows to reduce the defects of conventional surfactant as surfactant leaching, water sensitivity and foaming.

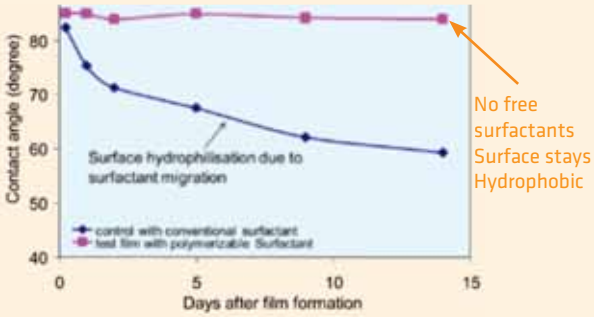
Comparison of Surface Tension between Polymerizable and Conventional Surfactants



Foaming of Diluted Latexes



Contact Angle changes with Time



Binder Solutions

Adhesion and Much More....
Sipomer® PAM 600

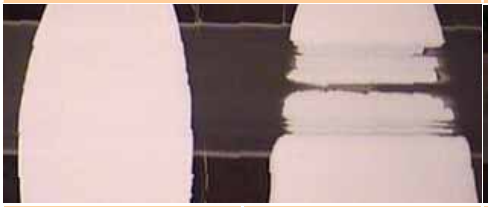
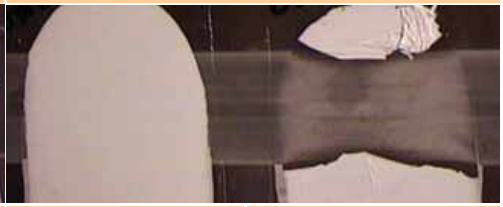
Sipomer® PAM 600 used as polymerizable surfactant demonstrates less water sensitivity

Water Resistance Improvement

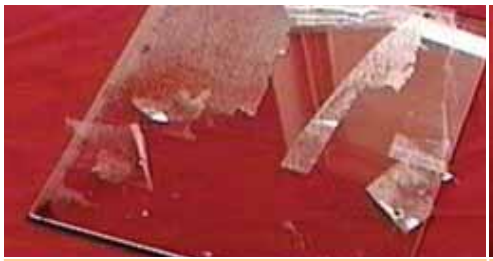
Less Sensitive to Water (Styrene/Acrylic System)	
Control Latex with Conventional Surfactant	**Target Latex with Polymerizable Surfactant**
	
Migration of surfactant in water drop	PAM 600 latex stabilized shows a better resistance to water

Sipomer® PAM 600 improves adhesion on glass

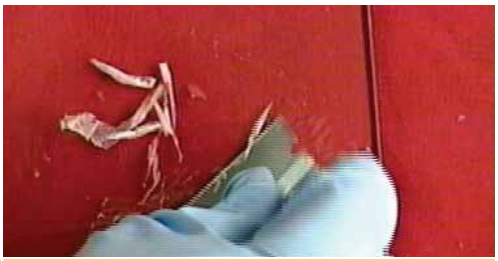
Metal Adhesion

Wet scrub test on paint based on Acrylic latex			
4000 cycles		**330 cycles**	
			
1.2% Polymerizable Surfactant PAM 600	Conventional Surfactant and PAM 600	Conventional Surfactant and PAM 600	Conventional Surfactant

Adhesion on Glass Substrates



Latex with Conventional Surfactant



Latex with Polymerizable Surfactant

Sipomer® PAM 600 helps to strongly improve corrosion resistance in latex paints

Anti-corrosion Improvement

Benefits of Adhesion on Corrosion Resistance	
Corrosion: Salt spray test on CRS after 720 hours – S/A latex paint	
	
Control Formulated latex S/A paint on Cold Roll Steel	PAM 600 Formulated latex S/A paint on Cold Roll Steel

Scrub Resistance Improvement
Sipomer ® PAM 5000, Sipomer® COPS 3

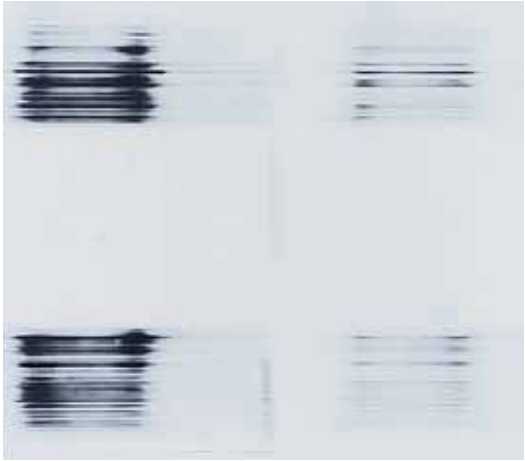
Key features

- Specialty monomer
- Suitable for sterene acrylic latex system
- Recommended usage: 1% phm

Key benefits

- Scrub resistance improvement in high PVC paint
- Allows to decrease the quantity of your latex in mat paint
- Cost/performance advantage

Influence of Sipomer PAM 5000 on scrub resistance of a semi-gloss acrylic paint



Benchmark Sipomer® PAM 5000

Scrub Resistance Results (PVC = 82) With SA Latex

Scrub Resistance Measurement	Benchmark	1% Sipomer® PAM 5000
ISO test (m)	36	17
DIN scrub resistance (cycles)	1050	4000

Scrub Resistance Booster for Matt Paint

Binder Solutions

Peel & Shear Improvement for PSA
Sipomer ® β CEA

Key features

- Recommended usage : 0.5 to 1.0% (phm)
- Readily copolymerizes with other vinyl monomers yielding polymers with pendant carboxylic acid groups

Key benefits

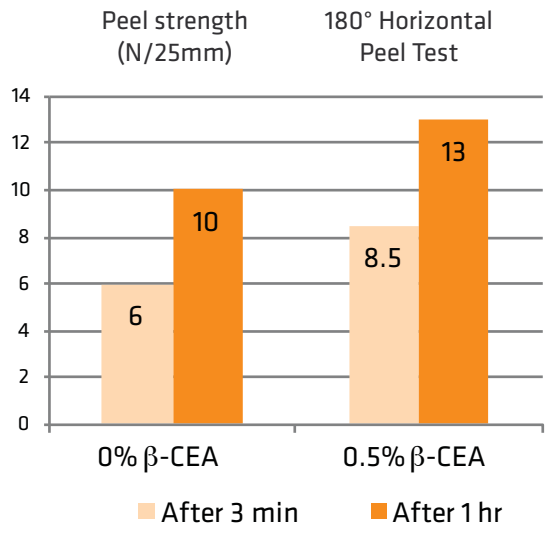
- Enhances latex stability
- Improves adhesion for PSA Adhesives

Latex Properties (93 BA/ 5 MMA) + AA or Sipomer® β-CEA				
Monomer compositions	AA	2.0	1.0	0.0
	Sipomer® β-CEA	0.0	1.0	2.0
	% coagulum	3.0	0.6	0.5
Average particle size (um)		0.39	0.42	0.32
Performance in PSA				
180° horizontal peel strength (N/ 25mm)		4.0	7.0	7.0
Shear with 1kg load (hours)		5.0	8.0	7.0

Improvement of both Shear & Peel in comparison to Acrylic acid used

Functional Monomer that improves Adhesion for Pressure Sensitive Adhesives

Effect of Sipomer® β-CEA in PSA Peel Strength



Monomer system: 97.3 BA/ 1.2 MMA/ 1.5 MAA

HASE Rheology Monomers
Sipomer® BEM, HPM, SEM, Monomers

By combining its experience in specialty monomers and emulsion polymerization, Solvay extended the available range of specialty methacrylic esters monomer for HASE thickeners.

Customer Benefits & Functionalities

- Designed for HASE thickeners
- Ability to design a variety of flow profiles
- Low – Mid- High Shear ranges
- Ease of incorporation

Applications

- Waterborne architectural paints
- Waterborne industrial paints
- Waterborne adhesives
- Waterborne inks

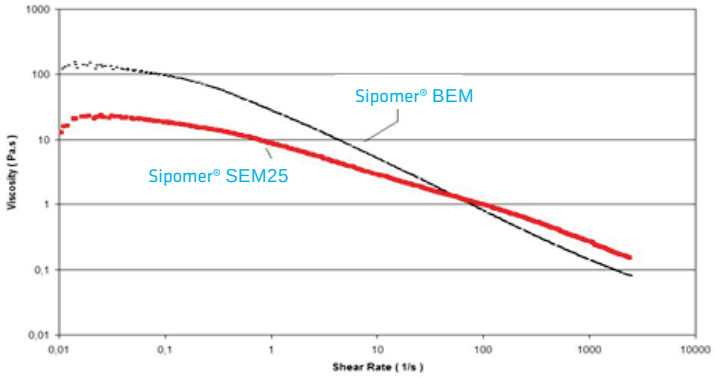
Product Description

Product	Customer Benefits
Sipomer® BEM	Low shear efficiency
Sipomer® HPM 400	Low to middle shear efficiency (match easily cellulosic thickeners profile)
Sipomer® HPM 100	Mid shear efficiency
Sipomer SEM 25	Mid-to-high shear efficiency
Sipomer HPM 200	High shear efficiency (match easily Newtonian thickeners profiles)

PSEUDOPLASTIC

NEWTONIAN

Paint - Styrene-Acrylic binder



Binder Solutions

Stability Improvement
Sipomer® COPS 1

Key features

- Reactive co-stabilizer
- Used in latex synthesis for all Acrylic, Vinyl/Acrylic, Vinyl Veova, Styrene/Acrylic systems
- Applications : paints, coatings and PSA
- Normal usage level in latex: around 0.5% (phm)

Key benefits

- Stability improvement also in high solid system (60% SC acrylic)
- Efficient in solving scale up issue
- Less coagulum in reactor
- Freeze/T haw stability to medium size latex
- Strong reduction of grit
- Decrease the quantity of surfactant (less foaming, surfactant leaching, water sensitivity, ...)

Sipomer® COPS 1 improves Chemical and Mechanical stability

Benefits – Practical Example- Chemical stability

Effect on CaCl2 stability in small size Acrylic

Ether Sulfate (phm)	1,5	1,5	1,5
Sipomer® COPS I (phm)	0	0,5	0
Non ionic (phm)	0	0	1,0
Size	152	140	143
% CaCl2	3 %	5 %	5 %

Pre-Emulsion Process Sipomer® COPS I added to the kettle
increase Chemical Stability (CaCl2) using Sipomer® COPS I instead of adding non-ionic surfactants

Benefits – Practical Example - Mechanical stability

Surfactant (phm)	Rhodacal® DS-4 (0.2)		Rhodapex® LA 40S (1.5)	
Particle Size (nm)	180		150	
Solid Content	50		50	
Level of COPS1 (phm)	0.2	0.5	-	0.5
Mechanical stability (20 000 RPM – 5')	Failed	> 5'	6000 ppm	600 ppm

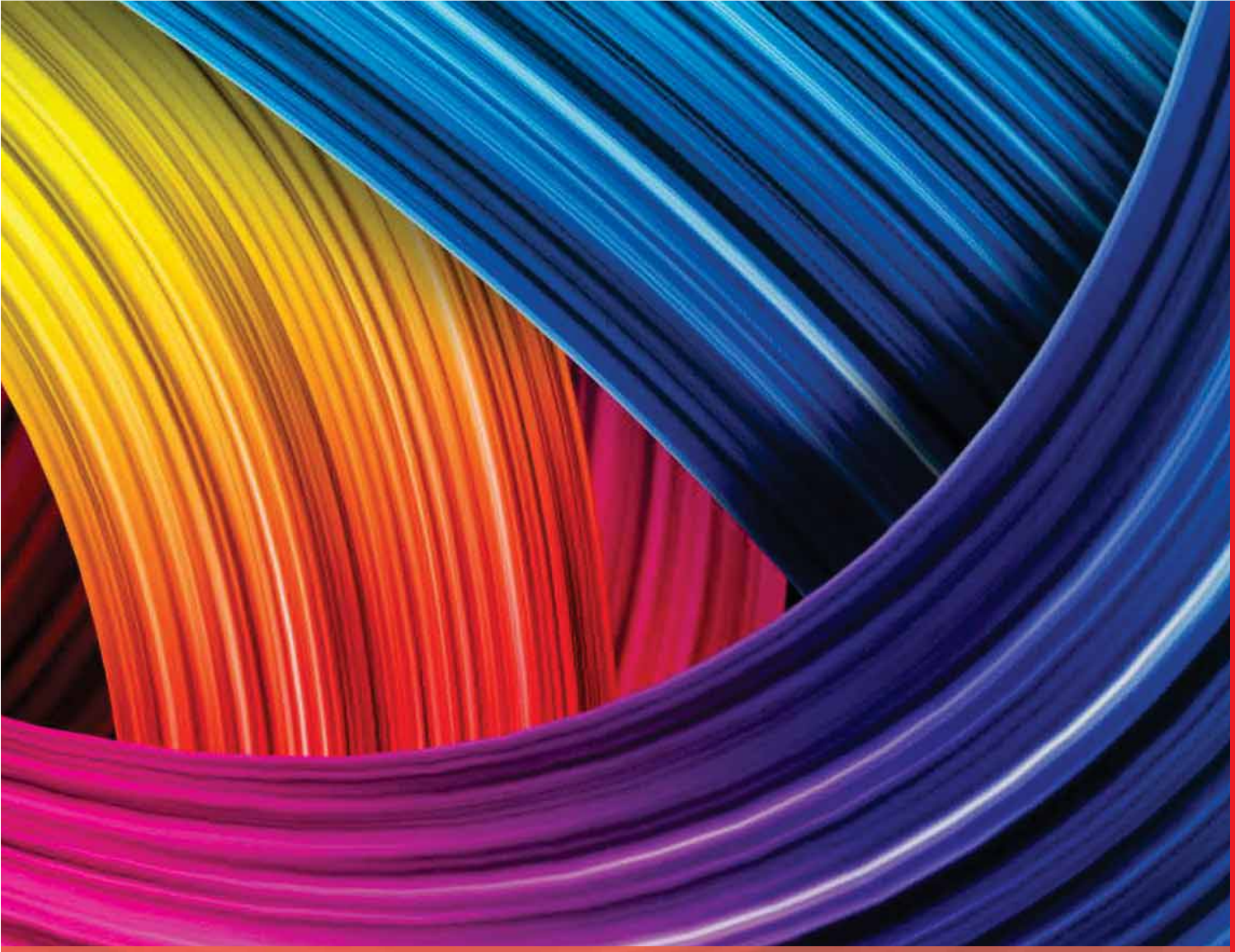
Improved mechanical stability adding COPS-1 to primary emulsifier

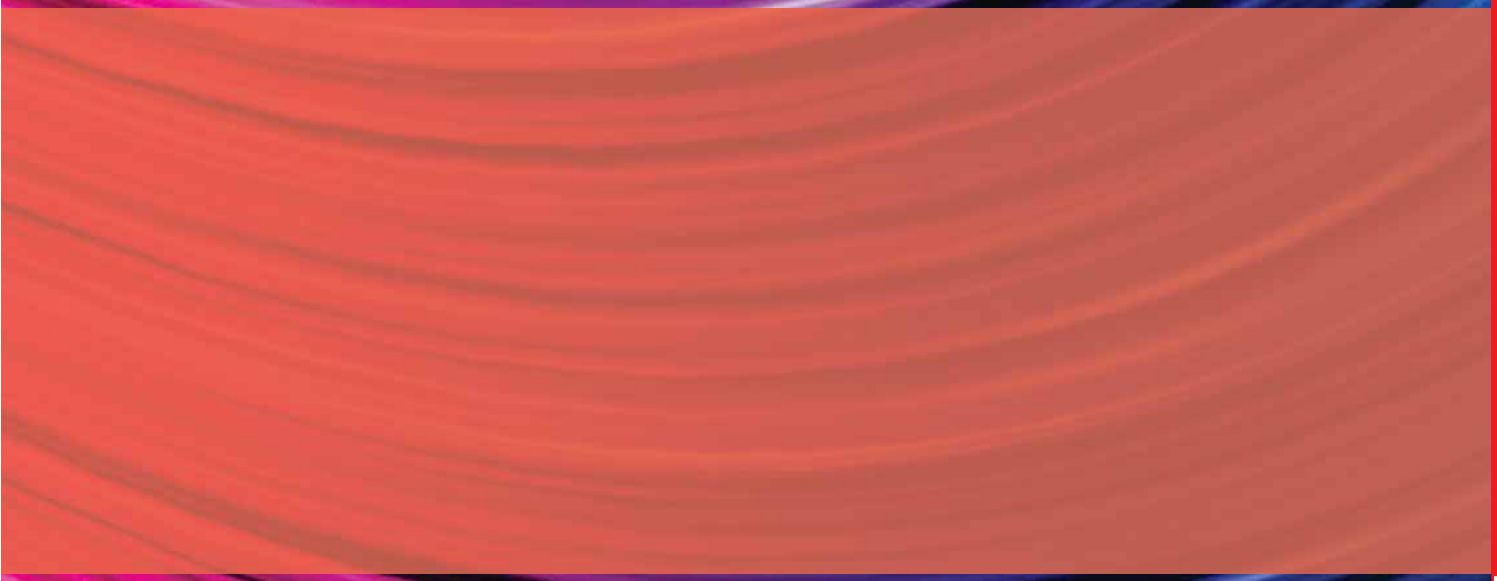
Specialty Monomers

Purpose	Product	Performance Features and Applications
Adhesion Promoter	Sipomer® WAM*	Wet adhesion monomer.
	Sipomer® WAM II**	Wet adhesion monomer.
	Sipomer® WAM E W 50*	Wet adhesion monomer.
	Sipomer® B-CEA	Low Tg acid functionality; provides adhesion; effective in adhesives and coatings.
	Sipomer® PAM-100	Suitable for waterborne and solvents systems; improve wet adhesion on metal and glass; effectively improve emulsion stability
	Sipomer® PAM-200	Suitable for water borne system; improve wet adhesion on metal and glass; effectively improve emulsion stability.
		Suitable for styrene acrylic water borne system; improve wet adhesion; effectively improve emulsion stability
Scrub Resistance	Sipomer® PAM-5000	Enhanced scrub resistance
Reactive Stabilizer	Sipomer® COPS-1	Polymerizable stabilizer, low foaming latex; reduce the usage of conventional emulsifier; provides latex solubility at low surfactant level; coatings with improved water resistance and blench resistance; improve scrub resistance.
	Sipomer® COPS-3	Polymerizable stabilizer, improve latex stability, enhance scrub resistance, washability, stain resistance, anticorrision and pigment binding power in paints formulation. Applicable to High PVC system.
	Geropon® MLS/A*	Polymerizable stabilizer; provide water and scrub resistance to latex; dye improve reactive co-monomer for acrylic fibers polymerization.
	Sipomer® SVS 25*	Improve polymer adhesion, dispersibility, hydrophilicity and conductivity.
Polymerizable Surfactant	Reactsurf® S8115*	General primary surfactants in emulsion polymerization, improve latex stability and water resistance, reduce surfactants surface migration and low foam tendency.
	Sipomer® PAM 600	For performance and applications, please insert the following: Suitable for waterborne systems, easy to handle specialty monomer; improves adhesion on aluminum, cold steel and glass
Rheological Modifiers	Sipomer® BEM	Primarily for alkali soluble associative thickener
	Sipomer® SEM-25	Primarily for alkali soluble associative thickener.
	Sipomer® SEM 6025*	Primarily for alkali soluble associative thickener.
	Sipomer® HPM-100	Primarily for alkali soluble associative thickener.
	Sipomer® HPM-200	Primarily for alkali soluble associative thickener.
	Sipomer® HPM-400	Primarily for alkali soluble associative thickener.
	Sipomer® IBOA-HP*	High Tg, hydrophobic monomer; high performance coatings; improves toughness, water-resistance and UV resistance.
	Sipomer® IBOMA-HP	High Tg, hydrophobic monomer; high performance coatings; improves toughness, water-resistance and UV resistance.

* Check availability with your Solvay's regional representative
** Sipomer® WAMII contains ~20% methacrylic acid.

Color Solutions





Color Solutions

Solvay Novecare offers a comprehensive line of wetting and dispersing agents specifically designed for waterborne coatings systems. Solvay recognizes the difficulties in selecting the optimal additive package for maximizing color strength by improved wetting, dispersing, compatibility and stabilizing both organic and inorganic pigment dispersions in various coatings and inks systems.

As the industry continues to eliminate VOCs (Volatile Organic Compounds) to more cleaner and healthier paints, customers are looking for ways to formulate VOC-free colorant systems to comply with both regulatory requirements while maintaining performance.

Solvay Novecare offers solutions to customer's current and future needs in variety of colorant and pigment dispersion systems for all types of organic and inorganic pigments.

Rhodoline® wetting and dispersing agents broad compatibility, improve color strength, improve color acceptance and storage stability in waterborne architectural and industrial paints, inks and other pigmented systems.

In addition Solvay offers customized Solutions to help resolve many of the unmet needs of the market.

- VOC- and APE-Free solutions
- Universal colorant solutions
- Exceptional color strength development
- High pigment loading at low viscosity
- Improved stability
- Improved compatibility
- Improved color acceptance
- Ease of dispersibility
- Low viscosity
- Improved gloss
- Low foam

Colorant Challenges

Glycol-based colorants have been the industry standard for years until regulations, limiting the use levels of VOC containing solvents, were introduced, thereby all but eliminating the use of Glycols in water based applications. Furthermore, these glycol based colorants also utilize Nonylphenol Ethoxylates (NPE) based surfactants which are now being regulated in certain parts of the world (legislation in Europe; green movement in US, Canada and other Regions restricting use of NPE).

These changes in VOC content coupled with limitations on use of NPE based surfactants have posed a very serious challenge for pigment dispersion and coatings formulators. With the increasing demand for colorants that are VOC-free and more compliant with Green Seal and Ecolabel Standards, the need for high performance dispersants have also significantly increased and formulators are demanding the same, if not better, performance in compliant colorants, when compared to their VOC and APE surfactant containing predecessors.

Pigment stabilization – Challenges:

The major challenges encountered in the Industry today are:

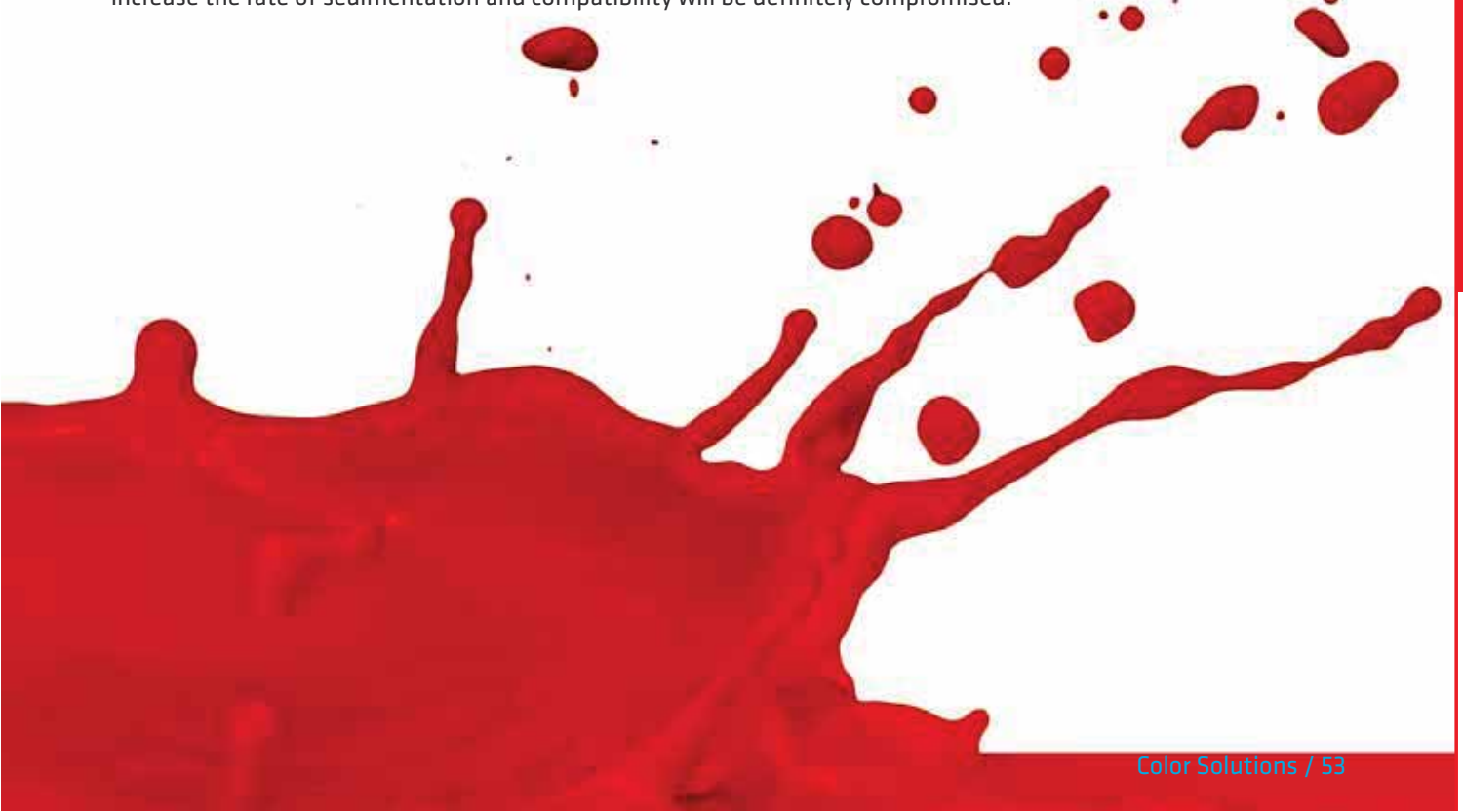
- Maintaining storage stability of pigment concentrates over longer time periods
- Maintaining the compatibility of these pigment concentrates with different coating systems after enduring longer storage time
- Good color acceptance and color development in tinted systems using pigment concentrates that were stored for prolonged periods

Improved storage stability:

Anchoring of dispersant onto the pigment surface is key to improved storage stability and helps to:

- Prevent flocculation
- Prevent sedimentation
- Improve compatibility
- Maintain viscosity

If the dispersants selected for use have poor anchoring abilities, then this will lead to pigment flocculation which will increase the rate of sedimentation and compatibility will be definitely compromised.



Mechanism

Mechanism of dispersion:
Most pigments are manufactured to specifications that would typically provide the best performance properties. However, during the pigment manufacturing process, pigment particles come into contact with each other, often resulting in the formation of aggregates or agglomerates which then requires further processing by the colorant manufacturer to separate them into primary particles during the colorant manufacturing process.

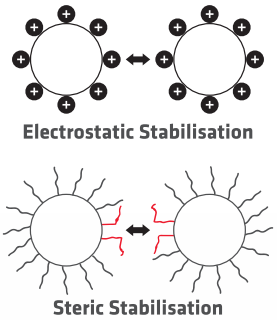
The mechanical breakdown or dispersion of the aggregates and agglomerates occurs in three stages as outlined in Figure 1.

Figure 1: Overview of the dispersion process

Wetting: Liquid that replaces air on the surface of the pigment particle by reducing the interfacial tension

Dispersant: Product that maintains fine solid particles in a suspended state and inhibits aggregation or sedimentation in a liquid medium

Stabilization: Prevents re-agglomeration by electrostatic and/or steric repulsion



Stabilization, which is by far, the most important step of the dispersion process, occurs either by steric, electrostatic or electro-steric repulsion. The goal of the dispersion process is to produce a liquid color concentrate which is not only stable but also compatible when combined with different water borne paint systems.

Since the dispersion phase is the most time and energy consuming stage of the manufacturing process, selecting the right equipment and using the correct dispersant is critical to the overall success and economic viability of the process.

How to Select Wetting Agents?

In waterborne coatings, inks and adhesive systems, wetting agents are needed to improve the performance of the coatings systems.

In solvent borne system, there is no real need for a wetting agent or surfactant due to inherent low surface tension of the solvents. However, for waterborne systems to perform well, both nonionic and anionic type of wetting agents are utilized to help lower the surface tension and improve performance properties.

In waterborne coatings, wetting agents provide pigment wetting, substrate wetting, improve flow and leveling, improve compatibility, better color acceptance and improved shelf stability.

Nonionic wetting Agents
Low HLB: 4-8 low foam/low solubility
Mid HLB: 9- 14 workhorse for paints/ pigment wetting/ stability/color acceptance
High HLB: 15- 18 stability improvement

In addition to traditional nonionic wetting agents, phosphate ester based wetting agents are used as co-wetting agent to improve color acceptance

How to Select Dispersants

Solvay Novecare offers a wide selection of dispersants for hydrophilic pigments such as TiO2, Clays, Calcium carbonate, zinc oxide, talc and other types of fillers as well as well difficult to disperse organic and carbon Black pigments for Architectural and Industrial Paints, inks or general of pigment dispersions.

Dispersant types used may be different for pigment types due to inherent surface properties of pigment types as listed below.

The inorganic pigments, which are typically metal oxides, are generally low in tint strength, high in opacity, low in brightness and are fairly easy to disperse. They also have excellent weathering properties.

The organic pigments on the other hand are high in tint strength, high in brightness but are very difficult to disperse.

This has created demand for high performance dispersants to help improve the overall dispersion process while maintaining good feasibility and manufacturing economics.

PROPERTY	INORGANIC	ORGANIC
Solubility	Generally Insoluble; Non-Bleeding	Slightly Soluble
Tint Strength	Low	High
Hiding Power	High, Opaque	Low, More Transparent
Ease Of Dispersion	Fairly Easy To Disperse	Difficult
Specific Gravity	High	Low
Heat Resistance	High	Low
Weathering	Excellent	Poor
Intensity	Low	High
Weathering	Excellent	Poor
Intensity	Low	High

Color Solutions

Waterborne Architectural Paints Interior/Exterior Flat Paints

Our solutions to waterborne architectural paints include APEO and VOC-free wetting agents & stabilizers, pigment dispersants for hydrophilic and hydrophobic pigments and color acceptance improvers.

Purpose	Product	Customer Benefits	Recommended Dosage
Wetting Agents	Rhodoline® WA 265N	Eco-label compliant, excellent pigment wetting for organic pigments, improved tint-strength, improved stability, excellent color acceptance.	0.5-5.0%
	Rhodoline® WA 1801*	APEO- free, excellent pigment wetting for hydrophilic pigments, low foam, improved color acceptance	0.2-1.0%
	Rhodoline® WA 40*	Rhodoline® WA40 is an APE-free, non-ionic surfactant with excellent stabilization properties for waterborne architectural coatings.	0.2-1.0%
	Rhodoline® WA 9*	APE-free wetting agents	0.2-1.0%
	Rhodoline® 2809	APE-free wetting agents	0.2-1.0%
	Rhodoline® 3100	APEO and VOC –free, excellent pigment wetting. Improved stability, low viscosity	0.5-2.0%
Pigment Dispersants	Rhodoline® 111 Rhodoline® 111E	Most versatile hydrophobic dispersant for stabilizing TiO2 and other inorganic pigments.	0.2-1.0%
	Rhodoline®226-35/40*	Low-foaming, excellent dispersing of reactive and non-reactive pigments.	0.2-1.0 %
	Rhodoline®270* Rhodoline®271	Low foaming dispersant for TiO2 and other inorganic pigments.	0.2-1.0%
Color Acceptance	Rhodoline®4188	Best for inorganic and organic pigments. Improved color acceptance.	0.2-2.0%
	Rhodoline® WA 265N	Eco-label compliant, recommended for organic pigments, excellent color acceptance.	0.5-1.0%
Stabilizers	Rhodoline® WA 200	APEO-free, excellent wetting in low to high PVC paint formulations. Excellent alternate for APE containing high HLB wetting agents. Improved paint stability.	0.5-2.0%
	Rhodoline® WA 40*	Rhodoline WA40 is an APE-free, non-ionic surfactant with excellent stabilization properties for waterborne architectural coatings.	0.2-1.0%

*Check availability with your Solvay's regional representative

Color Solutions

Waterborne Architectural Paints Interior/Exterior Semi-Gloss

For semi-gloss paint systems, Solvay offers a wide selection of unique wetting and dispersant agents whic are widely used by the industry. Rhodoline® 4188 provides excellent color acceptance and compatibility to tinted systems.

Purpose	Product	Customer Benefits	Recommended Dosage
Wetting Agents	Rhodoline® WA 265N	Eco-label compliant, excellent pigment wetting for organic pigments, improved tint-strength, improved stability, excellent color acceptance.	0.5-5.0%
	Rhodoline® WA 1801*	APEO- free, excellent pigment wetting for hydrophilic pigments, low foam, improved color acceptance.	0.2-1.0%
	Rhodoline® WA 40*	Rhodoline WA40 is an APE-free, non-ionic surfactant with excellent stabilization properties for waterborne architectural coatings.	0.2-1.0%
	Rhodoline® 3100	APEO and VOC –free, excellent pigment wetting. Improved stability, low viscosity.	0.5-2.0%
Pigment Dispersants	Rhodoline® 111* Rhodoline® 111E	Most versatile hydrophobic dispersant for stabilizing TiO2 and other inorganic pigments.	0.2-1.0%
	Rhodoline®226-35/40*	Low-foaming, excellent dispersing of reactive and non-reactive pigments.	0.2-1.0%
	Rhodoline® 286N* Rhodoline® 103	High gloss dispersant for TiO2 and other inorganic pigments.	0.2-1.0%
Color Acceptance	Rhodoline®4188	Best for inorganic and organic pigments. Improved color acceptance.	0.2-2.0%
	Rhodoline® WA 265N	Eco-label compliant, recommended for organic pigments, excellent color acceptance.	0.5-1.0%
Stabilizers	Rhodoline® WA 200	APEO-free, excellent wetting in low to high PVC paint formulations. Excellent alternate for APE containing high HLB wetting agents. Improved paint stability.	0.5-2.0%
	Rhodoline® WA 40*	Rhodoline WA40 is an APE-free, non-ionic surfactant with excellent stabilization properties for waterborne architectural coatings.	0.2-1.0%

*Check availability with your Solvay's regional representative

Waterborne Architectural Paints Interior/Exterior High-Gloss

Rhodoline® WA 265N is an Ecolabel-compliant APE-free wetting & dispersing agent for organic pigments, used in both paints and pigment dispersions, providing excellent tint strength and stability over time.

Purpose	Product	Customer Benefits	Recommended Dosage
Wetting Agents	Rhodoline® WA 265N	Eco-label compliant, excellent pigment wetting for organic pigments, improved tint-strength, improved stability, excellent color acceptance.	0.5-5.0%
	Rhodoline® WA 1801*	APEO- free, excellent pigment wetting for hydrophilic pigments, low foam, improved color acceptance.	0.2-1.0%
	Rhodoline® WA 40*	Rhodoline WA40 is an APE-free, non-ionic surfactant with excellent stabilization properties for waterborne architectural coatings.	0.2-1.0%
	Rhodoline® 3100	APEO and VOC –free, excellent pigment wetting. Improved stability, low viscosity.	0.5-2.0%
Pigment Dispersants	Rhodoline® 286N* Rhodoline® 103	High gloss dispersant for TiO2 and other inorganic pigments.	0.2-1.0%
Color Acceptance	Rhodoline®4188	Best for inorganic and organic pigments. Improved color acceptance.	0.2-2.0%
	Rhodoline® WA 265N	Eco-label compliant, recommended for organic pigments, excellent color acceptance.	0.5-1.0%
Stabilizers	Rhodoline® WA 200	APEO-free, excellent wetting in low to high PVC paint formulations. Excellent alternate for APE containing high HLB wetting agents. Improved paint stability.	0.5-2.0%
	Rhodoline® WA 40*	Rhodoline WA40 is an APE-free, non-ionic surfactant with excellent stabilization properties for waterborne architectural coatings.	0.2-1.0%

*Check availability with your Solvay's regional representative

Waterborne Colorants & Pigment Dispersions

Rhodoline® WA 1801 is an APEO and VOC-free, low foam wetting agent specifically designed to replace APEO containing wetting agents. The new product offers excellent color acceptance and long term stability.

Type of Pigment	Purpose	Product	Customer Benefits	Recommended Dosage
TiO2, CaCO3, Zinc Oxide, Talc and other Hydrophilic fillers	Pigment Dispersing	Rhodoline® 111* Rhodoline® 111E	Most versatile hydrophobic dispersant for stabilizing TiO2 and other inorganic pigments.	0.2-1.0%
		Rhodoline® 226-35/40*	Low-foaming, excellent dispersing of reactive and non-reactive pigments.	0.2-1.0%
		Rhodoline® 270* Rhodoline® 271	Low foaming dispersant for TiO2 and other inorganic pigments.	0.2-1.0%
		Rhodoline® 286N* Rhodoline® 103	High gloss dispersant for TiO2 and other inorganic pigments.	0.2-1.0%
Organic Pigments Tinting Blacks	Pigment Dispersing	Rhodoline® 3100	Workhorse dispersant for low to medium HLB organic pigments including medium grade carbon black and lampblack pigments.	5.0-10.0%
Industrial Coatings Grade Carbon Blacks and Organic Pigments	Pigment Dispersing	Rhodoline® 3500	Excellent tint strength development: reduced milling time, High efficiency: 20% less dispersant usage, faster grind times, low viscosity and high pigment loading, and high gloss.	5.0-20.0%
Conductive Grade Carbon Blacks	Pigment Dispersing	Rhodoline® 3700	High efficiency, low viscosity, improved stability.	5.0-15.0%
All pigments	Pigment Wetting	Rhodoline® WA 265N	Eco-label compliant, excellent pigment wetting for organic pigments, improved tint-strength, improved stability, excellent color acceptance.	0.5-5.0%
All Pigments	Color Acceptance	Rhodoline® 4188 Rhodoline® 4200	Best for both inorganic and organic pigments. Improved color acceptance.	0.2-2.0%

*Check availability with your Solvay's regional representative

Color Solutions

Dispersants for Organic Pigments & Carbon Black

Rhodoline® line of wetting and dispersing agents are specifically designed for water-based pigment dispersions and is effective for the improvement of color acceptance & development of inorganic pigments used in Architectural, Industrial and Ink applications. The new wetting and dispersing additives can be used to formulate coatings that are compliant with sustainability protocols.

Pigments Tested	Rhodoline® Dispersants						Percent
	Rhodoline® 3100	Rhodoline® 3200	Rhodoline® 3300	Rhodoline® 3400	Rhodoline® 3500	Rhodoline® 3700	Usage*
Phthalo Blue PB 15:2	++	–	+	–	+	–	10 - 20
Phthalo Blue PB 15:4	++	+	+	–	–	–	5 - 15
DPP Red PR 254	++	+	++	+	–	–	5 - 15
Organic Red PR 122	+	–	–	++	++	–	12 - 20
Organic Red PR 188	++	++	–	–	+	–	5 - 12
Violet Pigment PV 19	++	–	–	–	++	–	10 - 20
Organic Yellow PY 65, PY 74, PY 83, PY 97	++	+	–	–	+	–	5 - 20
Yellow Y151	++	++	-	+	-	–	4 - 10
Green PG 7	+	–	–	–	+	–	10 - 25
Orange PO 34	++	–	–	–	+	–	5-10
Carbon Black-Architectural	++	–	–	–	-	–	15-20
Carbon Black – Industrial	–	–	–	–	++	–	45-50
Carbon Black-Conductive	–	–	–	–		++	80-90

++ Recommended; + Suitable; - Not Recommended

*Actives

Benefits

- Excellent dispersion
- Better efficiency - reduced use levels
- Good versatility with Rhodoline® 3100

Carbon Black Pigment 7
Rhodoline® 3100

Ingredients	Rhodoline® 3100	Benchmark
DI water	50.4	40.6
Dispersant	**8.5**	**18.0**
Ammonia (28%)	0.1	0.4
Defoamer	1	1
Carbon black PBk7 (Raven 1170)	40	40
Total	**100**	**100**
Active dispersant on pigment, %	18	18

Test	Rhodoline® 3100	Benchmark
Initial viscosity, cps	85	706
Equilibrated viscosity, cps	62	1450
Viscosity, 7 days at 50°C, cps	86	1098

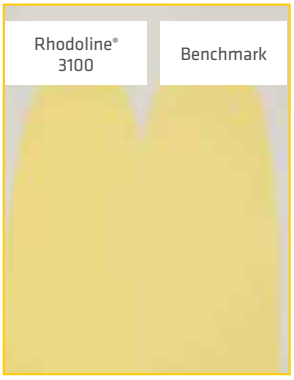
Test	Semi-Gloss White Base		Flat White Base	
	Rhodoline® 3100	Benchmark	Rhodoline® 3100	Benchmark
Tint Strength, %	98	100	101	100
Rub-up, ΔE	0.42	0.65	0.13	0.09
Masstone	**Semi-Gloss Clear Base**		**Flat Clear Base**	
Masstone, %	99	100	100	100
Rub-up, ΔE	0.39	0.73	0.27	0.09
Gloss, 20°/ 60 °	18/53	16/49	x	x

Attributes

- Excellent efficiency on a supplied basis
- Improved rub-up in semi-gloss bases
- Excellent viscosity stability

Yellow Pigment 74
Rhodoline® 3100

Ingredients	Rhodoline® 3100	Benchmark 4
DI water	55.3	54.9
Dispersant	**3.6**	**4**
Ammonia (28%)	0.1	0.1
Defoamer	1	1
Hansa Brilliant Yellow 2GX 70-S	40	40
Total	**100**	**100**
Active dispersant on pigment, %	8	10



Properties	Rhodoline® 3100	Benchmark 4
Active dispersant (dry/dry), %	**8**	**10**
Initial results		
BF 12 RPM #3 Spindle	**10**	**30**
Equilibrated results		
BF 12 RPM #3 Spindle	**10**	**20**
Semi-gloss white base tint		
Tint strength, %	**107**	**100**
Rub-up, ΔE	**1.01**	**0.93**
Semi-gloss clear base masstone		
Masstone, %	**96**	**100**
Color difference, ΔE	**0.59**	**Std**
Gloss (24 hrs), 20°/ 60°	**13/49**	**11/45**

Attributes

- Excellent efficiency: 10% less dispersant usage
- Improved tint strength

Color Solutions

Water-based Pigment Dispersants
Rhodoline® 4000 Series

The new **Rhodoline® 4000 series** is specifically designed for water-based pigment dispersions and is effective for the improvement of color acceptance & development of inorganic pigments used in Architectural, Industrial and Ink applications. The new wetting and dispersing additives can be used to formulate coatings that are compliant with sustainability protocols.

Benefits

- Improved color acceptance
- Improved color development
- Reduced color floating
- Low water sensitivity
- Enhanced gloss
- Higher scrub resistance
- Excellent wetting
- Adhesion

Rhodoline® 4000 Series

Product	Ion Nature	Active %	Recommendation	Dosage
Rhodoline® 4200	Anionic	100	Used in low/zero VOC colorants; best for inorganic and organic pigments that require mid HLB range wetting agents.	0.1 - 0.5% (active) as paint wetting agent; 1 - 2% (active) as pigment wetting; 5 - 20% (active) based on total pigment weight as dispersant for concentrates.
Rhodoline® 4160	Anionic (ammonium salt)	25	Used in low/zero VOC colorants; best for inorganic and organic pigments that require mid HLB range wetting agents.	
Rhodoline® 4170*	Anionic (potassium salt)	25	Used in low/zero VOC colorants; best for inorganic and organic pigments that require mid HLB range wetting agents.	
Rhodoline® 4188	Anionic (ammonium salt)	87	Used in low/zero VOC colorants; best for inorganic and organic pigments that require mid HLB range wetting agents.	

*Check availability with your Solvay's regional representative

Color Acceptance Improvement
Rhodoline® 4188

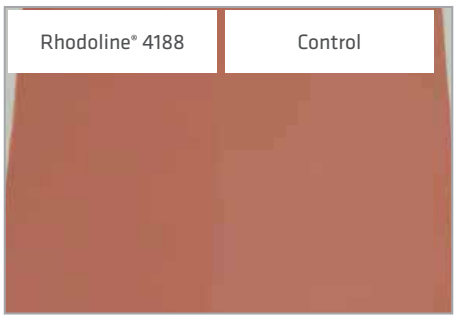
Attributes

- Excellent color compatibilizer
- Good dispersant and co-dispersant for inorganic pigments
- Improved color acceptance and color development
- Reduced color float

Tinted with red iron oxide colorant

Control	**Rhodoline® 4188**	Competitor 1	Competitor 2

Raw Materials	Weight, %
Pigment Grind	
Water	**9.51**
KATHON LX 1.5%	**0.19**
Rhodoline 270	**0.56**
Rhodoline 688	**0.09**
Tiona 595	**25.17**
Attagel 50	**0.28**
Letdown	
Water	**8.02**
Optive 130	**46.61**
Rhodoline 688	**0.37**
Rhodoline® 4188	**0.20**
Ammonia (28%)	**0.14**
Coapur 3025 (25%)	**0.84**
Coapur 817W (17.5%)	**2.33**
Water	**5.69**
Total	**100.00**



- ⇨ Wetting and dispersing agent, ammonia salt
- ⇨ High concentration: 87% solids
- ⇨ APE-free
- ⇨ Global registration

Color Solutions

Eco-friendly Wetting & Dispersing Pigment Agent
Rhodoline® WA 265N

Ecolabel-compliant APE-free wetting & dispersing agent for paints and pigment dispersions, providing excellent tint strength and stability over time

Key features:

- Ecolabel Compliant
- Excellent tint strength
- Superior color acceptance
- Excellent wetting of pigments
- Ecolabel alternative of alkyl phenol
- Very low VOC & low SVOC
- Steric stabilization
- APE-free

Benefits:

- Eco friendly
- Improves indoor air quality
- Offers broad compatibility to colorants
- Protects the environment & the consumer

Specifications	Results
Characteristic	Non-ionic
Appearance	Clear or slightly hazy liquid
Color Gardner	5 Maximum
Density, 20°C (g/cm3)	1.01
Active content (%)	90 approx.
Pour Point	5 approx
Viscosity (cPs)	30-238
Static surface tension (mN/m)	31
VOC Content (g/L)	<0.5
SVOC Content (g/L)	<20

Applications

- Waterborne colorants
- Waterborne coatings

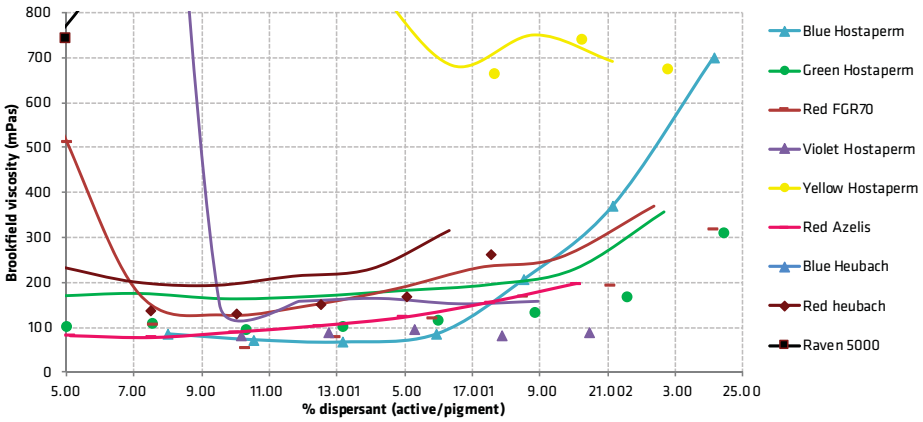
Dosage

- The optimum dosage should be checked in each case individually
- In pigment concentrates it should be added prior to the pigment addition at a percentage between 2 and 25%
- In coatings formulation 0.1 to 0.6% would be required to improve the compatibility

Eco-friendly Wetting & Dispersing Pigment Agent **Rhodoline® WA 265N**

Rhodoline® WA 265N demonstrates good performances as pigment wetting & dispersing agents for organic pigments

Rhodoline® WA 265N demand curve Organic Pigments-100 rpm



	Pigments		Color Index	% of pigments	% Active Rhodoline® WA 265N
	Red special color EC	Azelis	PR 112	37	7-15
	Red	Heubach	PR122	37	5-10
	Hostaperm Yellow H3G	Clariant	PY 74	40	5-15
	Hostaperm Green GNX	Clariant	PG 7	40	7-17
	Hostaperm Blue BRG-L	Clariant	PB 15:2	40	5-15
	Raven 5000	Aditya Birla	PB LK-7	20	8-15

Rhodoline® WA 265N can be used in colorants as wetting & dispersing agent or in the base paint as compatibilizer. In both cases it improves the color development, the tint strenght and the stability over time.

2% Colorant with water-based commercial paint

Performance Solutions

Performance Solutions

Solvay Novecare, a world leader in the development and production of specialty chemicals, supplies performance additives for a variety of paint and coating applications. Solvay additives deliver outstanding benefits to coating formulations, such as enhanced surface wetting, improved coating adhesion to substrate, superior dispersion stability and gloss, enhanced color development and stability, and better foam control. Solvay additives are also effective in minimizing production mixing time and improving manufacturing efficiency.

In addition Solvay offers customized Solutions to help resolve many of the unmet needs of the market.

- VOC and APE-Free solutions
- Open time improvement
- Freeze-Thaw improvement
- Odor-Free / VOC-Free Coalescent solutions
- VOC-free defoamers for paints, inks and adhesives
- Low odor and VOC-free amine solutions
- Epoxy curing solutions

Performance Challenges

Solvay Novecare is developing and expanding its line of industry-leading paint additives to enhance the performance of VOC-free and APE-free water-based formulations while providing additional benefits such as improved freeze-thaw, open time, film appearance, defoaming and wetting characteristics.

Solvay consistently develops new sustainable additives that allow formulators to address the performance challenges of newer waterborne formulations, while answering the demand for more sustainable and cost-effective products. Solvay's Sustainable Portfolio offers a versatile toolbox for waterborne paint and coatings formulation.

Maximize Your Open-Time
Rhodoline® OTE 600

Ecolabel-compliant APE-free low VOC & SVOC solution for coatings, Rhodoline® OTE 600 enhances workability, open-time and application properties & film appearance, which leads to better aesthetics of the paint.

Key Features

- Extends open-time
- Enables design of low to zero VOC coating formulations
- APE-free
- Very low VOC & low SVOC
- Ecolabel-compliant
- Low odor
- Versatile utility of binders: acrylic, styrene acrylic, vinyl acetate, VEOVA
- Reduces / eliminates wetting agents
- Electrosteric stabilization
- Alternative to glycols

Key Benefits

- Longer workability
- Better film appearance
- Better applicability
- Better flow and leveling
- Perfect for Ecofriendly paints
- Improves indoor air quality
- Maintains & improves other paint performances

Properties

Appearance	Clear to hazy, slightly amber to yellow liquid
Specific gravity at 25°C (g/cm3)	1.026 – 1.226
Active content (%)	Around 75.0
Pour point	5 approx.
pH (5% solution)	4.0 - 7.0
Viscosity at 25°C, spindle 4, 60 rpm (cPs)	5000 Max
VOC* Content (g/L)	< 2.0
SVOC* Content (g/L)	< 5.0

*VOC & SVOC: test method ISO 11890-2

Application

- In coatings formulation, 1,0% is recommended to gain open-time
- Product should be formulated as close as possible to the binder and mixed thoroughly

Dosage

- Optimum usage levels need to be determined for each formula
- Possibility to eliminate wetting agent

Rhodoline® OTE 600 improves colloidal stability thus delaying coalescence thanks to its unique patented technology. This open-time extender provides a longer workability leading to a better applicability and film appearance. Rhodoline® OTE 600 doesn't impact the paint properties such as gloss, scrub resistance, block resistance, stability, compatibility with colorants, ...etc.

Due to its low VOC & SVOC content, low odor and its non toxicological profile, Rhodoline® OTE 600 answers the needs of the market by offering you the best compliant solution for your coatings.

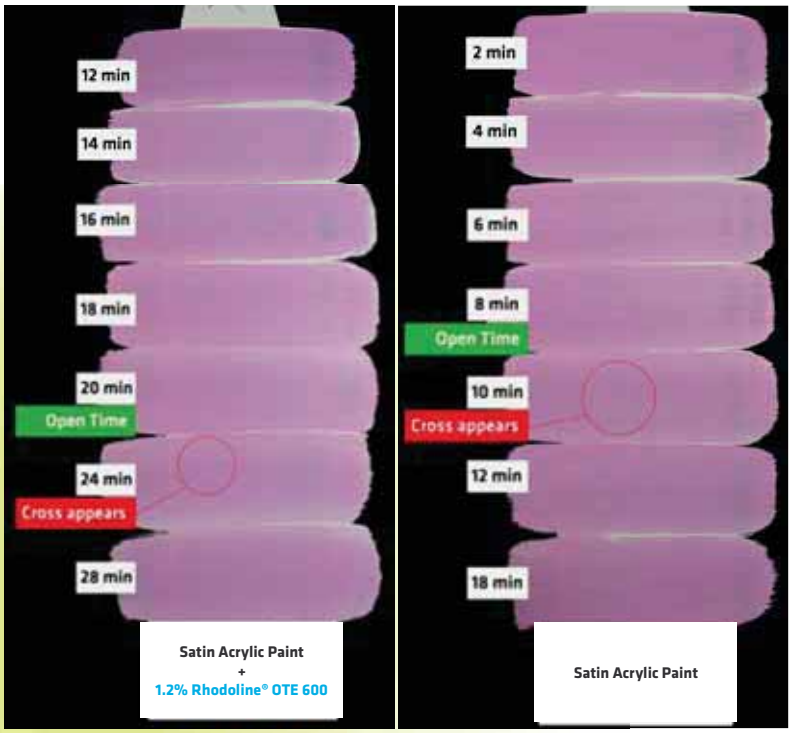
As Rhodoline® OTE 600 increases open-time it is the best candidate to substitute glycols without bringing volatile solvent and with even better results on workability of the paint.

Open Time Extenders

Open-Time vs. Drying Time

When the cross is visible, it means that the paint has dried and it's not possible to remove cross marks. Open time is the section above the first cross visible.

Open Time Test

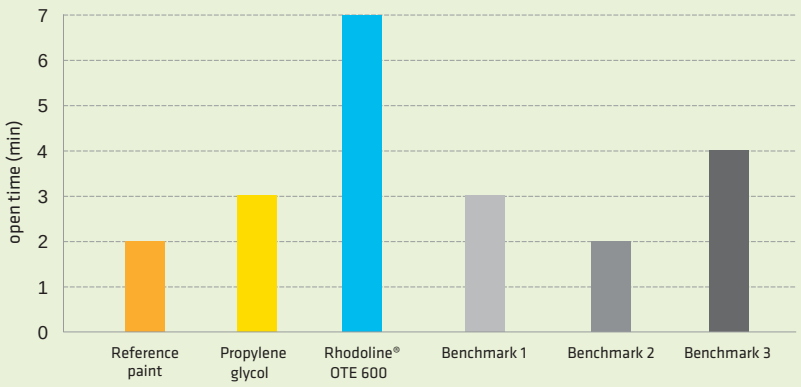


Rhodoline® OTE 600 utilizes a "patented hydrophobe technology" that slows latex particle to particle contact during the drying process thereby delaying initial coalescence.

Maximize Your Open-Time
Rhodoline® OTE 600

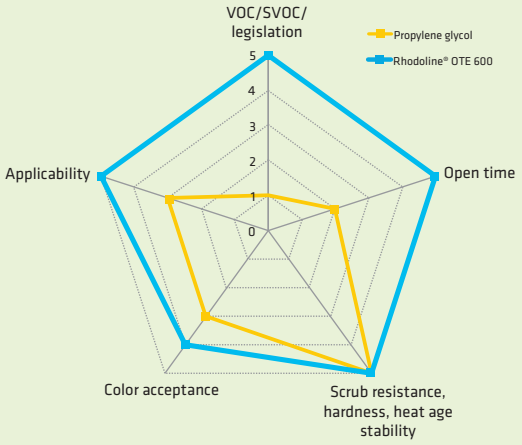
Performances

Rhodoline® OTE 600 is the best solution* for open-time



*PVC 31% semi gloss acrylic paint 1% of open time additive

The Ecofriendly solution even more performing than volatile glycols!



Rhodoline® OTE 600 improves open-time properties without impacting VOC & performances of your coatings

Freeze-Thaw Additives

Rhodoline® FT is a unique VOC and APE-free liquid additives, developed to aid freeze-thaw resistance in waterborne coatings.

Rhodoline® FT utilizes a "novel hydrophobe chemistry" that reduces latex particle to particle contact during the freezing process – steric stabilization leading to improved colloidal stability.

How is Rhodoline® FT utilized?
Rhodoline® FT is typically added in the letdown stage of the formulation

- Prefer to add as close as possible to the addition of binder and mixed thoroughly.
- Can also be used in the grind stage of the formulation to replace wetting agent

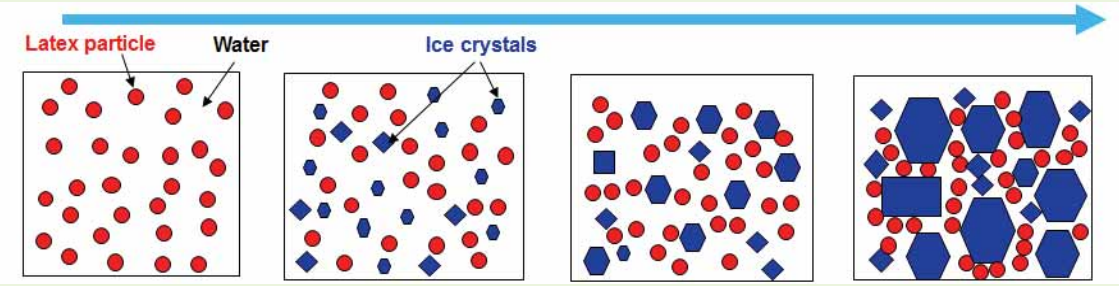
Typical usage levels – recommend to start with 1% addition based on total formula weight

Must allow formulation to equilibrate prior to testing
Possible to reduce/eliminate other additives in the formulation such as:

- Wetting agents
- Solvents such as glycols – intended to impart F/T

Freeze-Thaw Stability mechanism

Freezing of Latex Polymers (to -18°C)



Thawing of latex polymers (to 25°C)

Problem more common with low/zero VOC formulations that utilizes lower Tg resins

Freeze-Thaw Additives
Rhodoline® FT 100, 100E, 100Xtrim

Rhodoline® FT 100, Rhodoline® FT 100E and Rhodoline® FT 100Xtrim are a unique APE-free and solvent-free additives utilized to improve freeze-thaw stability primarily for low Tg latex binders as well as waterborne paints,formulated with these binders.

Rhodoline® FT 100, Rhodoline® FT 100E and Rhodoline® FT 100Xtrim also improve gloss, pigment dispersions and stain resistance in these formulations.

Key Features

- Delivers freeze-thaw stability
- Enhances gloss
- Boosts stain resistance
- APE-free and VOC-free
- Easy to use for a wide range of polymers
- All Acrylic
- Vinyl / Acrylic
- Styrene / Acrylic
- Ethylene vinyl acetate

Purpose	Product	Customer Benefits
Freeze-Thaw	Rhodoline® FT-100 Rhodoline® FT-100E	To improve freeze thaw stability of water based dispersion and low / zero VOC coating. Good wetting and color acceptance.
	Rhodoline® FT-100Xtrim	Label-free multifunctional additive that enhances freeze-thaw stability of water-based dispersion and low/zero VOC coatings in a harsh/extreme climate. Good wetting and color acceptance. Improve open-time.

Unique Freeze-Thaw Stabilizer for Low and Zero VOC Waterborne Paints **Rhodoline® FT 100E**

Rhodoline® FT 100E is a distinctive, APE free and solvent free additive utilized to improve freeze-thaw stability. This additive is primarily used in low glass transition latex binders and waterborne paints formulated with these binders.

Key Features

- Low VOC and SVOC (<1.0%)
- 1% dosage recommended
- Add after binder addition in letdown stage
- May eliminate wetting agents

Key Benefits

- "Novel Hydrophobe Chemistry"
- Delivers freeze-thaw stability properties
- Reduces latex particle to particle contact during the freezing process
- Steric stabilization leading to improved colloidal stability
- Allows to pass 5 cycles Freeze/Thaw

Properties	
Appearance	Slightly yellow liquid
Specific Gravity, @ 25°C	1.09
Solid Content (SC), %	88.0 - 92.0
pH (5% aq. Solution)	5.0 - 7.0
Viscosity, @ 25°C, LV4, 60 RPM, cPs	3000 Max

Performances

Rhodoline® FT100E allows to maintain performances of the paints even after 5 cycles.

Semi-Gloss Paint without Rhodoline® FT 100E After 1 Cycle

Semi-Gloss Paint with Rhodoline® FT 100E After 5 Cycles

Label Free Multifunctional Freeze-Thaw Stabilizer **Rhodoline® FT 100Xtrim**

Key Features	Key Benefits
• Label free • Very low VOC & SVOC • Low odor • Ecolabel compliant • Versatile utility of binder : acrylic, styrene acrylic, vinyl acetate, VEOVA • Alternative to glycols • 1% doage recommended	• "Novel Hydrophobe chemistry" • Improve freeze thaw stability • Enables to target Ecofriendly market • Maintain the performances of your paint even after cycles of freezing thawing • Increase open time • Provides dispersing properties for organic pigments

Properties	
Appearance	Slightly yellow liquid
label	No labelling
Solid Content (SC), %	88.0 - 92.0
pH (5% aq. Solution)	6.0 - 8.0
Viscosity, @ 25°C, LV4, 60 RPM, cPs	3000 Max

Performances

Rhodoline® FT 100XTrim is a freeze thaw stabilizer and much more ...

Semi-Gloss Paint without Rhodoline® FT 100Xtrim After 1 Cycle

Semi-Gloss Paint with Rhodoline® FT 100Xtrim After 5 Cycles

Label Free Multifunctional Freeze-Thaw Stabilizer **Rhodoline® FT 100Xtrim**

Freeze-Thaw Performances enhanced

Paint properties tested	Control Paint	Rhodoline® FT 100XTRIM
Rhodoline FT 100XTRIM- %	0.00	1.2
Gloss - 20/60/85	1.6/9.2/29.8	1.7/9.1/34.2
Opacity - %	96.3	95.9
Freeze/Thaw, number of cycles passed	0 (loss of gloss after one cycle)	5
Gloss after x cycle	1 cycle: 1.5/5.8/9.2	5 cycles: 2/14.5/37.1
Viscosity - Brookfield 50/100 rpm ΔPa.s	1 cycle: 4.2.5/1.9	5 cycles: 4.5/2.5
Scrub resistance ISO 28 days at RT (µm)	3.3	4.2
Heat aged, 2 weeks @ 40°C, Brookfield 10/50/100 rpm ΔPa.s	No syneresis 1.9/0.5/0.3	No syneresis 1.6/0.5/0.3

Low VOC satin Acrylic (Tg: 10°C, MFFT: 5°C) Paint Formula PVC = 35.0%.
Weight Solids = 49.0%; Volume Solids = 25.4%.

Open-time improved

Paint properties tested	Control Paint	Rhodoline® FT 100XTRIM
Rhodoline® FT 100XTRIM	0.0 %	1.2 %
Freeze/Thaw, ASTM D2243	1 cycle	5 cycles
Open time	8 min	20 min
Open time after 5 cycle	Not possible	20 min
Scrub resistance ISO 28 days at RT (µm)	1.5	2.9

Low VOC satin Acrylic (Tg: 10°C, MFFT: 5°C) Paint Formula PVC = 35.0%.
Weight Solids = 49.0%; Volume Solids = 25.4%.

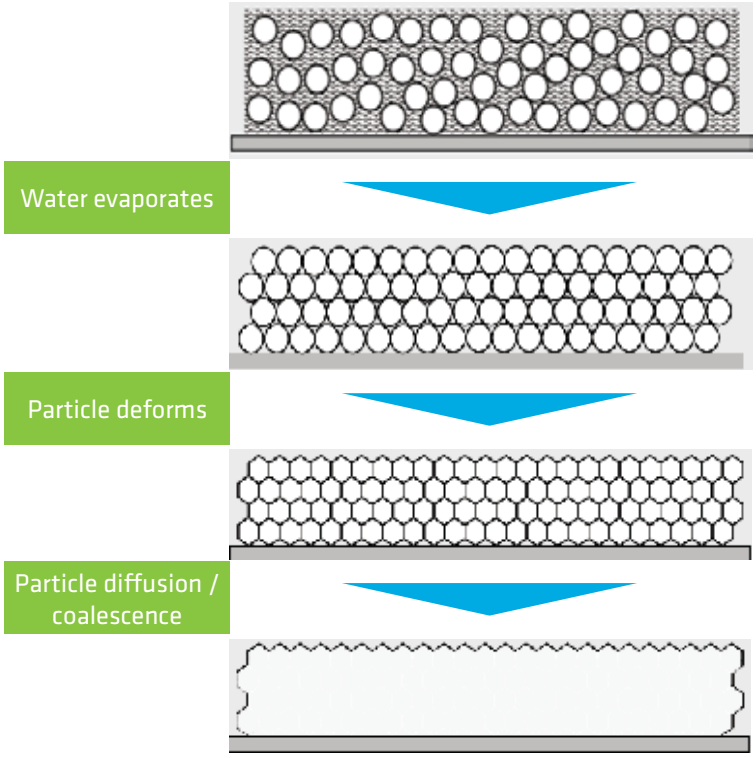
Better wetting & dispersion of organic pigments

Rhodoline® FT 100XTrim improves also the dispersion of organic pigments, in particular the yellow ones and has also a positive impact on color development.

Coalescents

Coalescence is the process by which latex particles come into contact with one another and unite to form a continuous, homogeneous film.

A coalescing agent acts as a *temporary* plasticizer to reduce the glass transition (Tg) of the latex below that of the drying temperature to allow for good film formation.



Low VOC and Low Odor Coalescing Agent
Rhodiasolv® DIB

Rhodiasolv® DIB is a mixture of aliphatic esters and a new generation of coalescing aid that meets the tightening VOC regulations in the paint industry. Combining a high boiling point with an optimal evaporation rate, Rhodiasolv® DIB helps to formulate low VOC paints without the drawback of plasticizers. It is an extremely low odor and efficient coalescing agent for architectural, industrial coatings and paints.

Key Features

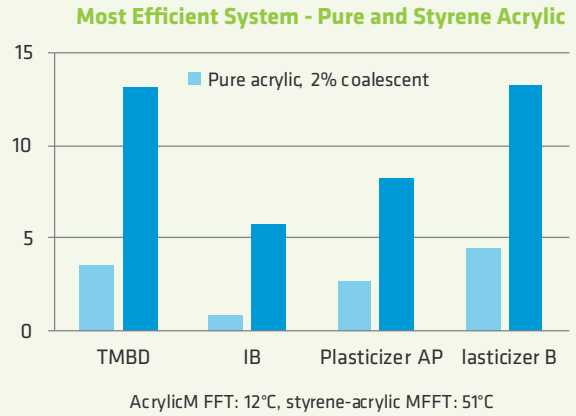
- Low VOC < 0.5%
- Low odor
- Low toxicity
- Ecolabel compliant
- Enhanced efficiency:
  - Excellent evaporation profile
  - No plasticizing effect
  - Best Tg recovery
  - Best hardness development

Properties

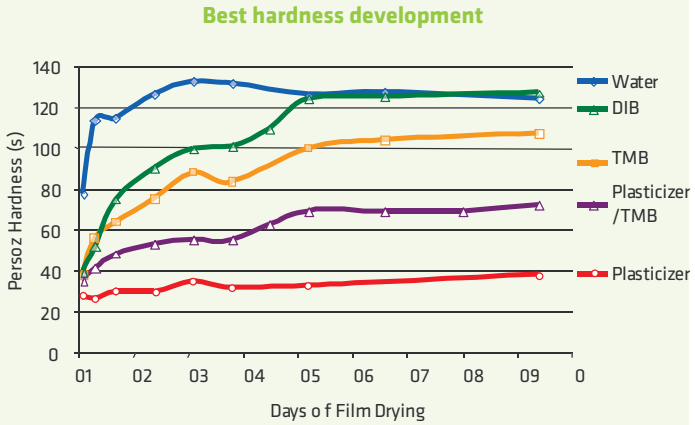
Boiling point / range (°C)	273 / 265 - 295
Purity (wt%)	> 99
Color (Gardner)	2 max
Acid value (mg KOH/kg)	1.5 max
Water (wt%)	0.4 max
Solubility (wt% in water @ 23°C)	<0.05
Evaporation rate (nBAc=1)	<0,001

Performances

Rhodiasolv® DIB is highly efficient in reducing the minimum film formation temperature (MFFT) for a variety of resin systems. A lower level of Rhodiasolv® DIB is usually required to achieve a defined MFFT compared to industrial standards.



Unlike plasticizers, which permanently stay in the paint film and make it soft, Rhodiasolv® DIB leaves the film gradually and enables the hardness of the paint to recover faster, resulting in better block resistance.



Best Solution for Low Emission Paints
Rhodoline® CL3101*

Solvay provide solution to answer the low emission need of the decorative market with its new high boiling point coalescent, the Rhodoline® CL 3101.

Due of its extreme low odor, very low VOC, and its label free, Rhodoline® CL3101 is the best candidate for your Ecofriendly paint!

It demonstrates very high performances in term of film formation temperature decrease, which allows to reduce the quantity of coalescent. Even with a boiling point of 293°C, Rhodoline® CL 3101 provides very good hardness recovery, and good performances of scrub and blocking resistance.

Key Features	Key Benefits
• High boiling point • Extreme low odor • Label free • Low VOC	• Enables low emission paints • Target very low odor paint • Good harness recovery • Very good performances of the paint as scrub & blocking resistance

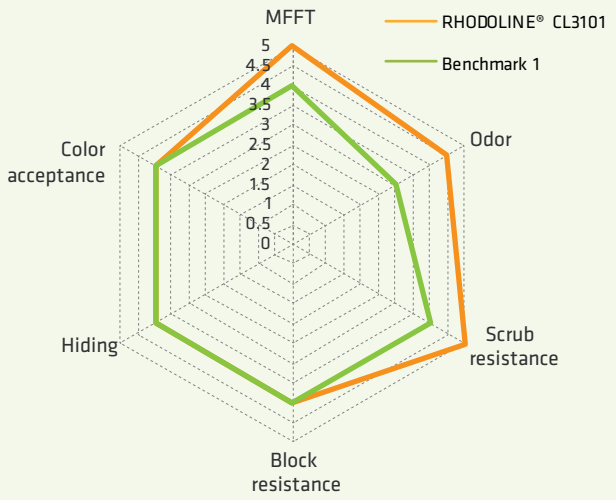
Properties	
Boiling point (°C)	293
Purity (wt%)	> 99.0
Color (APHA)	< 25
Specific Gravity @25°C	0.950
Water (wt%)	< 0.2

Method	VOC
China Environmental labelling	NOT VOC
Green Seal GS11	NOT VOC
Eco-Label	NOT VOC
Directive of European Union 2004/42/EC	NOT VOC

*Not commercial product in Europe/Reach under investigation

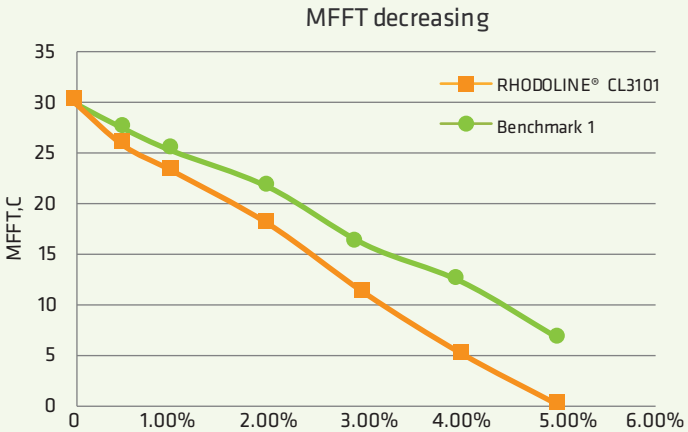
Best Solution for Low Emission Paints
Rhodoline® CL3101*

Performances



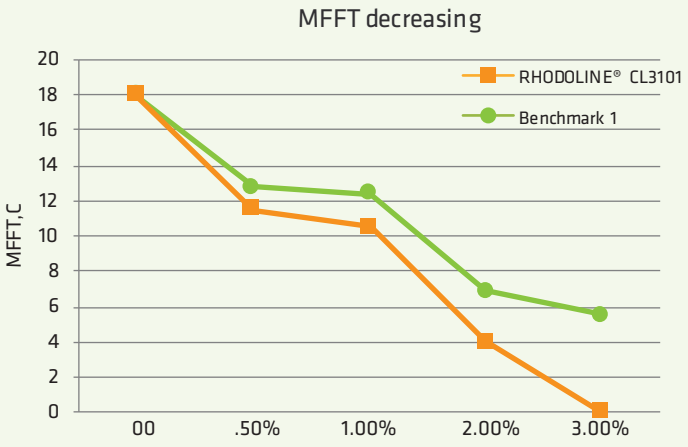
Better efficiency compared to benchmark

- Low odor
- High boiling point
- Better MFFT decreasing
- Better scrub resistance
- Comparable paint stability
- No defects on other paint properties



Dosage of Coalescent,%

Latex: Styrene Acrylic MFFT: 30°C



Dosage of Coalescent,%

Latex: Pure Acrylic MFFT: 18°C

Defoamers

Solvay's extensive line of Rhodoline® defoamers is designed to provide optimal foam control in coatings, inks and adhesive formulations. Rhodoline® defoamers provide excellent deaeration and prevent foam formation during manufacture and application of paints, coatings, emulsion polymerization, inks and adhesives. Rhodoline® defoamers minimize foam formation during high-shear applications such as paint roll, brush, spray and high-speed ink or coating applications.

Rhodoline® defoamer portfolio includes industry workhorse products for flat to high gloss paint systems as well as printing inks and adhesive systems. The newly developed eco-friendly, APE–free and Zero-VOC defoamers, provide quick foam knockdown and the lasting efficiency.

Wide range of use in polymers:

- All acrylic
- Vinyl/Acrylic
- Styrene/Acrylic
- Vinyl Acetate Ethylene (VAE)

Key Features

- Quick bubble break and lasting efficiency in Flat to SG Paints
- Excellent efficiency in architectural and industrial paints, adhesives and inks
- Does not cause fish-eyes or film defects
- Excellent foam control in latex manufacturing of vinyl, acrylics and VAE resins
- Broad compatibility

Defoamers

Function	Product	Description
Foam Control	Rhodoline® DF 642NI*	Effective anti micro foam agent especially in high Tg Lacquer and all types of latex. Suitable as anti-webbing agent.
	Rhodoline® DF 6002*	Excellent defoaming and anti-foaming property, with wide pH and temperature stability.
	Rhodoline® DF 681F*	Applicable for all coating systems.
	Rhodoline® DF 691*	Excellent defoaming persistence and has a wide pH and temperature stability.
	Rhodoline® DF 4226*	Recommended for high gloss and clear coating.
	Rhodoline® DF 5676*	Specially for adhesive and emulsion polymerization application.
	Rhodoline® DF 5688*	Recommended for Industrial and architectural coating, dispersion and printing ink.
	Rhodoline® DF 5800C*	Cost-effective defoamer for all types of water-based coating.
	Rhodoline® DF 6008*	Cost-effective mineral oil-based defoaming agent.
	Rhodoline® DF 6078*	For water based architectural coating and water based ink.
	Rhodoline® DF 5642*	Applicable for high gloss architectural and wood coatings.
	Rhodoline® DF 660*	Organic silicon defoamer recommended for high viscosity elastomeric coatings .
	Rhodoline® DF 0114*	Compliance with FDA CFR 175.105 & CFR 176.210, GB-9685 and BfR, recommended for paper & paperboard and adhesive application.
	Rhodoline® DF 962-Z*	Excellent compatibility and air-release features in paper coatings, adhesives, paints, inks and latex applications.

*Check availability with your Solvay's regional representative

Amines & Amine Ethoxylates

Solvay Specialty amines are predominately based on the feedstock of methyl amines, acrylonitrile and ethylene/ propylene oxide. Our advanced synthesis technology and flexible manufacturing units also help us to extend the specialty amine product portfolio to a wider range including polyamines, ether amines and amides.

Eco-Friendly Additives for Paints & Coatings	Product	Appearance (25°C)	Total Amine Value (mgKOH/g)	Moisture (%)	Purity (GC) (%)	Colour (Hazen)	Colour (Gardner)
Neutralizer	Rhodoline® AN 130*	Clear Liquid	-	≤0.5	≥99.0.	≤50	-
Wetting & Dispersing	Fentamine® DPTA T (518)*	Light Yellow Paste	418-440	≤0.5	-	-	≤12
	Fentamine® DA-HT*	Light Yellow Paste	323-356	≤0.5	-	-	< 3
	Fentcare® D1821*	Light Yellow Paste	-	24-26	-	-	< 3
	Fentcare® 1201*	Colorless To Light Yellow Liquid	230.0-250.0	≤1.0	-	-	≤2
	Rhodoline® DP 618Y*	Light Yellow To Yellow Solid	≥435	≤1.0	-	-	-
Epoxy Hardener	Fentamine® DEAPA*	Colorless To Light Yellow Clear Liquid	-	-	≥99	≤30	-
	Fentamine® DMAPA*	Colorless Clear Liquid	-	-	≥99.5	≤20	-
	Rhodoline® HD N4*	Colorless To Yellow, Clear Bright Liquid	≥1200	≤0.5	≥93.0	≤100	-
	Rhodoline® HD CHAPA*	Colorless To Light Yellow Liquid	-	≤0.5	≥99.0	≤100	-
	Rhodoline® HD DMAPAPA*	Colorless Liquid	-	≤0.3	≥98.5	≤20	-
	Fentamine® NMEA*	Colorless Clear Liquid	720.0-760.0	≤0.2	≥99.5	≤15	-
	Fentamine® DMEA*	Colorless Clear Liquid	610-640	≤0.5	≥99.3	≤30	-

*Check availability with your Solvay's regional representative

SOLVAY Way

The way we do business

Solvay puts into practice a sustainable development policy called Solvay Way because we are convinced our future is dependent upon the responsible way in which we conduct our current activities — a way that reflects our commitment to each of our stakeholders. Solvay Way encompasses three interlinked, equally important spheres: the Environment Sphere, the People Sphere and the Economic Sphere.

Based on a framework of responsibilities, Solvay Way allows Solvay sites and businesses to conduct self-assessments of their practices and establish action plans that promote continuous progress. At Solvay, the way we do business creates sustainable value for all our stakeholders through innovation and partnership.

> Responsible Care is the chemical industry's voluntary continuous improvement initiative to promote safe handling of products. (1987)

> The United Nations Global Compact aims to ensure that heads of companies promote and uphold 10 universal principles concerning human rights, Working Conditions,
Respect for the environment and anti-corruption. (2003)

> The International Federation of Chemical, Energy, Mine and General Workers' Unions. (2005)

> Solvay Novecare has achieved worldwide ISO-9001 Quality Management System Multi-Site Certification. (2008)

SOLVAY
asking more from chemistry®

Solvay S.A.
Rue de Ransbeek, 310
1120 Bruxelles
Belgique
T: +32 2 264 2111
F: +32 2 264 3061

WW | JANUARY | 2017 | NOVECARE - Dileo Graphic Design, mariadileo@comcast.net

www.solvay.com

North America
Solvay Novecare – 504 Carnegie Center – Princeton, NJ 08540 – USA
Phone: +1-800-973-7873 – Fax: +1-609-860-0463 – NovecareCC@solvay.com

Europe - Middle East - Africa
Solvay Novecare – 40 rue de la Haie-Coq – F-93306 Aubervilliers Cedex – France
Phone: 00 800 55 400 600 – Fax: +33 (0) 1 53 56 53 90 – product.info@solvay.com

Asia Pacific
Solvay Asia Pacific Pte. Ltd. – 1 Biopolis drive – #05-01/06 AMNIOS – 138622 Singapore
Phone: +65 - 6291 1921 – Fax: +65 - 6394 3377 – NovecareCC@solvay.com

Latin America
Solvay Novecare – Centro Empresarial – avenida Maria Coelho Aguiar, 215, Bloco B-1º Andar
Cep: 05804-902 – São Paulo-SP Brazil
Phone: +55 11 3747-7637 – Fax: +55 11 3741-8378 – NovecareCC@solvay.com