



BASF用于水性工业涂料用的配方助剂

Formulation Additives

13816332379/18516751107

Jan. 19th. 2018 郭金峰 matthew.guo@basf.com

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内容

巴斯夫配方助剂的历史、产品线和行业需求

水性工业涂料用的消泡剂

水性工业涂料用的分散剂

水性工业涂料用的润湿剂

水性工业涂料用的流变剂

水性工业涂料助剂总结

问题答疑

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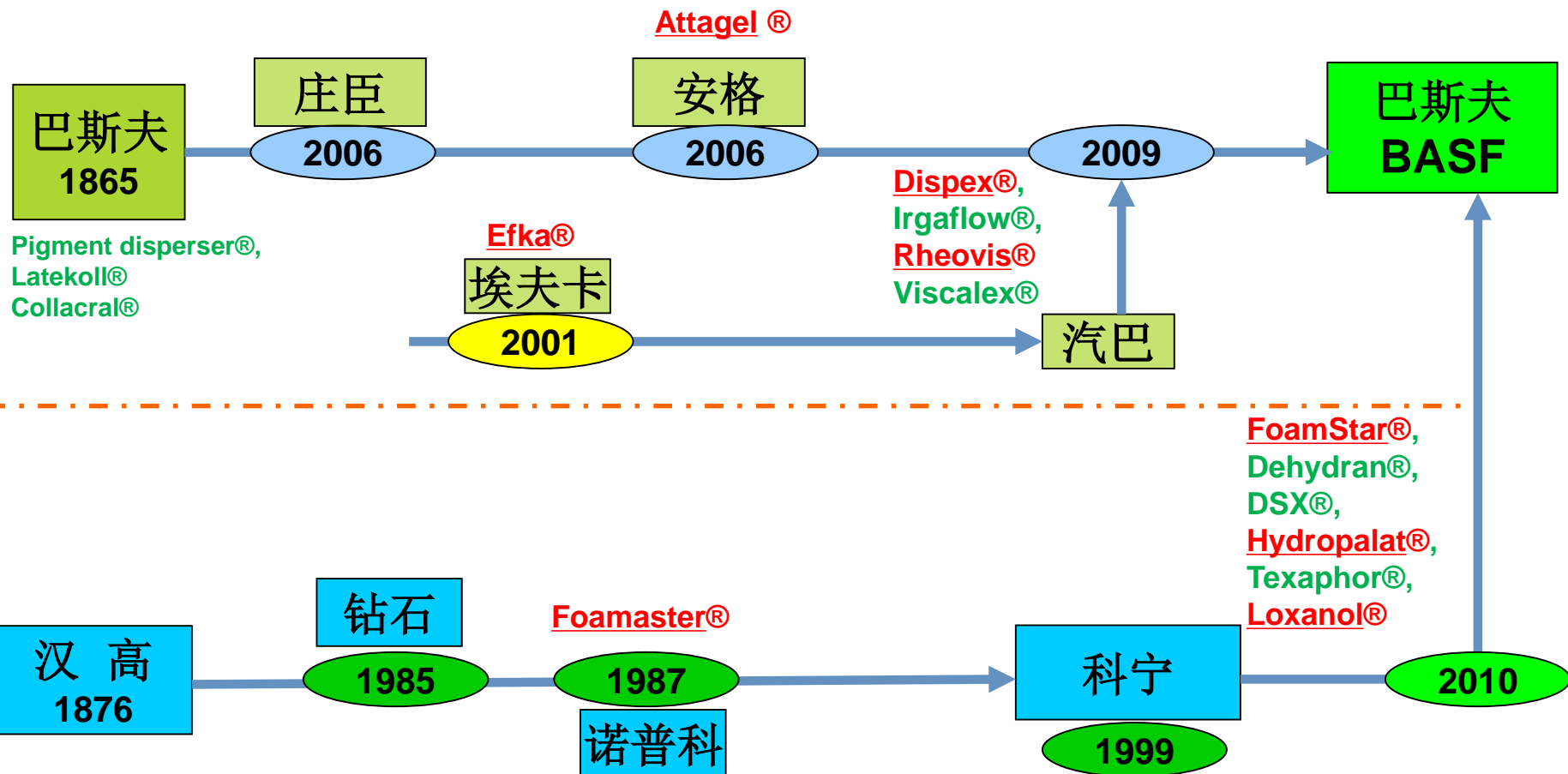
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巴斯夫配方助剂的历史



品牌产品线（自从 2013年）

	Water based 水性体系	Non-aqueous 非水体系
Dispersing agents 分散剂	Dispex[®] / Dispex[®] Ultra 帝派斯 [®]	Efka[®] 埃夫卡 [®]
Defoamers 消泡剂	Foamaster[®] / FoamStar[®] 佛玛特 [®] / 佛玛拓 [®]	Efka[®] 埃夫卡 [®]
Rheology modifiers 流变助剂	Rheovis[®] (瑞乐斯[®]) Attagel[®] (阿塔杰[®])	Efka[®] 埃夫卡 [®]
Wetting agents and surface modifiers 润湿及表面改性助剂	Hydropalat[®] 海卓帕特 [®]	Efka[®] 埃夫卡 [®]
Film-forming agents 成膜助剂	Loxanol[®] 莱思诺 [®]	Efka[®] 埃夫卡 [®]

命名规则

水性产品

Nomenclature

	Water-based products		Letters	Number	
Rheology modifiers	Rheovis® HS 1xxx Rheovis® AS 1xxx Rheovis® PU 1xxx Rheovis® PE 1xxx	Attagel Nomenclature will be continued	HS = HASE AS = ASE PU = Polyurethane PE = Polyethers	11xx = low shear 12xx = mid shear 13xx = high shear 19xx = Solid	
Defoamers	Foamaster® MO 2xxx Foamaster® NO 2xxx Foamaster® WO 2xxx	FoamStar® SI 2xxx FoamStar® PB 2xxx FoamStar® ST 2xxx FoamStar® ED 2xxx	MO/NO = Mineral/natural oil WO = White oil SI/PB Silicone / Polymer ED = Emulsion ST = Star shaped	2xxx = Serial number 29xx = Solids	
Wetting and surface modifiers	Hydrolat® WE 3xxx Hydrolat® FL 3xxx Hydrolat® SL 3xxx		WE = Wetting FL = Flow & levelling SL = Slip agent	31xx = Alkoxylated 33xx = Polymer 35xx = Acrylates 37xx = PEG/PP	32xx = Silicone 34xx = Sulfosuccinates 36xx = Miscell. 39xx = Solid
Dispersing agents	Dispex® AA 4xxx Dispex® CX 4xxx	Dispex® Ultra FA 4xxx Dispex® Ultra PX 4xxx Dispex® Ultra PA 4xxx	AA = Acrylic acid CX = Carboxylic acid copolymers PA = Polyacrylates PX = Controlled and Advanced FA = Fame, Amine based and fatty alcohol alkoxylates	4xxx = Serial number 49xx = Solid	
Film forming agents	Loxanol® CA 5xxx Loxanol® OT 5xxx Loxanol® PL 5xxx		CA = Film forming agents OT = Open time PL = Plasticizers	5xxx = Serial number 59xx = Solid	
Miscellaneous	Loxanol® MI 6xxx		MI = Miscellaneous	6xxx = Serial number 69xx = Solid	

配方助剂化学结构

分散剂

- 聚氨酯
- 丙烯酸&SMA (盐)
- 可控聚合 CFRP
- 烷基氧化
- 脂肪酸改性
- 其它

消泡剂

- 矿物油
- 天然油
- 有机硅
- 聚醚
- 乳液型
- 其它

润湿流平剂

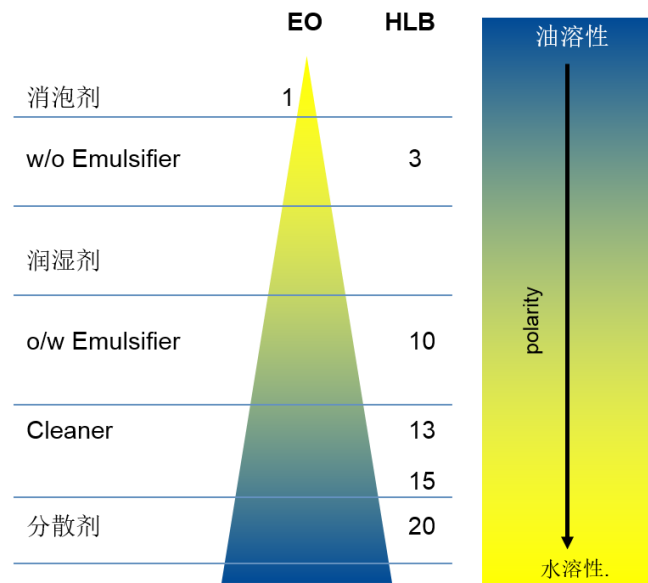
- 氟改性丙烯酸酯
- 烷基氧化物
- 炔二醇类
- 改性硅油
- 其它

流变剂

- 碱溶胀
- 疏水改性碱溶胀
- 疏水改性聚氨酯
- 疏水改性聚醚

成膜助剂

- 脂肪酸酯
- 其它



国家级各部委的挥发性有机物防控政策一览

部委	政策文件	1涂料行业	2汽车涂装	3工业涂料	4修补涂料
环保部	《"十三五"挥发性有机物污染防治工作方案》 2017-07-26	推广低VOCs含量、低反应活性的原辅材料和产品	推广使用高固体分、水性等低挥发性涂料	推广使用高固体分涂料，到2020年底前，使用比例达到30%以上；试点推行水性涂料	大力推广使用水性、高固分等低挥发性涂料，京津冀、长三角、珠三角等使用比例不低于50%
工信部 财政部	《重点行业挥发性有机物削减行动计划》 2016年7月8日	1、重点推广水性涂料、粉末涂料、高固体分涂料、无溶剂涂料、辐射固化涂料（UV涂料）等绿色涂料产品。 2、涂装环节推进水性涂料、高固体份涂料替代溶剂型涂料。			
国务院	印发《“十三五”生态环境保护规划》 2016年11月24日	1、推广低VOCs含量、低反应活性的原辅材料和产品；2、3、			
发改委	对《外商投资产业指导目录》	1、鼓励投资高性能涂料，高固体分、无溶剂涂料，水性工业涂料及配套水性树脂生产。			

不同行业有关十三五挥发性有机物污染防治

推广低VOCs含量、低反应活性的原辅材料和产品。

- 减少苯、甲苯、二甲苯、DMF使用；
- 推广水基化类溶剂；
- 推广石蜡油替代普通芳烃油、煤焦油等。

工业涂装：集装箱、汽车、家具、船舶、工程机械、钢结构、卷材等工业涂装。

- 集装箱：全面水性涂料替代，2017年底100%
- 汽车制造：推行高固分和水性等涂料
- 家具制造：木质家具推行水性和UV涂料；2020年底60%；胶黏剂到2020年底100%。
- 船舶制造：推广水性、高固体分、无溶剂型涂料；
- 工程机械制造：推广高固分涂料，2020年底30%以上；试点水性涂料替代。
- 钢结构制造：大力推广高固分涂料，2020年底50%以上；试点水性涂料替代。
- 卷材制造：未提及涂料替代

国家级各省市的挥发性有机物防控政策一览

省市	政策文件	1涂料行业	2汽车涂装	3工业涂料	4修补涂料
江苏	挥发性有机物污染治理专项行动实施方案		2、交通工具制造行业使用高固体分、水性、粉末、无溶剂型等低VOCs含量涂料替代；3、高固份		
浙江	挥发性有机物深化治理与减排工作方案(2017-2020年) 7月2017		1、涂料、油墨制造行业限制溶剂型产品的生产，推广水性、高固体、紫外光固化等涂料；4、大力推广使用水性、高固体分等低挥发涂料		
山东	《山东省重点行业挥发性有机物专项治理方案》		2、3、鼓励企业使用符合环保要求的水性、高固份、粉末、紫外光固化等低VOCs含量的涂料。		
河南	2017年挥发性有机物专项治理工作方案		1、涂料、油墨制造行业限制溶剂型产品的生产，推广水性、高固体、紫外光固化等涂料		
湖北	湖北省重点行业VOCs污染整治技术要点(试行)		2、3、4、根据涂装工艺的不同，应使用水性、高固份、粉末、紫外光固化涂料等低VOCs含量的环保型涂料，限制使用溶剂型涂料		
四川	四川省固定污染源大气挥发性有机物排放标准DB51/2377-2017		2、小客车：<35g/平方米建立有机废气分类收集系统；对喷漆、流平、烘干等环节产生的废气，采取焚烧等治理措施。		
山西	山西省防治2017年行动计划的 通知晋政办发〔2017〕30号		2、推广使用高固体分、水性等低挥发性涂料，配套使用“三涂一烘”或“两涂一烘”等紧凑涂装工艺；3、小客车：<35g/平方米		
陕西	挥发性有机物排放控制标准 DB61/T 1061-2017		2、小客车：<35g/平方米建立有机废气分类收集系统；对喷漆、流平、烘干等环节产生的废气，采取焚烧等治理措施。		

水性工业涂料注意事项

- 水性树脂（分散体）水溶性和耐水性
- 水分挥发和干燥条件
- 表面活性剂：表面张力、起泡和稳泡
- 消泡剂对施工方式、涂膜外观的影响
- 有机、无机颜填料的分散和稳定
- 成膜机理，助溶剂（成膜助剂）的选择
- 施工方式和流变助剂的选择
- 闪锈和耐腐蚀性

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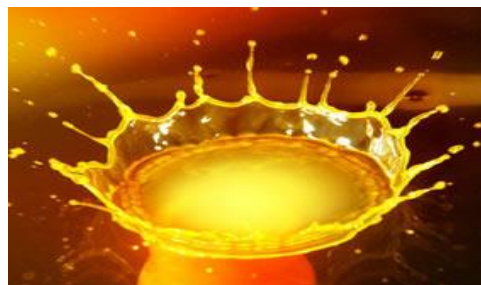
理论

消泡剂的好处

Where does foam come from 泡来自何处？



Which features should a defoamer have?



And if we choose the best one?



Foam origin

- ✓ Dispersion 分散体
- ✓ Pumping & Stirring 泵送和搅拌
- ✓ Application 应用

Defoamer requirements

- ✓ Defoaming efficiency 消泡效率
- ✓ Incorporation 混溶性
- ✓ Long term effect 长效性
- ✓ Sufficient compatibility 足够的相容性

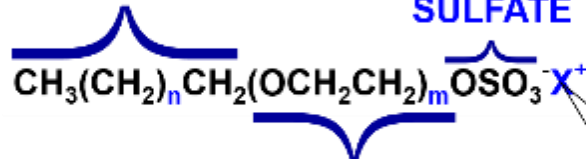
Effects

- ✓ Reduced production time 减少生产时间
- ✓ Increased milling efficiency 提高研磨效率
- ✓ Accurate filling levels 准确计量
- ✓ Best film appearance 涂膜外观

表面活性剂：水性工业涂料的关键原材料

FATTY ALCOHOL

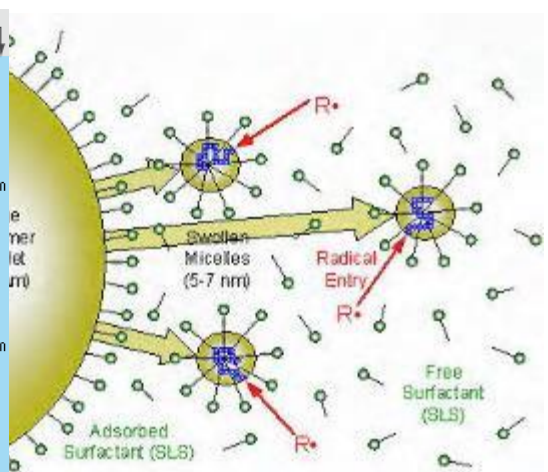
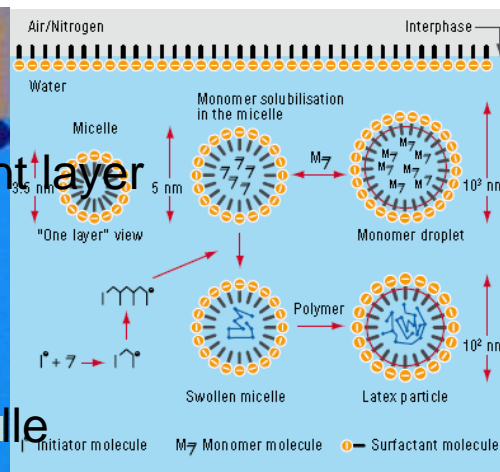
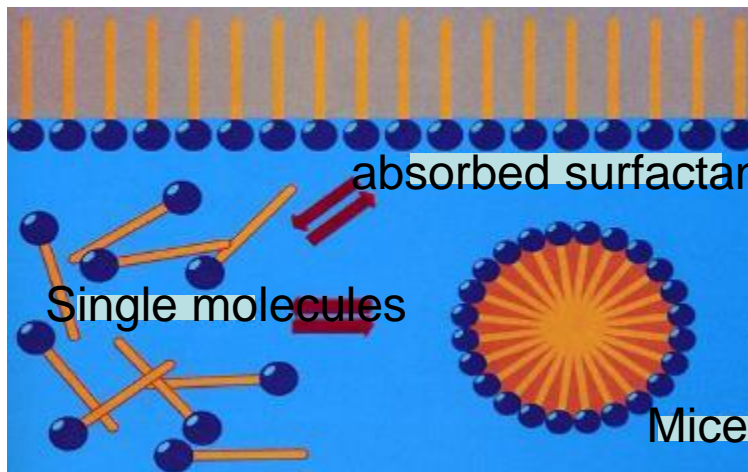
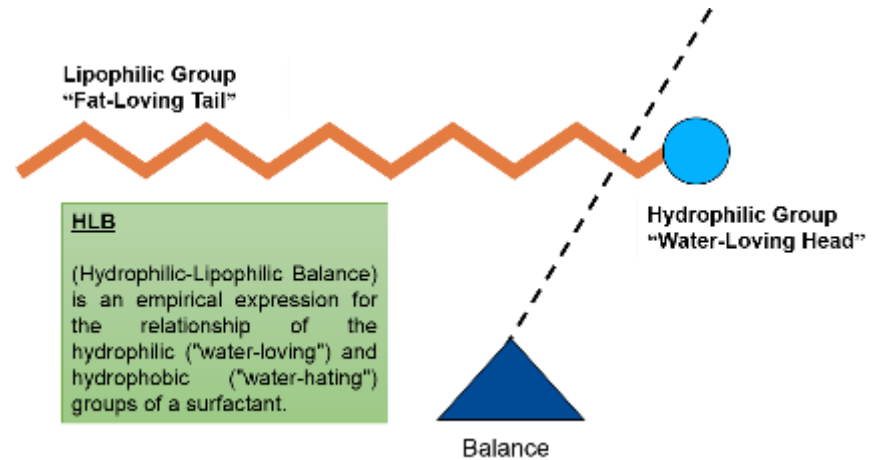
$n = 6 - 20$



SULFATE

Ethylene Oxide
 $m = 0 - 50$

**Na; NH₄;
MEA; TEA;
Mg;**

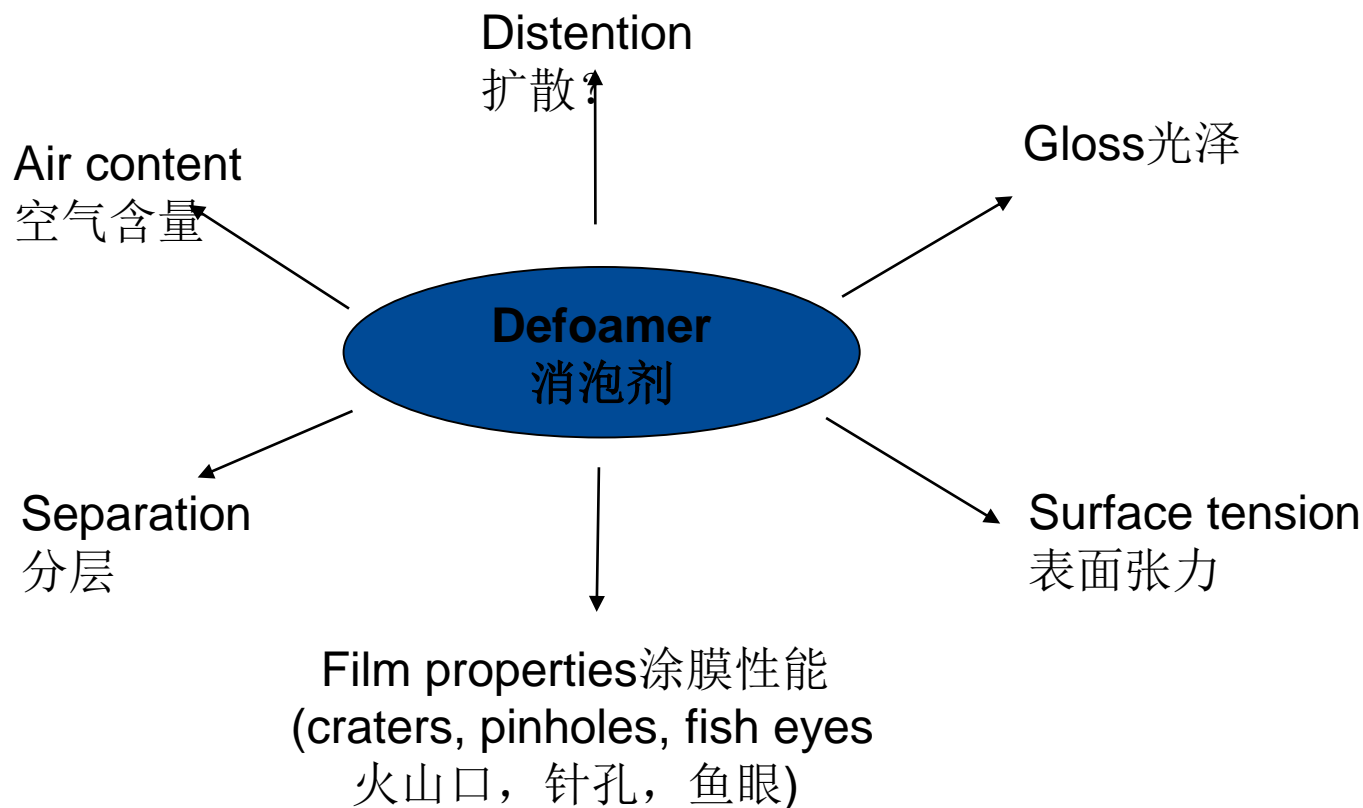


The term “Foam Control Agent” (FCA)泡沫控制剂 is a collective name for:

1. **Antifoams** 抑泡剂 are used to prevent foam formation.
2. **Defoamers** 消泡剂 are added to destroy existing foam at the surface.
3. **Air release agents** 脱气剂 remove (micro) air bubbles from the liquid and help them to rise to the surface.

Often the differences between these terms are not obvious or unclear.
Therefore it is important to understand the requirements and the application.

消泡剂理论 影响的性能



理论

水性体系的消泡剂

- A good defoamer for wb-systems needs the following characteristics:

Low surface tension低表面能 in order to increase its concentration on the air/liquid interface. Here, the defoamer actives can penetrate the foam lamella, weaken and burst the lamella.

Capability to spread有扩散能力 at the air/liquid interface in order to weaken the foam stabilizing surfactant layer.

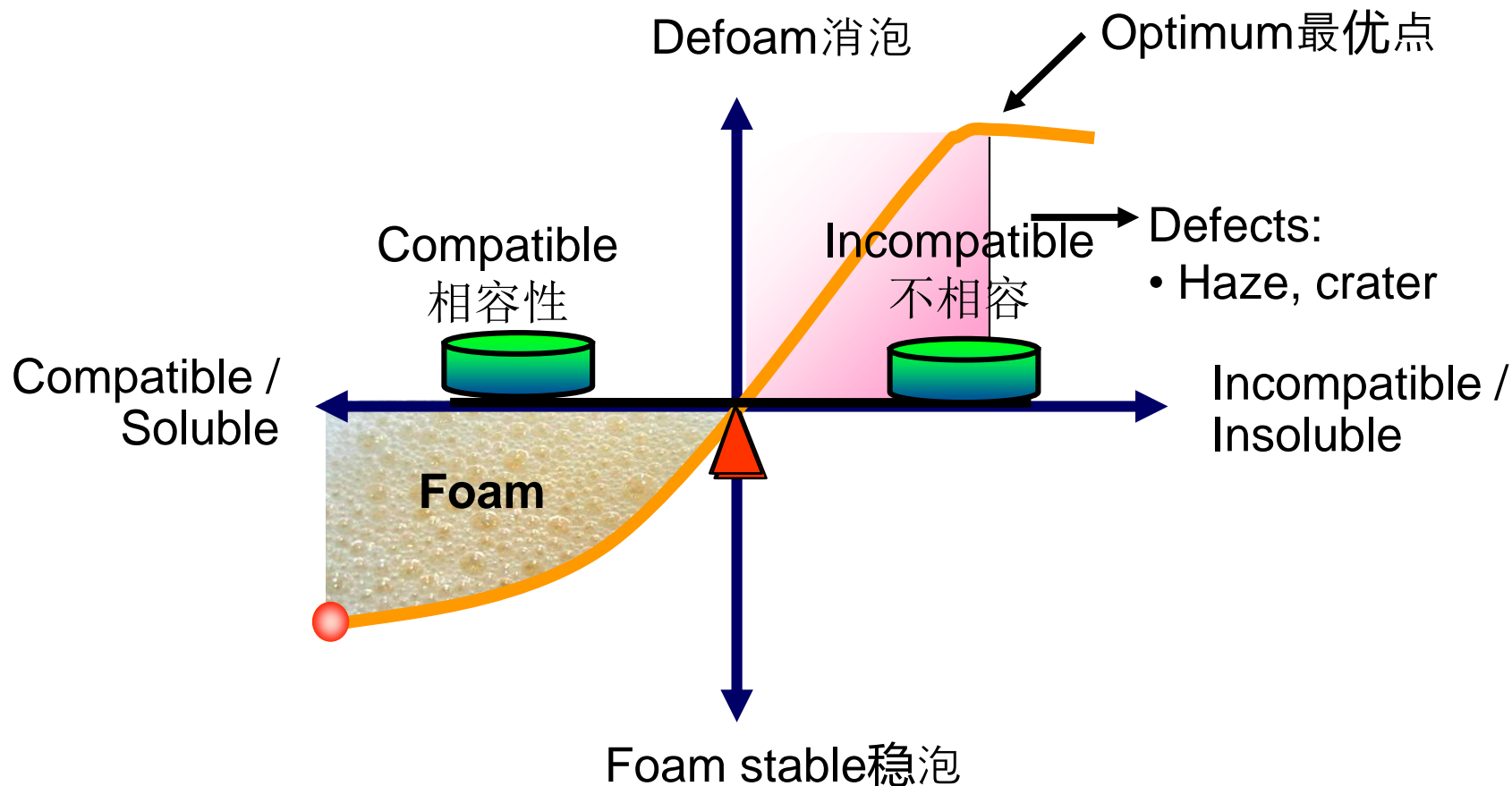
Insoluble不溶性 in the medium for a long time. This will ensure the long term stability of the defoamer.

However a good/suitable defoamer has to have a good balance between efficiency and compatibility in the formulation.

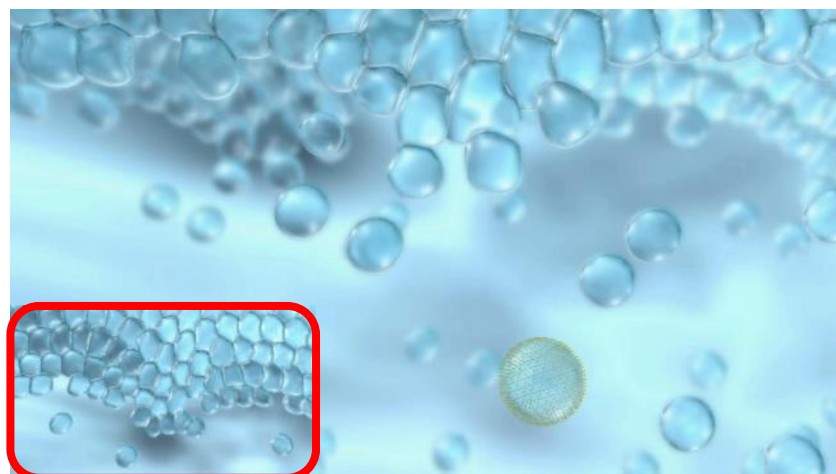
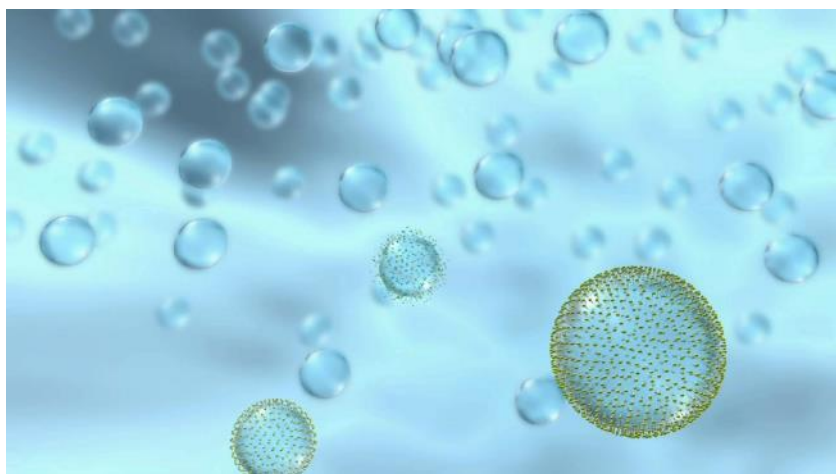
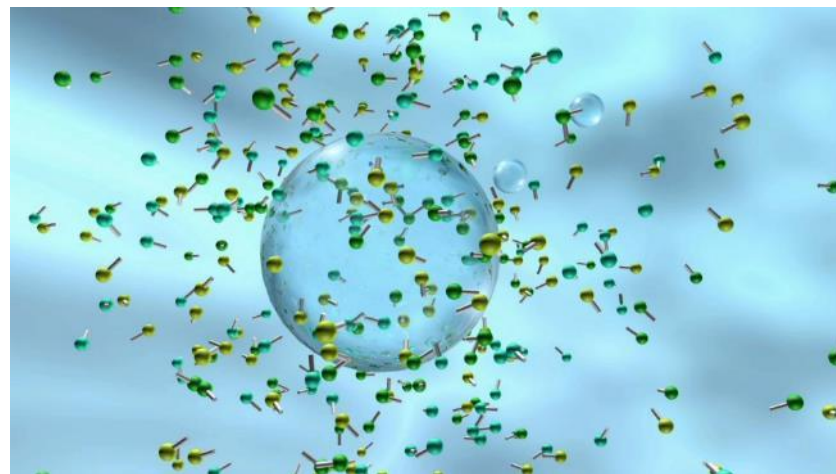
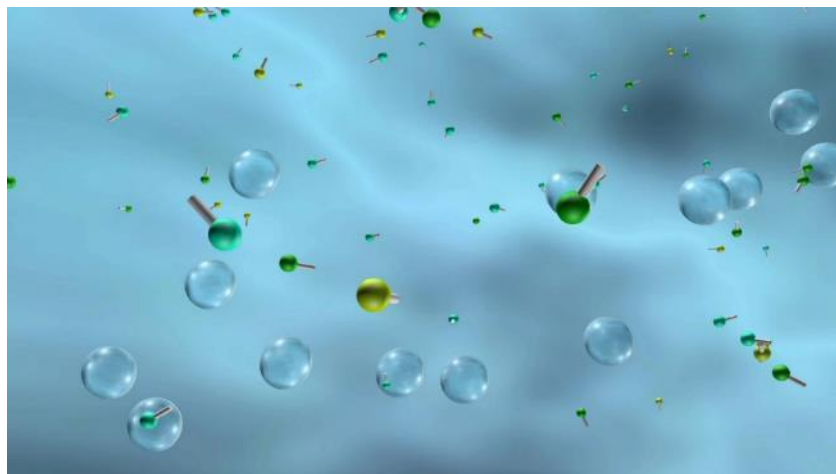
This can only be evaluated by testing in the respective system.

理论

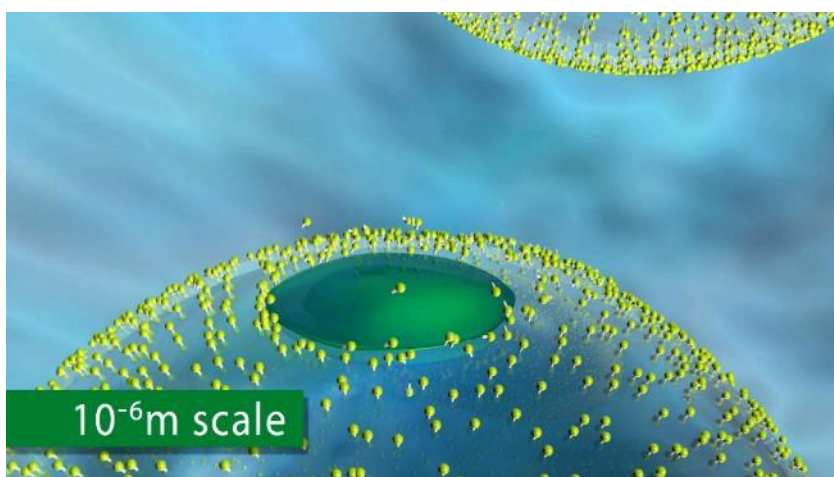
Compatibility相容 vs. Incompatibility不相容



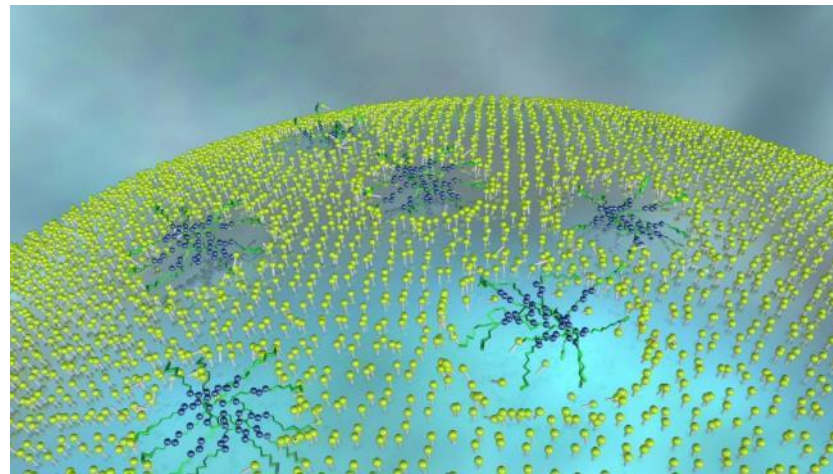
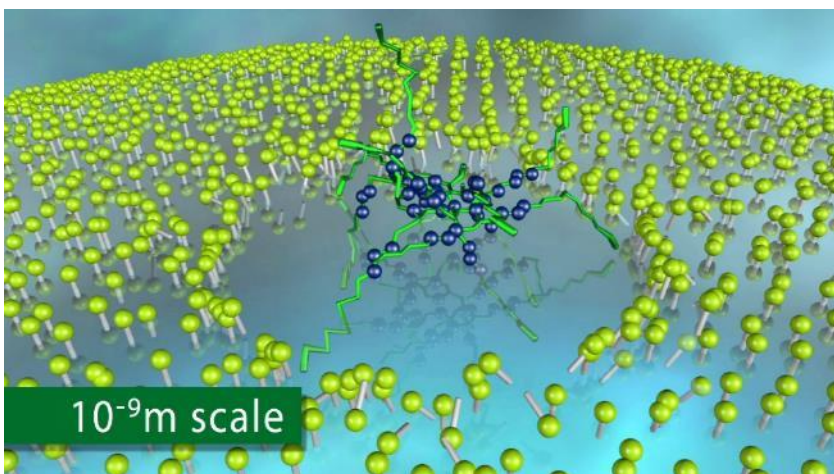
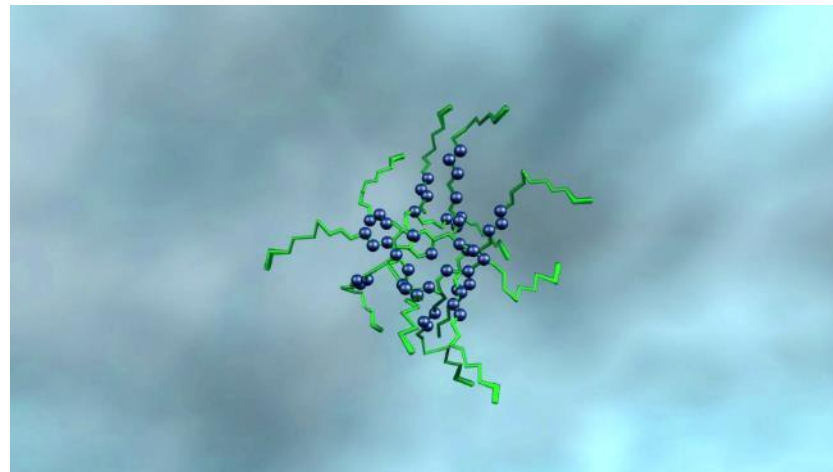
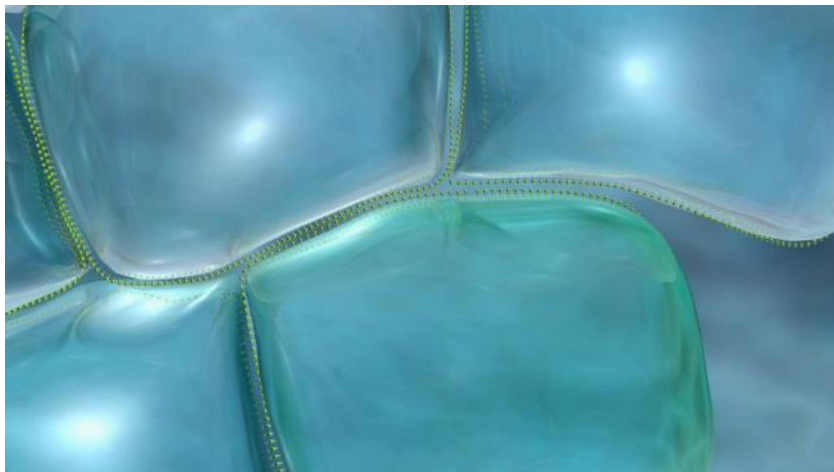
表面活性剂和泡沫



消泡过程

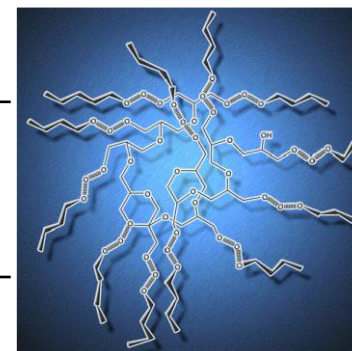


星状聚合物消泡剂

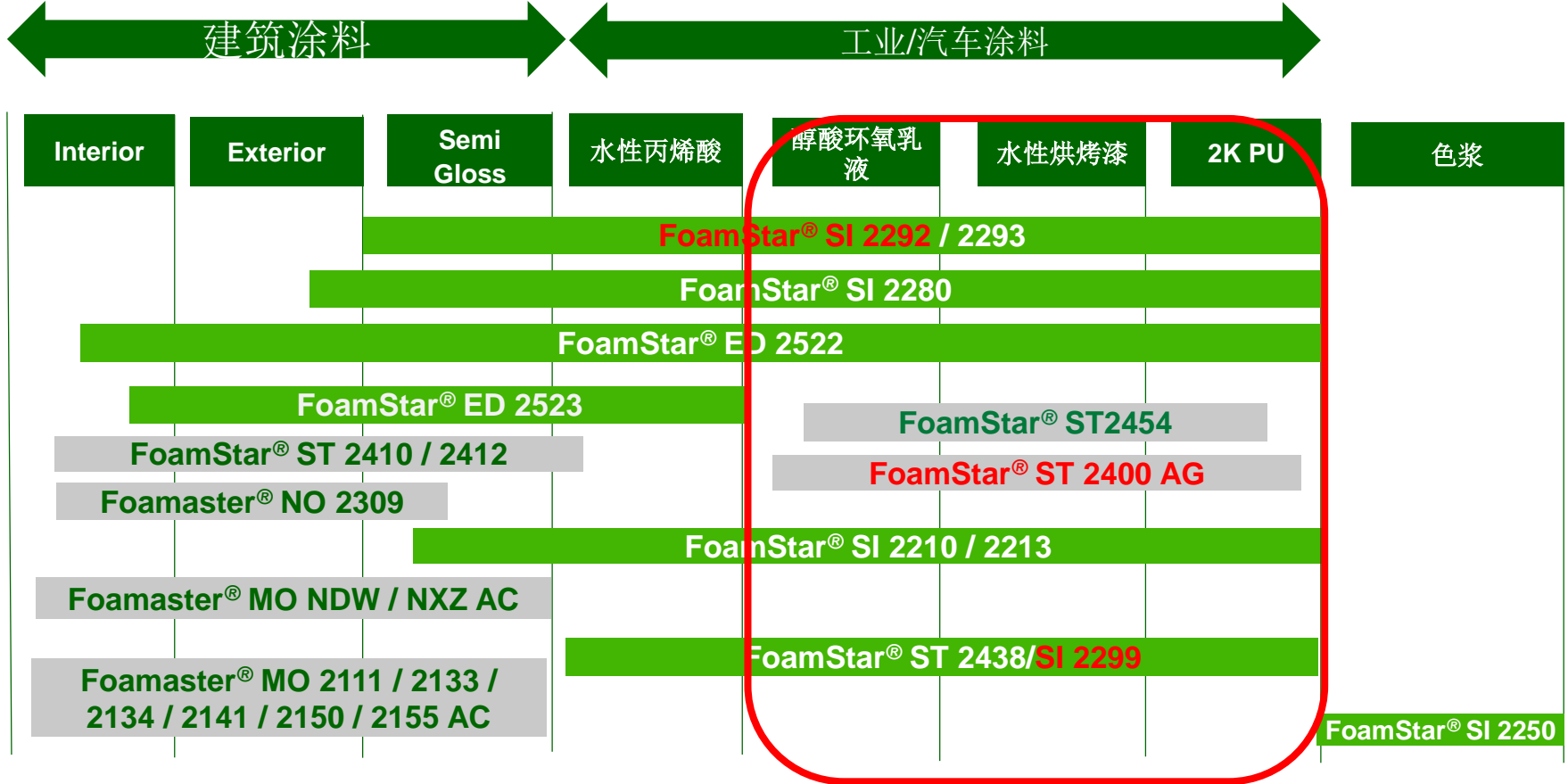


消泡剂的化学类型

化学类型	产品线	应用特点
(矿物) 油类	Foamaster [®] MO	通用、经济性, 含矿物油、白油、天然植物油, 大部分产品会影响光泽
有机硅类	FoamStar [®] SI Efka [®] SI	高光体系, 大部分工业涂料
乳液型	FoamStar [®] ED	通用型, 容易添加
(星状) 聚合物型	Efka [®] PB FoamStar [®] ST	高性能
粉末型	FoamStar [®] PB	粉末产品体系



水性体系中的消泡剂选择



- Silicone-based
- Oil or Polymer-based

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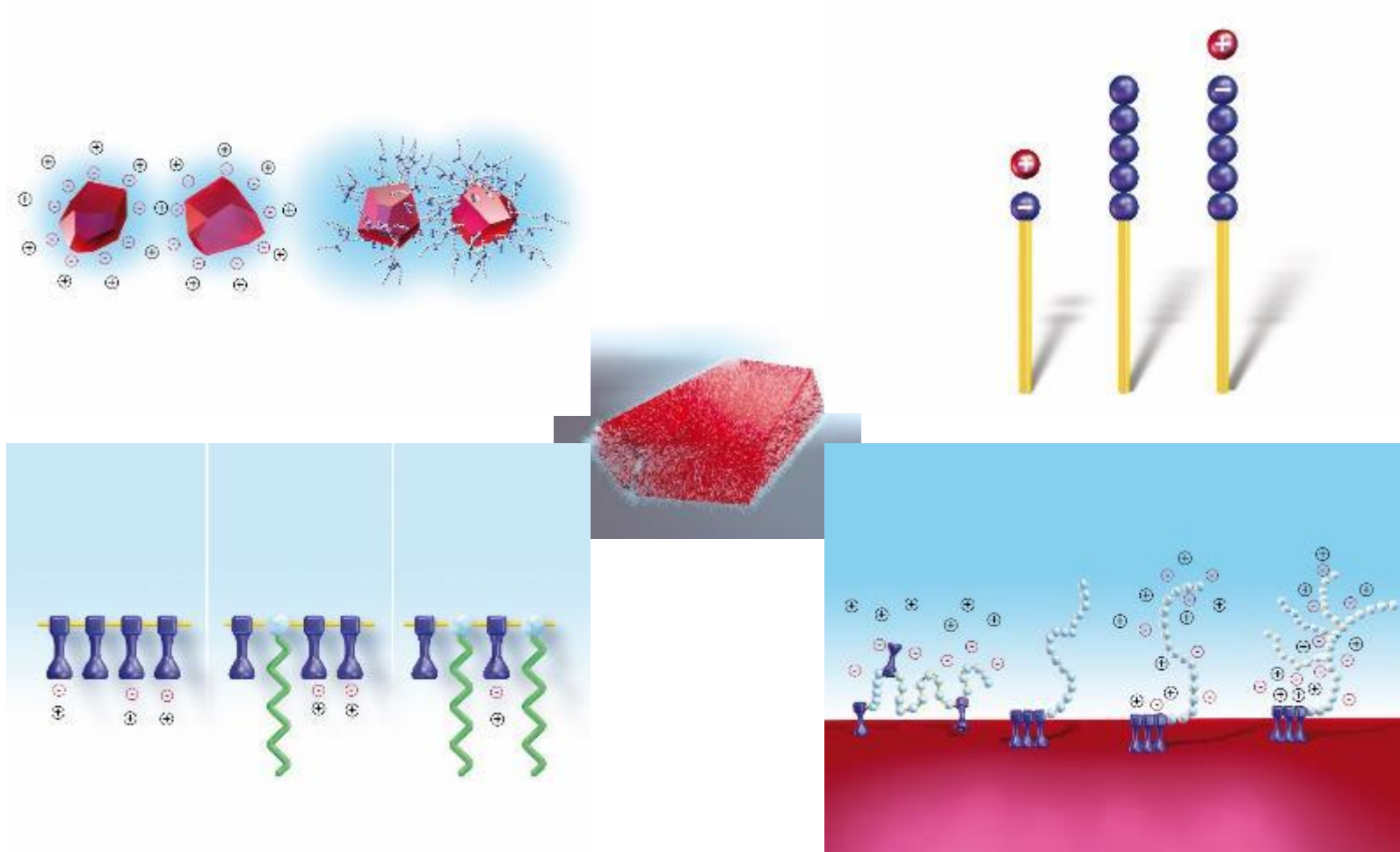
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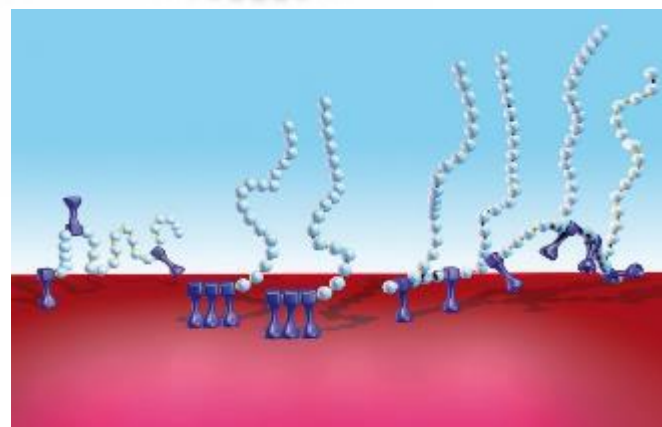
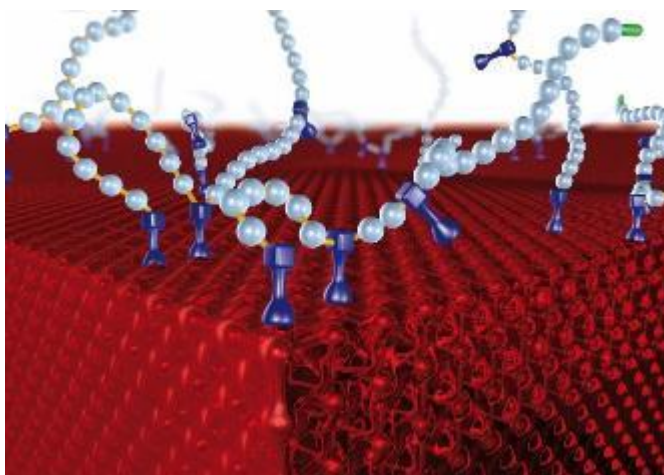
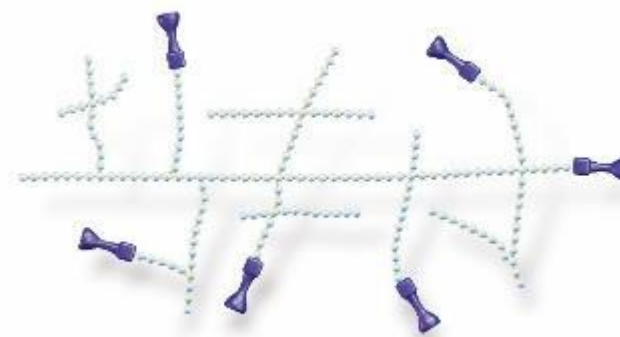
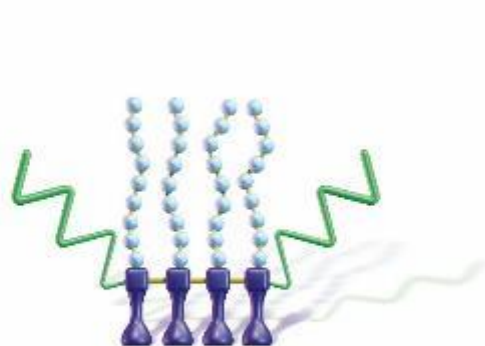
问题答疑

分散剂

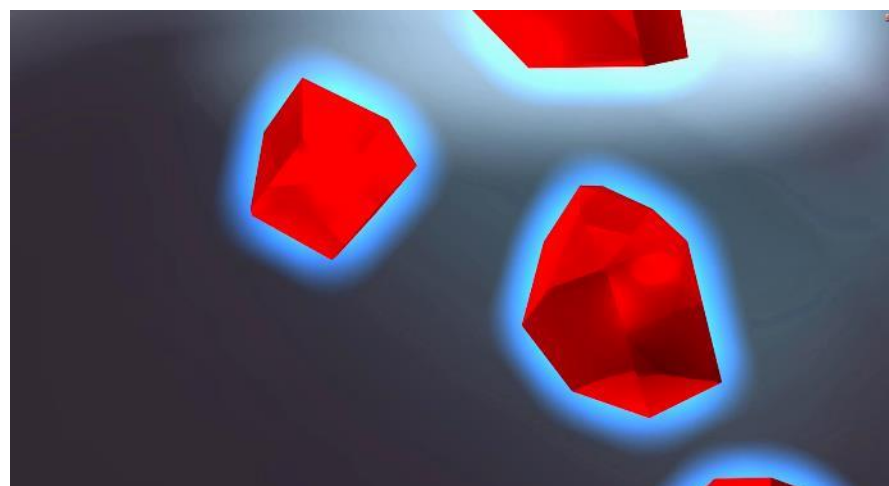
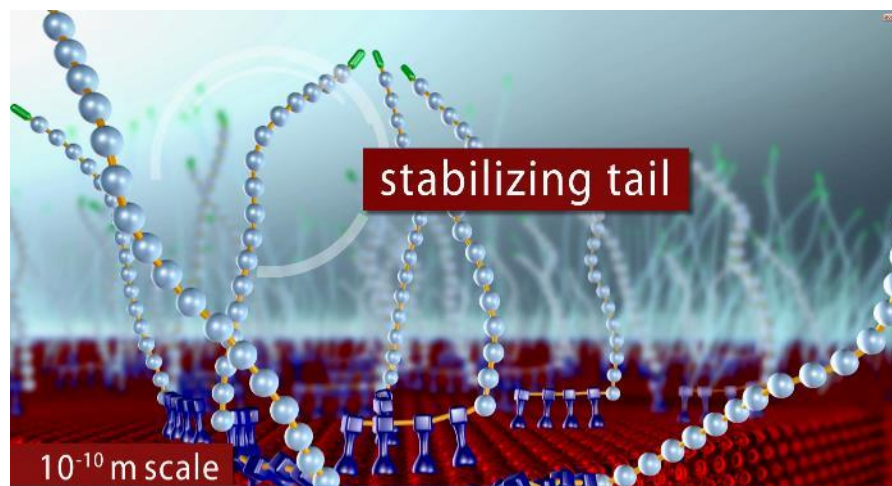
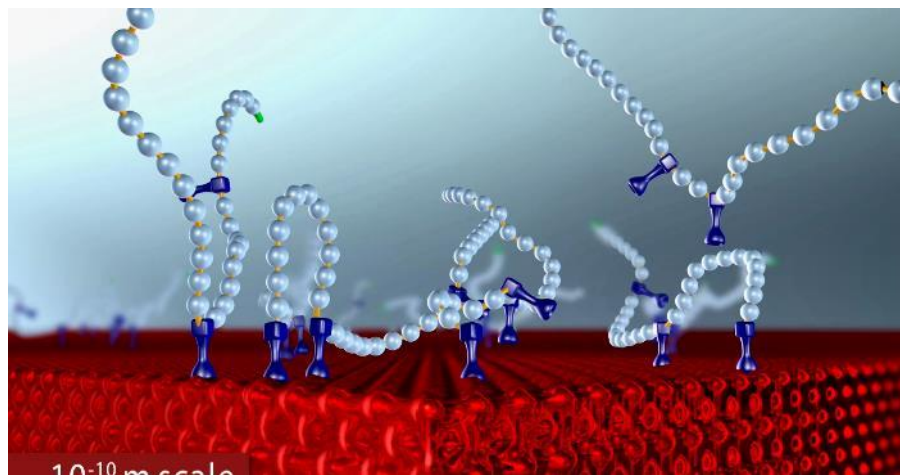


分散剂 可控自由基聚合

Controlled Free Radical Polymerization (CFRP)



分散剂



分散剂产品线

Universal resins for RMPC

Dispex® Ultra PA 45XX

Poly(acrylate) and polyester resins

High molecular weight dispersants

Efka® XX 4XXX

Poly(urethane) Dispersants

Dispex® Ultra PA 4XXX

Poly(acrylate) Dispersants

Poly(acrylate) Dispersants

Acrylic Block Copolymer Dispersants made via CFRP

Ionic dispersants

Dispex®

Modified poly- acid – salts
(carboxylic, mostly acrylic-acids)

Low molecular weight dispersants

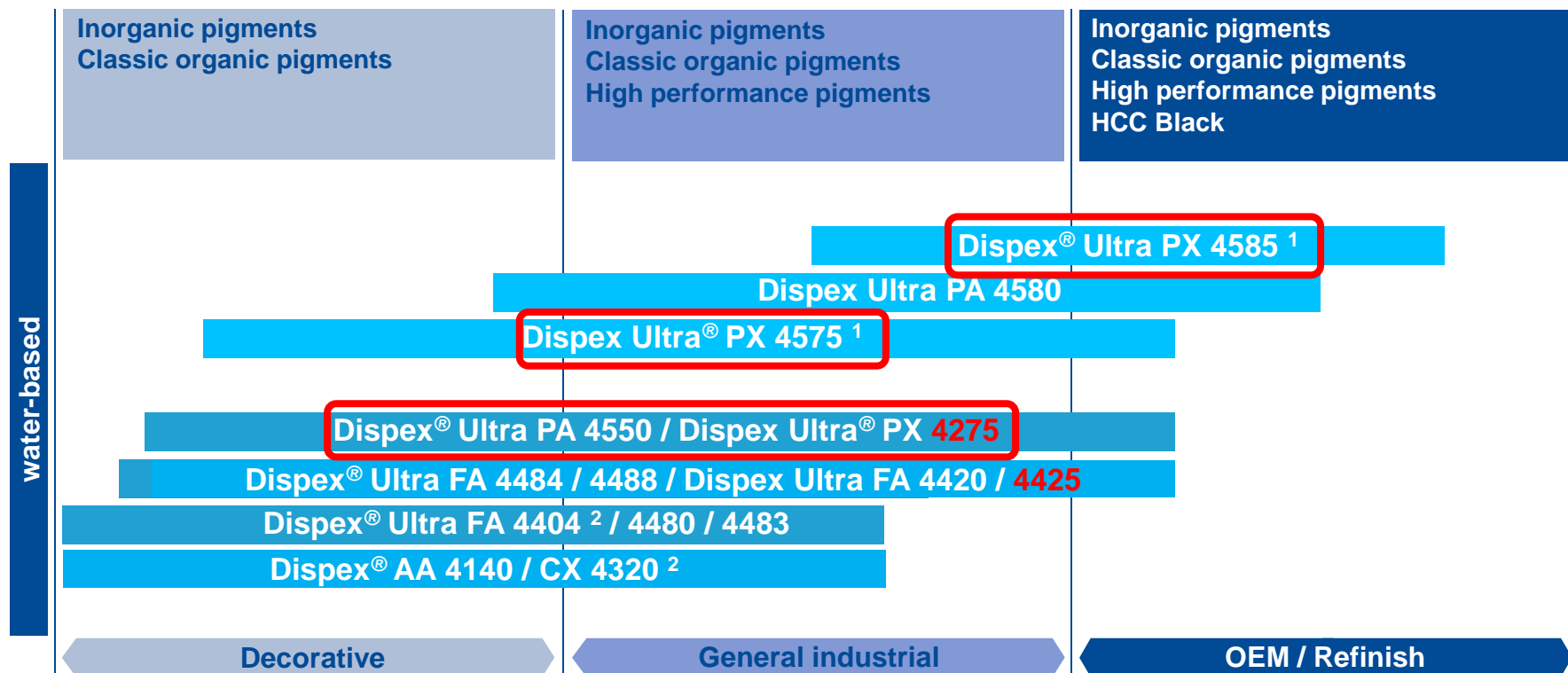
Efka® XX 4600

Conventional Wetting and dispersing agents

Dispex® Ultra FA 4XXX

- Non-ionic-, Anionic- and cationic- surfactants.
- Low MW polymeric

Dispex® Ultra 产品定位

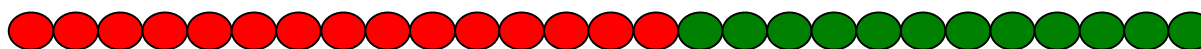


¹ CFRP technology (Controlled Free Radical Polymerization)

² Inorganic pigments and fillers/extenders only

Dispersing agents

Dispex® Ultra PX 4575 – Tailor-made with CFRP



**A-Block
stabilizer block**

Compatible with paint system, e.g. resins
and solvents

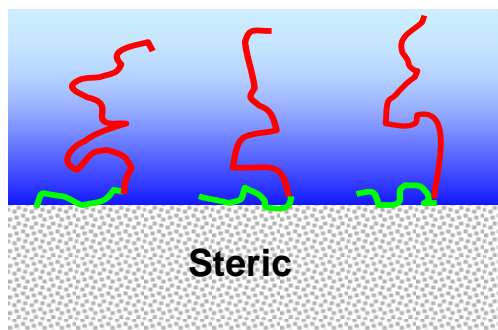
resin & solvent specific !

**B-Block
pigment affinic block**

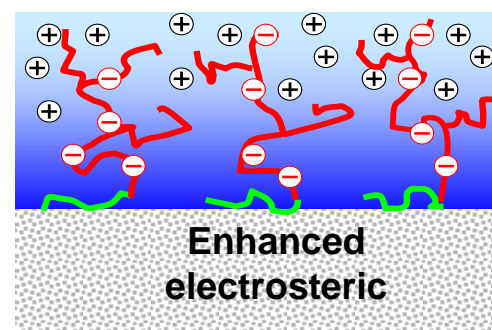
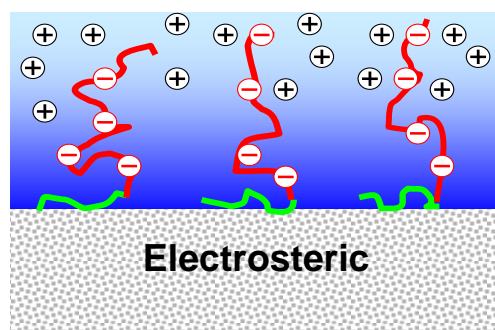
Anchoring onto pigment

pigment specific !

Dispex® Ultra PX 4575 is based on CFRP technology and a new pigment stabilizing mechanism that enhances electrosteric stabilization. CFRP also enables the precise design of the structured polymer to improve compatibility and stabilizing properties especially for inorganic pigments.



Dispex® Ultra PX 4585



Dispex® Ultra PX 4575

内容

巴斯夫配方助剂的历史、产品线和行业需求

水性工业涂料用的消泡剂

水性工业涂料用的分散剂

水性工业涂料用的润湿剂

水性工业涂料用的流变剂

水性工业涂料助剂总结

问题答疑

润湿剂和流平剂

Surface tension related effects

表面张力相关

- ✓ Increased substrate wetting
- ✓ 提高基材润湿
- ✓ Improved adhesion
- ✓ 提高附着力
- ✓ Eliminate cratering
- ✓ 减少弹坑



Slip effects增滑效果

- ✓ Improved anti blocking
- ✓ 提高抗粘连
- ✓ Improved mar resistance
- ✓ 提高抗划伤
- ✓ Anti dirt pick-up
- ✓ 体高耐沾污



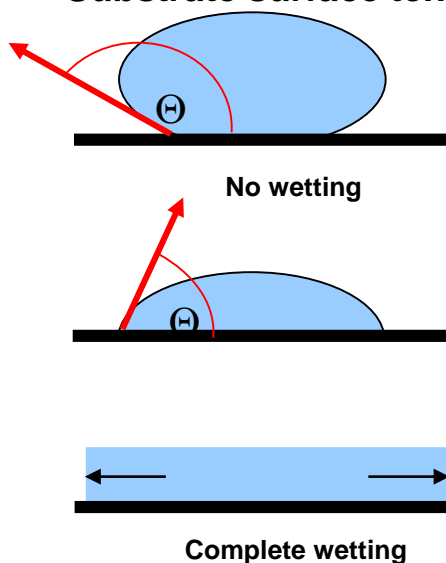
Flow related effects流动效果

- ✓ Eliminate orange-peel
- ✓ 减少橘皮
- ✓ Eliminate brush marks or cissing
- ✓ 减少刷痕或收缩
- ✓ Smooth surface and look
- ✓ 表面外观平整



Substrate wetting 基材润湿

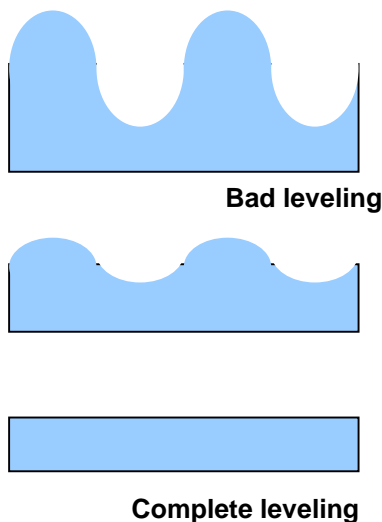
- Main influencing factors
 - Coating surface tension
 - Substrate surface tension



- Related defects
 - Craters, edge crawling, de-wetting, Fish eyes, ... 弹坑、厚边、润湿差、鱼眼

Leveling 流平

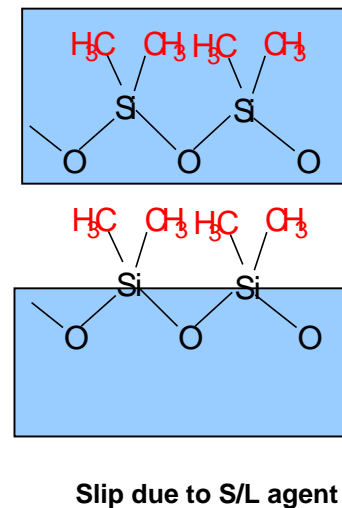
- Main influencing factors
 - Coating rheology 流变
 - Surface tension 表面张力



- Related defects
 - Orange peel, Waviness, Pinholes, decreased Gloss, ... 橘皮、针孔、消光

Slip from slip agents 滑爽

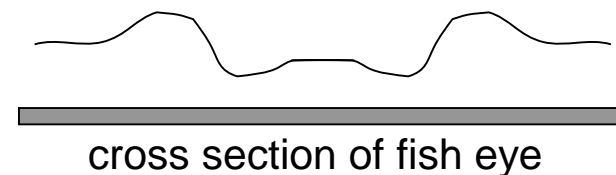
- Main influencing factors
 - Orientation at coating surface



- Related defects
 - Blocking, decreased mar resistance, intercoat adhesion, ... 粘连、划伤

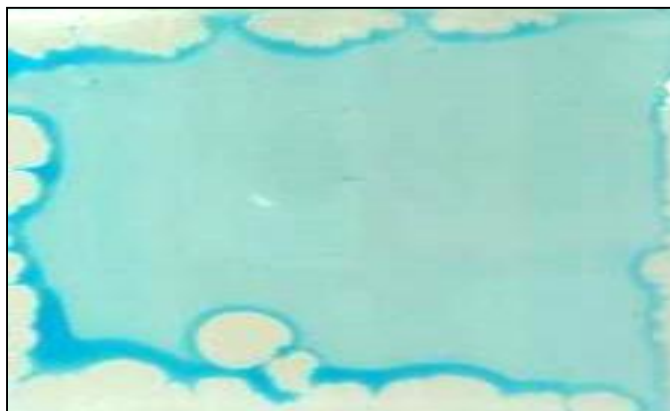
需要润湿剂和流平剂 – 表面缺陷-鱼眼

- crater-like holes: its center consists of a uniform flat painted region, surrounded by a depression, followed by a ridge of paint. Variable in size 火山口状孔：其中心由一个均匀和平涂区域组成，四周有凹陷，后面有一道油漆，尺寸可变
- caused by undispersed fluid globules in the paint or by air-borne droplets (silicones, water, dried soap, dust, wax and oil) deposited on the painted surface 用不分散液滴在油漆或通过空气传播的液滴引起（有机硅、水、干肥皂，灰尘，油蜡）沉积在表面上的
- large fish eyes can be found individually 大的直接可看到
- small ones are often found in small densely packed clusters. 小的密集成簇



需要润湿剂和流平剂 – 表面缺陷-缩孔、润湿不良

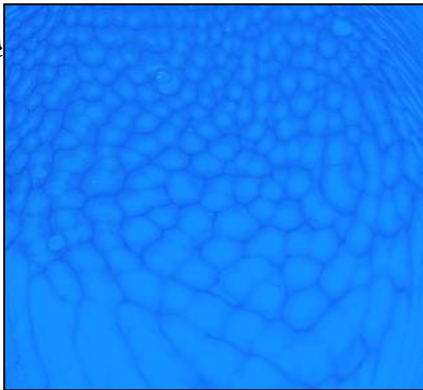
- 施工后很快出现
- tendency of a wet paint film to recede from certain areas of the substrate leaving them apparently uncoated 湿漆从基材的某些区域脱落的倾向，使它们明显没有涂层。
- caused by an incompatible film on the surface or a substrate with too low surface tension (e.g. plastic) 由于表面不相容的薄膜或表面张力过低的基材引起的（例如塑料）。
- more pronounced in aqueous systems (higher intrinsic surface tension water + polar components) than solvent-based systems 在水系统中比溶剂型系统更明显（内在的表面张力，水+极性成分）。
- 常见原因：水性树脂亲水性变差成胶粒，漆雾污染，低表面能物质



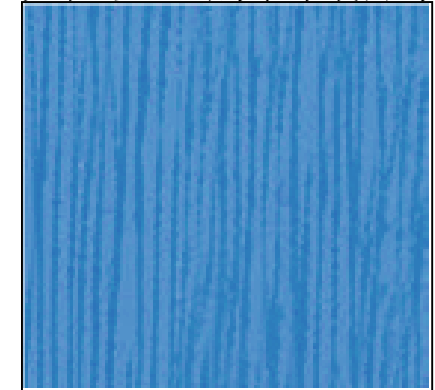
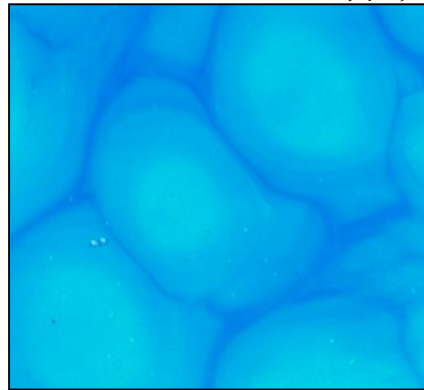
Aqueous coating on low energy surface

需要润湿剂和流平剂 – Bénard cells & silking

- polygonal (hexagonal) cell patterns, micro-separation of pigments in the film due to surface tension gradients 多边形（六边形）细胞图案，由湿膜前期粘度较低、还有底材润湿，所以初期的表面很快流平，随着助溶剂挥发、树脂体系、消泡剂等自身的原因，表面张力出现梯度，涂膜中颜料的微分离。Bénard Cell (贝纳德漩涡) 不是水平流动，而是垂直运动。
- this defect occurs in paints with low viscosity, fast solvent and high film thickness 这种缺陷存在于粘度低、溶剂快、漆膜厚度高的涂料中。
- silking is defined as fine parallel irregularities in a paint film that give the appearance of silk. This defect shows on vertical surfaces as paint drainage will cause Bénard cells to form elongated streaks. 这种缺陷表现在垂直的表面油漆脱水会引起



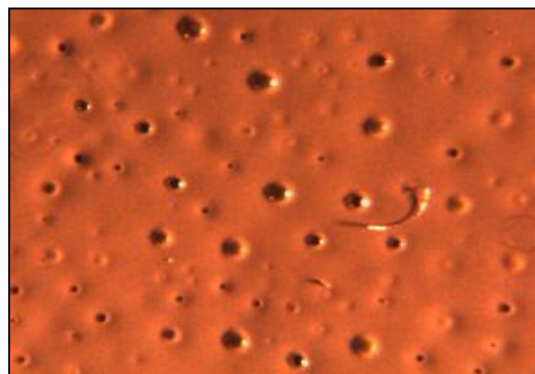
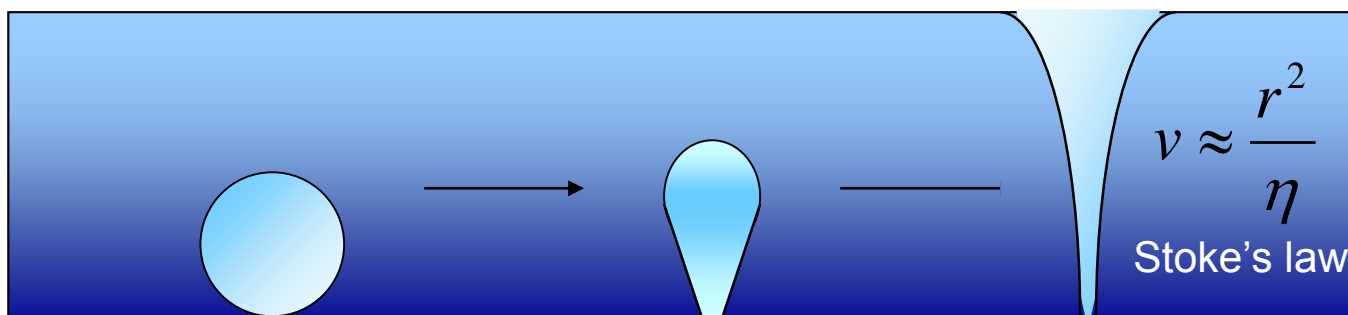
Bénard cells (horizontal)



Silking (vertical)

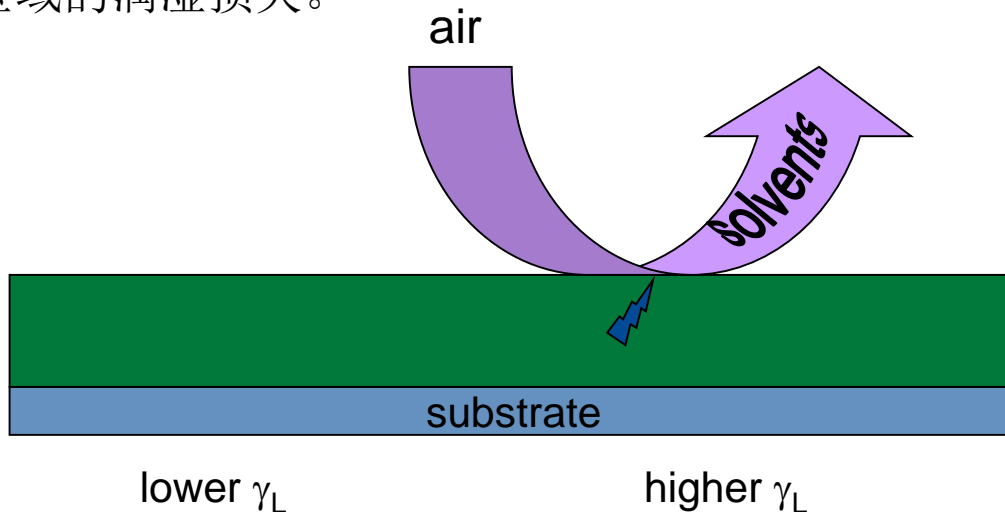
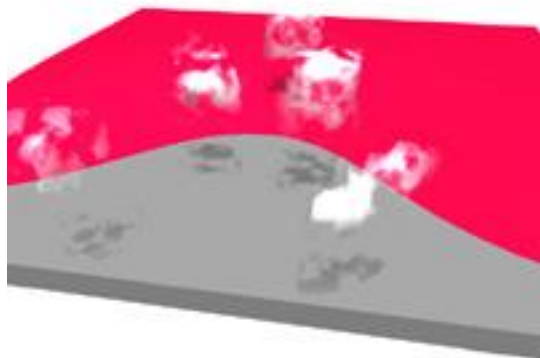
需要润湿剂和流平剂 – 表面缺陷-针孔

- 针孔可以穿透整个漆膜，降低漆膜的密闭性，降低漆膜的耐性；
- 要防止针孔的产生，必须减少漆膜下的溶剂含量，即漆膜不要过厚，禁止漆膜表面干燥过快；
- 调节助溶剂（成膜助剂）来抑制漆膜的干燥速度，防止瞬间大量气体的产生
- 通过消泡剂、抑泡剂来控制微泡



需要润湿剂和流平剂 – 表面缺陷-气流敏感性

- defect occurs during (forced) drying on large surfaces (e.g. wood coating), when coatings are applied to a substrate 当涂在基材上时，在大表面（如木器涂层）干燥时会出现缺陷。
- loss of wetting in local regions of higher surface tension caused by irregular evaporation of solvent due to air flow (ventilation) 由于空气流动引起的不规则蒸发引起的较高表面张力局部区域的润湿损失。

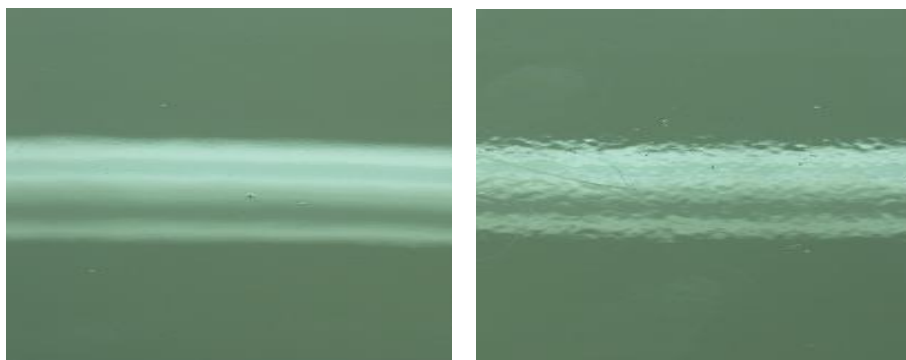


需要润湿剂和流平剂 – 橘皮

Orange Peel橘皮: A surface bumpiness or waviness that resembles orange skin. Often caused by poor levelling and a common defect in both spray and roll applied coatings.

Causes in liquid systems

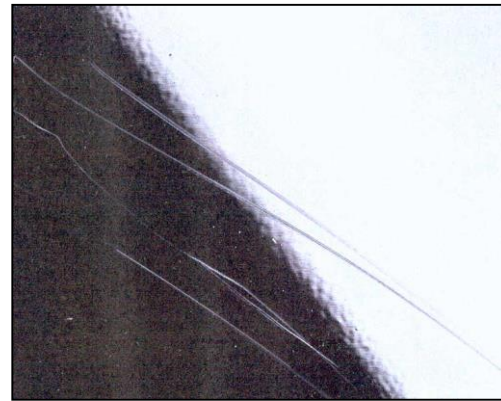
- 喷漆的粘度和流变
- 喷涂条件（助溶剂混合干燥太快，压力，气液比）
- 设备操作错误
- 液体涂料的表面张力。Lower γ_L leads to formation of smaller droplets with more regular flow



需要润湿剂和流平剂-抗划伤&粘连

Slip additives provide or improve mar and blocking resistance

Mar resistance 抗划伤: ability of a coating to resist damage caused by light abrasion, impact or pressure (e.g. scratches, metal marking).

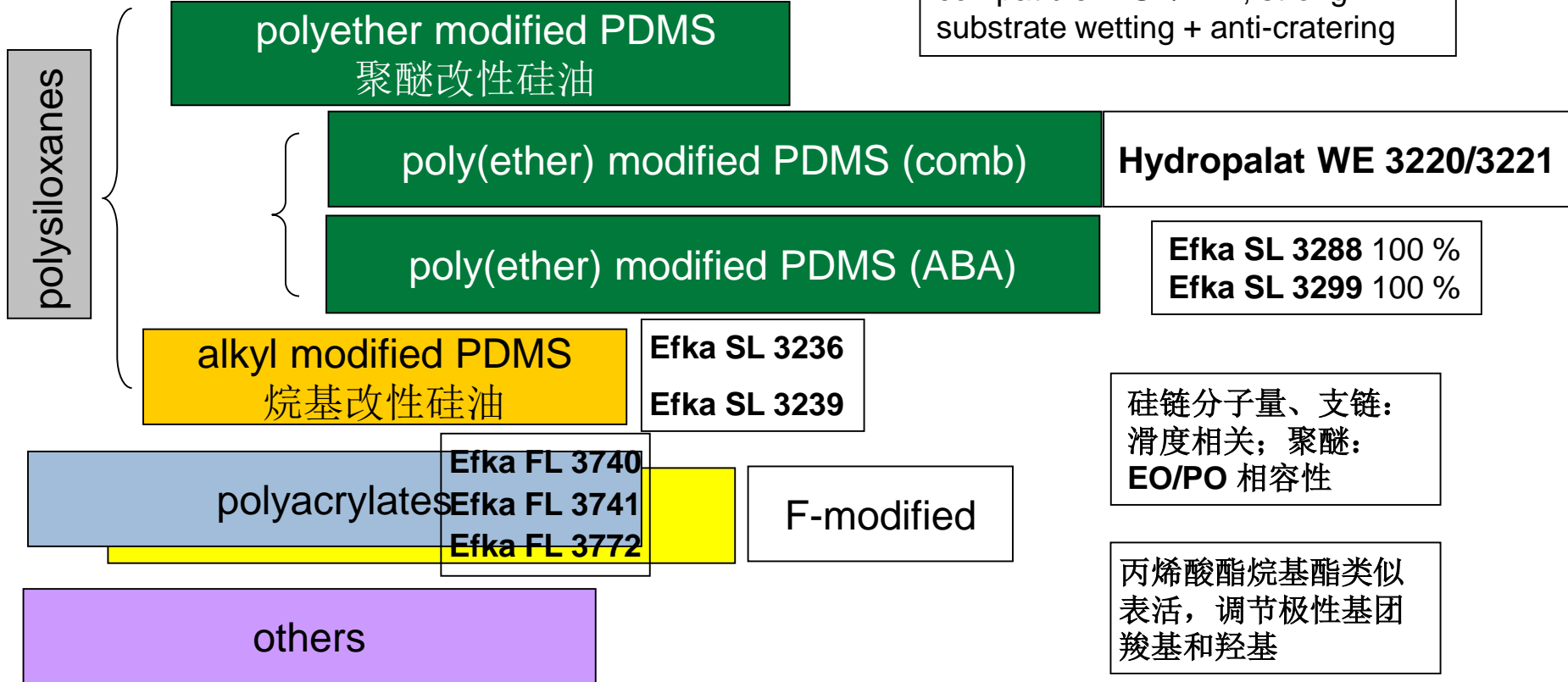


Blocking resistance (or anti-blocking) 抗粘连: undesired adhesion between touching layers of a material, such as occurs under moderate pressure and sometimes pressure and heat, during storage or fabrication; suppression of dirt adhesion.

润湿剂和流平剂

Solvents 溶剂

Efka SL 3030 52 % active highly compatible (SB/WB), improves slip & mar resistance
Efka SL 3034 52 % active compatible in SB/ WB, strong substrate wetting + anti-cratering



Hydropalat WE 产品系列

Hydropalat WE 3106
Hydropalat WE 3110
Hydropalat WE 3111
Hydropalat WE 3120
Hydropalat WE 3123
Hydropalat WE 3124
Hydropalat WE 3127
Hydropalat WE 3130



**Starter
(alcohol)**

**End-capping
(-OH / -OMe)**

**31xx = Alkoxylated
33xx = Polymer
35xx = Acrylates
37xx = PEG/PPG**

**32xx = Silicone
34xx = Sulfosuccinates
36xx = Miscell.
39xx = Solid**

Hydropalat WE 3163
Hydropalat WE 3161
Hydropalat WE 3162
Hydropalat WE 3164
Hydropalat WE 3966
Hydropalat WE 3169
Hydropalat WE 3160

Hydropalat WE 3692
Hydropalat WE 3189
Hydropalat WE 3694

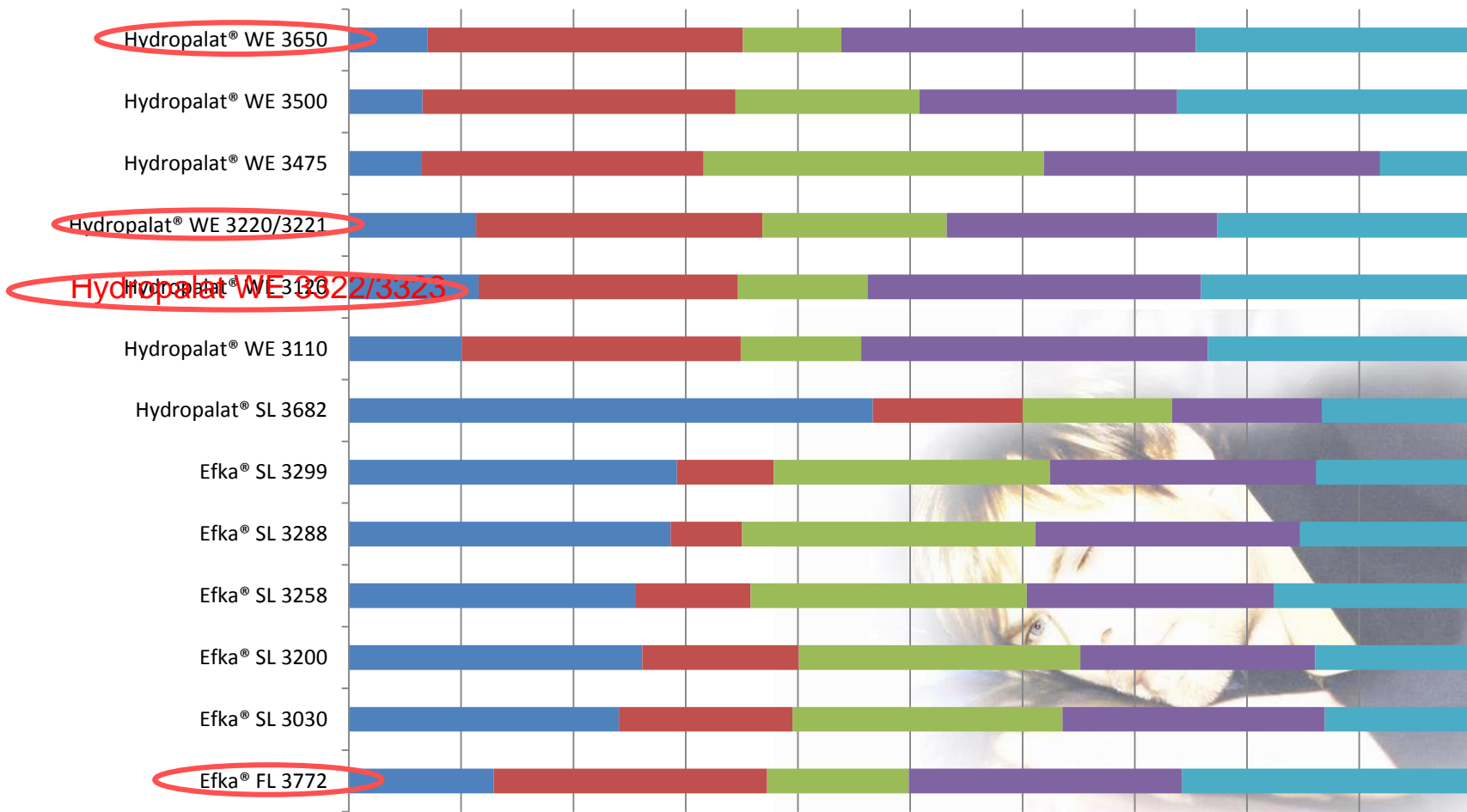


EO/PO - block copolymers



水性体系中的润湿剂和表面助剂选择

■ Slip ■ Intercoat adhesion ■ Foam stabilization ■ Substrate wetting ■ Leveling



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问题答疑

流变助剂



Associative acrylic (HASE)

Rheovis® HS 1xxx

Non-associative acrylic(ASE)

Rheovis® AS 1xxx

Associative polyether (HMPE)

Rheovis® PE 1xxx

Associative Polyurethane (HEUR)

Rheovis® PU 1xxx

Organoclay types

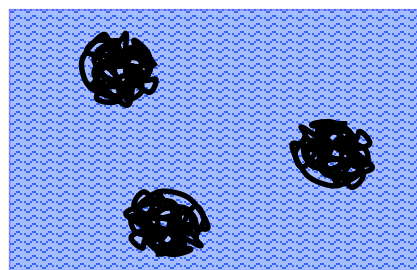
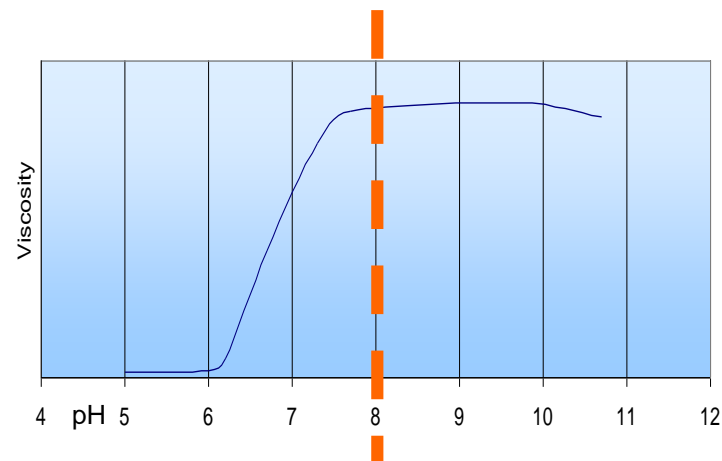
Attagel®

Modified castor oil

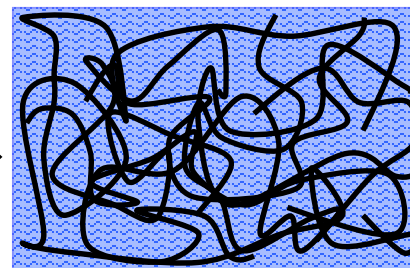
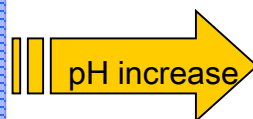
Efka® RM 1xxx

丙烯酸型流变助剂 ASE & HASE

- 在碱性PH条件下增稠
- 对水相增稠
- 聚合物链段的交错



pH < 7

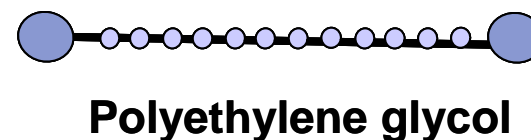
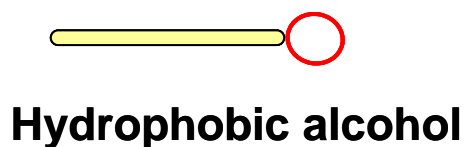
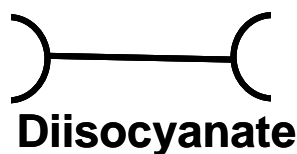


pH > 7

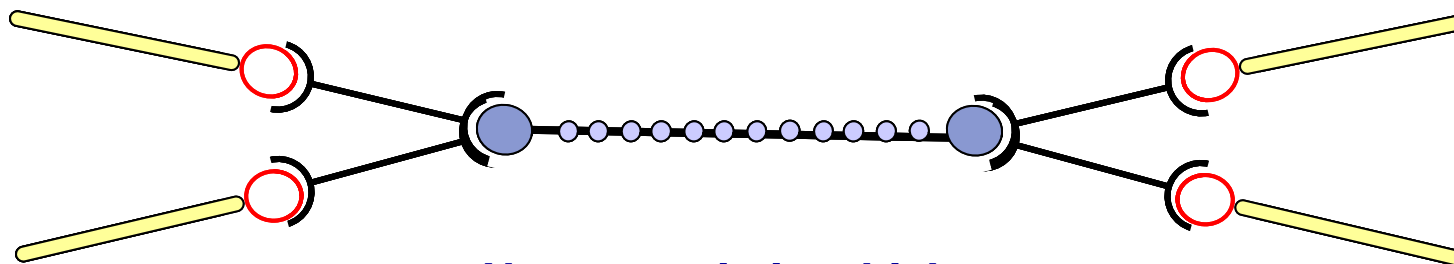
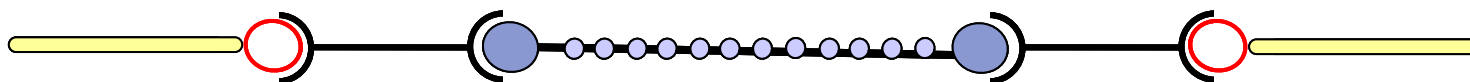


非离子型流变助剂 Rheovis® PU - 聚氨酯型 (HEUR)

Elements of Associative Thickeners



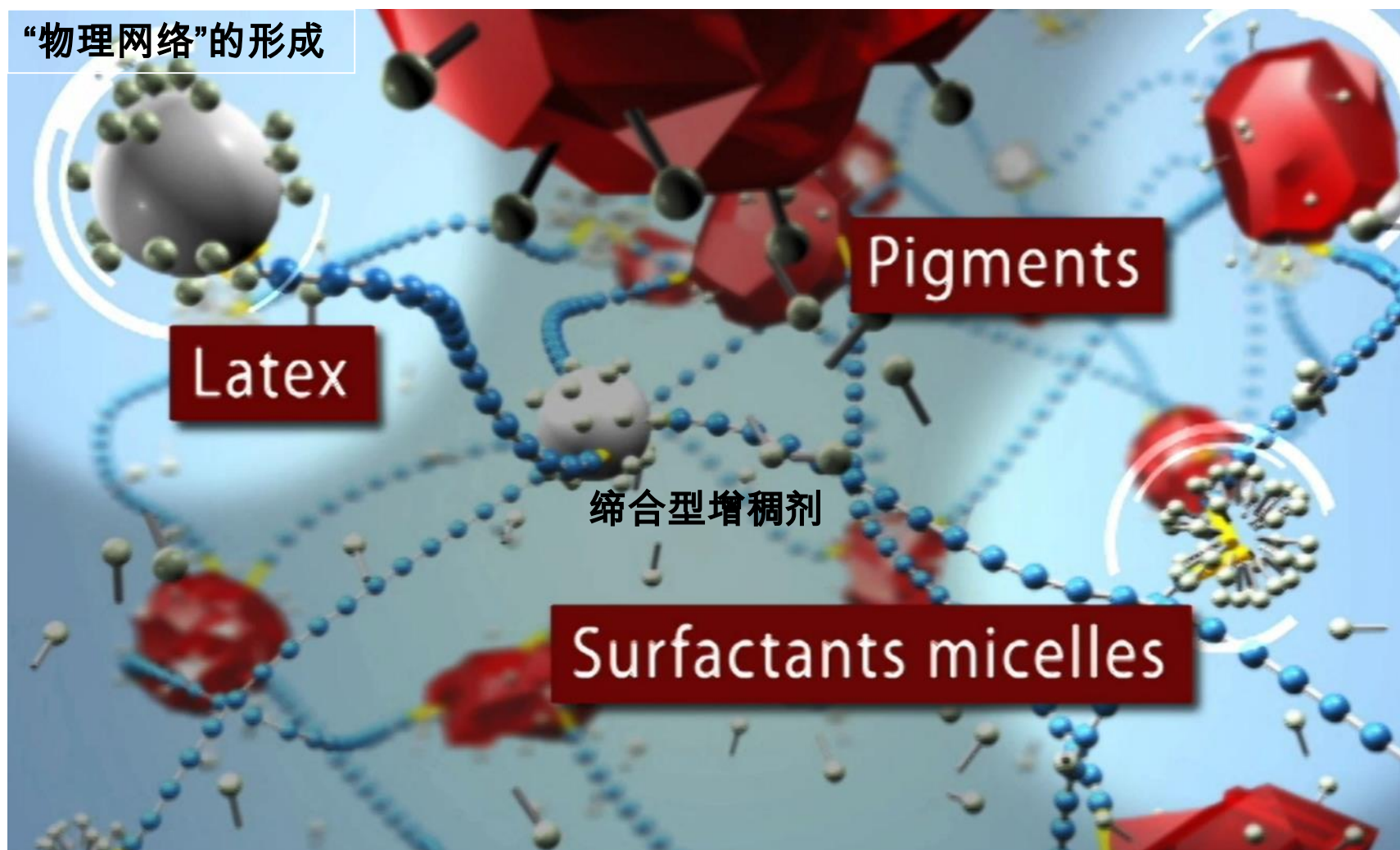
Classical Associative Thickener



New associative thickener

非离子流变助剂 Rheovis® PU – 在涂料中的增稠机理

“物理网络”的形成



丙烯酸类 (离子型) 流变助剂 ASE & HASE

(ASE)

Alkali Swellable Emulsion

- Rheovis AS 1956 (Collacral DS 6256)
- Rheovis AS 1125 (Latekoll D)
- Rheovis AS 1130 (Viscalex HV 30)
- Rheovis AS 1237 (Viscalex VM)
- Rheovis AS 1337 (Viscalex VG 2)

(HASE)

Hydrophobic Modified Alkali Swellable Emulsion

- Rheovis HS 1169 (Latekoll DS 6269)
- Rheovis HS 1212 (Rheovis 112)
- Rheovis HS 1332 (Rheovis 132)
- Rheovis HS 1152 (Rheovis 152)
- Rheovis HS 1162 (Rheovis 162)

丙烯酸类流变助剂 ASE & HASE

优势	限制
强的剪切变稀（假塑性）	pH 敏感
防沉抗流挂	离子(2 ⁺ /3 ⁺) 敏感
喷涂性能好	耐擦洗性差
调色后粘度稳定	耐水白
成本	流平性

非离子流变助剂产品线

HEUR / HMPE

<p>Strongly pseudo-plastic viscosity builders 强假塑性增稠剂</p>	<ul style="list-style-type: none"> ■ Rheovis PU 1190 (DSX 3290) ■ Rheovis PU 1191 (DSX 3291)
<p>Low-mid shear (KU) builders</p>	<ul style="list-style-type: none"> ■ Rheovis PU 1270 (Collacral PU 70) ■ Rheovis PU 1280 (Collacral PU 80) ■ Rheovis PU 1216 (DSX 1516) ■ Rheovis PU 1250 (DSX 1550) ■ Rheovis PU 1256 (DSX 3256)
<p>Mid to high shear builders</p>	<ul style="list-style-type: none"> ■ Rheovis PU 1214* (DSX 1514*) ■ Rheovis PU 1291 (DSX 3801)
<p>High shear (ICI) builders 高剪切流平</p>	<ul style="list-style-type: none"> ■ Rheovis PE 1330 (DSX 3000) ■ Rheovis PU 1331 (DSX 3100)

HEUR: Hydrophobically Modified Ethoxylated Urethane

HMPE: Hydrophobically Modified Polyether

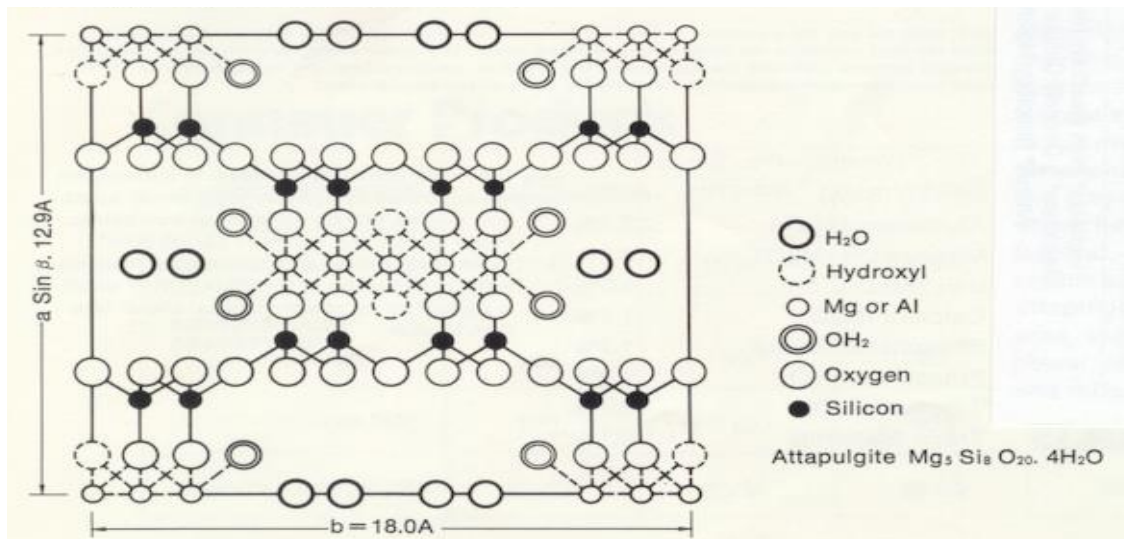
* Rheovis PU 1214 (DSX 1514) is VOC-free according to 2004/42/EU

非离子型流变助剂 HEUR / HMPE

优势	限制
<p>流变范围宽</p> <p>高效</p> <p>相容性好</p> <p>pH 不影响</p> <p>擦洗和耐水影响小</p> <p>耐水白</p> <p>流平性好</p> <p>光泽</p> <p>减少飞溅</p>	<p>流挂控制</p> <p>调色稳定性</p> <p>溶剂敏感</p> <p>表活敏感</p>

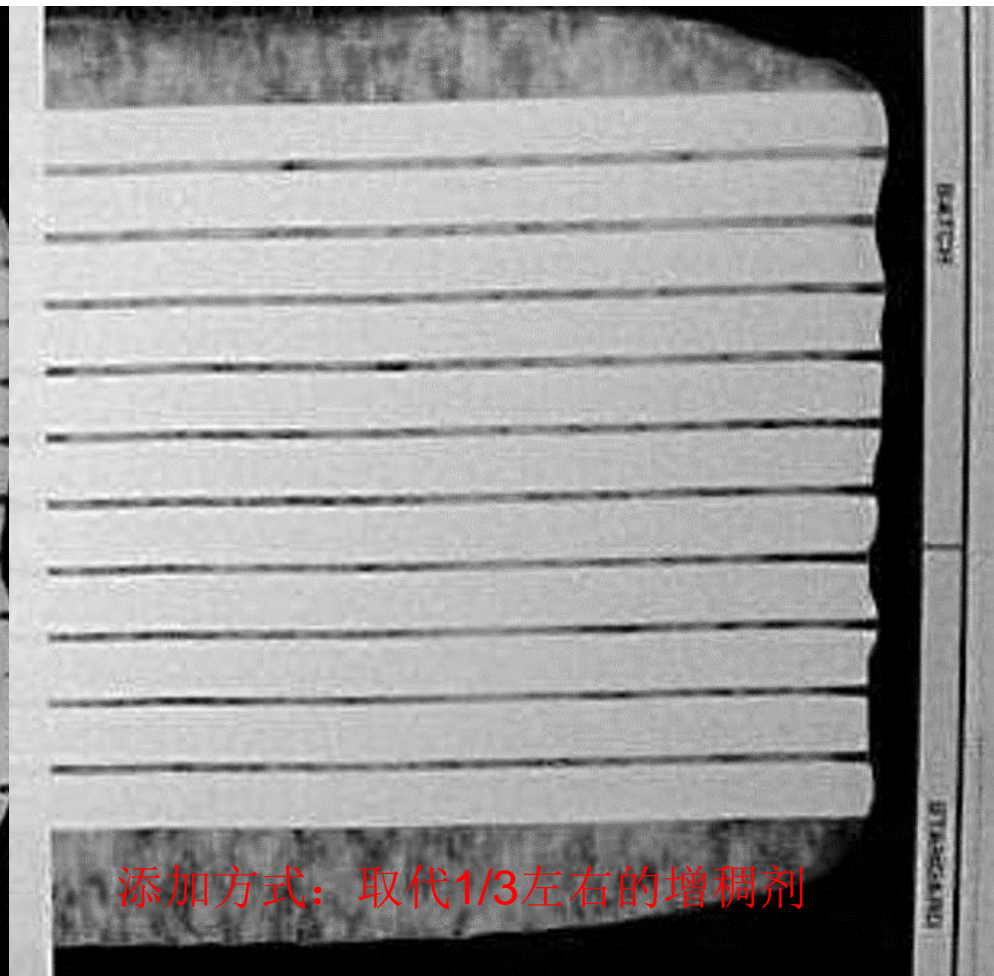
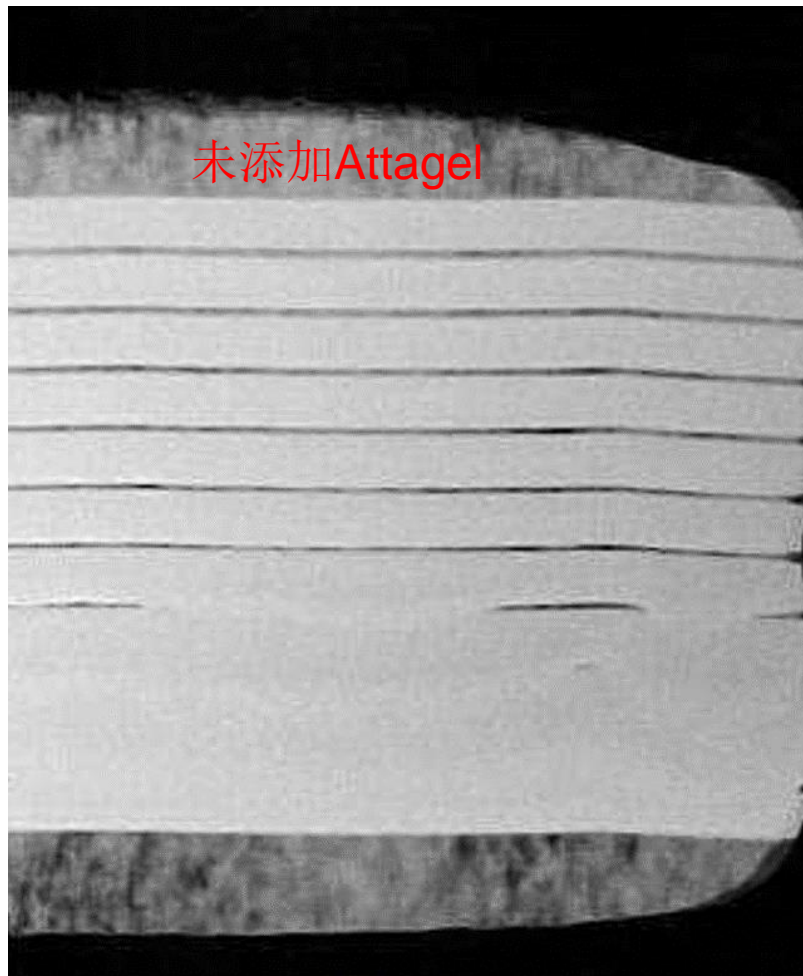
Attagel系列

- A Colloidal Hydrated Magnesium Aluminosilicate 水合硅酸镁铝
 - $(\text{Mg,Al})_5\text{Si}_8\text{O}_{20}\cdot 4\text{H}_2\text{O}$



<u>OXIDE</u>	<u>%</u> <u>TYPICAL</u>
SiO ₂	65.2
Al ₂ O ₃	11.9
MgO	10.8
Fe ₂ O ₃	3.5
CaO	6.2

Attagel 抗流挂性对比



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水性工业涂料用的分散剂

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问题答疑

BASF配方助剂

用于水性工业涂料

消泡剂

FoamStar®
ED 2522 / 2523
SI 2299
SI 2250
SI 2280
SI 2292 / 2293
ST 2400 AG
ST 2434 AC
ST 2438

润湿流平剂

Hydropalat®
WE 3220 / 3221
WE 3322 / 3323
WE 3500
WE 3650
EFKA FL 3772

分散剂

Dispex®
Ultra
FA 4404
FA 4416
FA 4437
PA 4550/4560
PX 4275
PX 4575
PX 4585

流变助剂

Rheovis®
AS 1130
HS 1152 / 1162
HS 1212
PU 1191
PU 1291
PE 1331

成膜助剂

Loxanol®
CA 5308
CA 5310
CA 5330
PL 5060

BASF供应、渠道和价格

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We create chemistry