

NEW RHEOLOGICAL ADDITIVES

TECHNICAL MEETING

AARAU

14/11/19



COATEX
ARKEMA GROUP

AGENDA

❖ COATEX : INTRODUCTION

❖ RHEOLOGICAL ADDITIVES

❖ DISPERSING AGENTS

- TECHNOLOGY – PROPERTIES
- CASE STUDIES
 - COADIS™ 123K : ACRYLIC COMONOMER
 - COADIS™ 790 : NON IONIC

❖ THICKENERS

- TECHNOLOGY-PROPERTIES
- ACRYLIC THICKENERS: CASE STUDIES
 - THIXOL™ 53L
 - VISCOATEX™ 730
 - RHEOTECH™ M03
 - RHEOTECH™ 4200
- HEUR THICKENERS : CASE STUDIES
 - COAPUR™ XS 83 : PSEUDOPLASTIC
 - COAPUR™ 520W : BALANCED TO NEWTONIAN
 - COAPUR™ 3320 : NEWTONIAN

COATEX: A GLOBAL LEADER IN RHEOLOGY AND DISPERSING ADDITIVES FOR WATERBORNE SYSTEMS

4  14
continents nationalities

8 
sales offices

INTIMACY:

Our global footprint designed to be close to our customers

450 
employees

CLEAN AND SAFE TECHNOLOGIES:

- Developing clean processes based on water
- Promoting energy savings
- Reducing environmental impact

 1
R&D center

 4
tech centers

 6
industrial sites

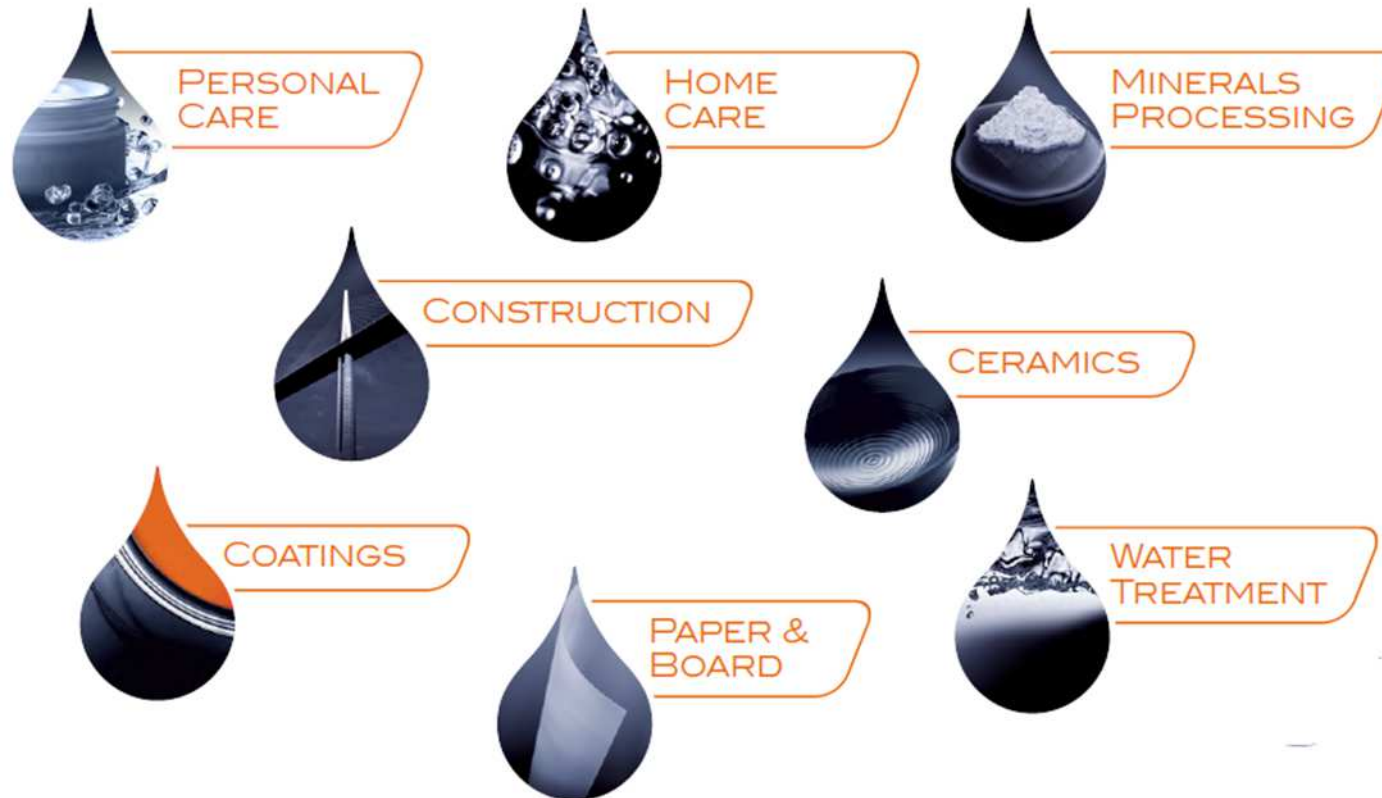
Turnover
> 200 M 

 > 300 kt
capacity

- To guarantee continuity of supplies
- Same product offer from each plant
- Local technical and logistic support



SERVING A WIDE RANGE OF MARKET SEGMENTS



- Coatings, Adhesives & Sealants is our main market
- Strong Technical cross-fertilization between markets for more reactivity and fast solutions

COATEX EXPERTISE

→ Dedicated to :

- Rheological modifiers and Dispersants for water-based formulations and processes
- Design of in-house products
- Original and tailor-made solutions

→ Focused on innovation:

- 1/2 of our sales with patented products
- 1/3 of our turnover is generated by new products (less than 5 years)
- 1/5 of our collaborators in R&D

→ Key drivers

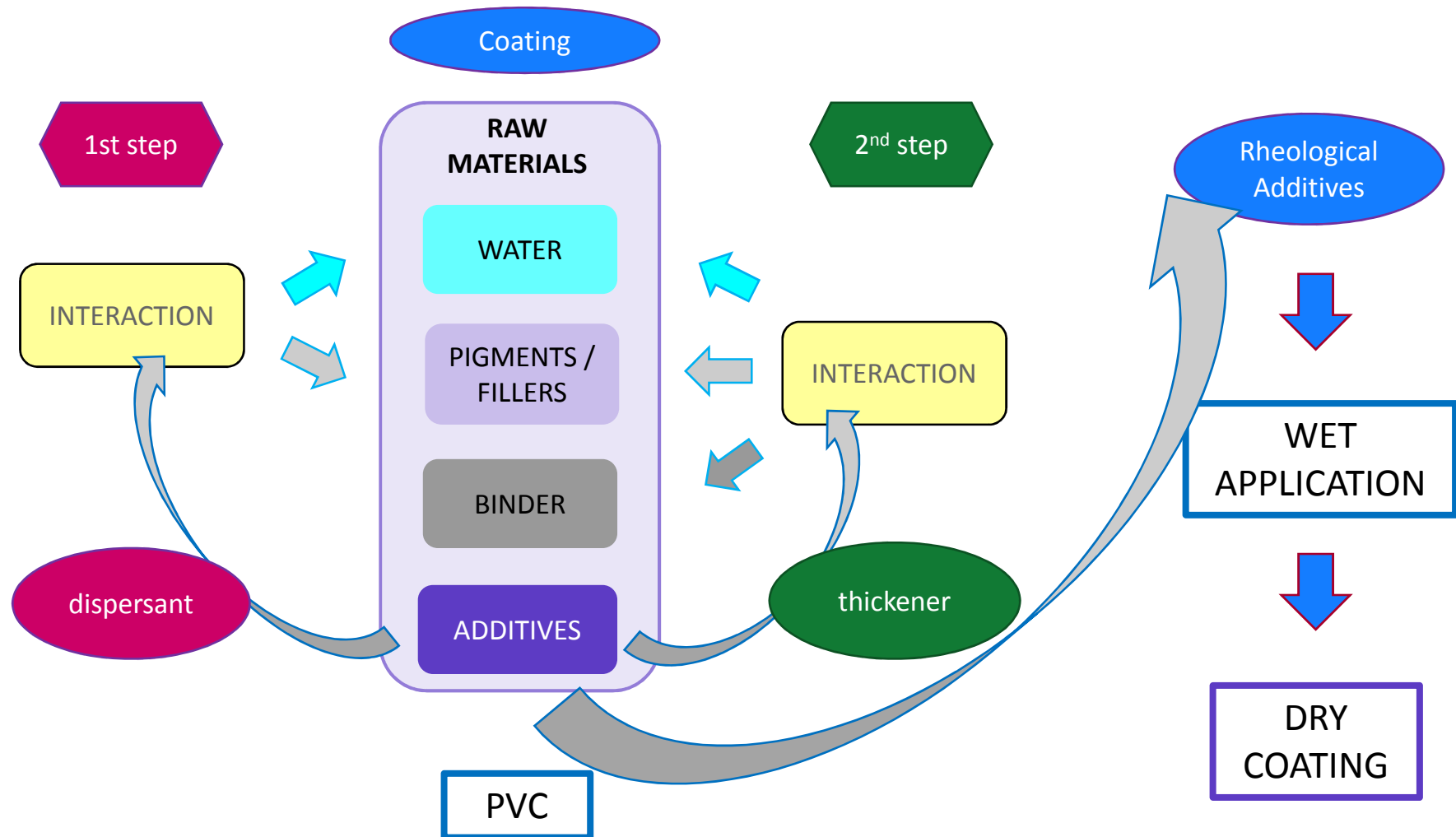
- Cleaner and Safer solutions: our additives are VOC-free, APEO-free and Heavy-metal free
- Innovate to enlarge possibilities of waterborne Coatings, Adhesives & Sealants
- Partnership and strong collaboration with our customers



RHEOLOGICAL ADDITIVES

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COATING : MAIN PARAMETERS



ABOUT COATEX RHEOLOGICAL ADDITIVES

Dispersing agents

 **COADIS™**

 **ECODIS™**

Thickeners

Polyurethanes
 **COAPUR™**

Acrylics
 **VISCOATEX™**
THIXOL™
 **RHEOTECH™**

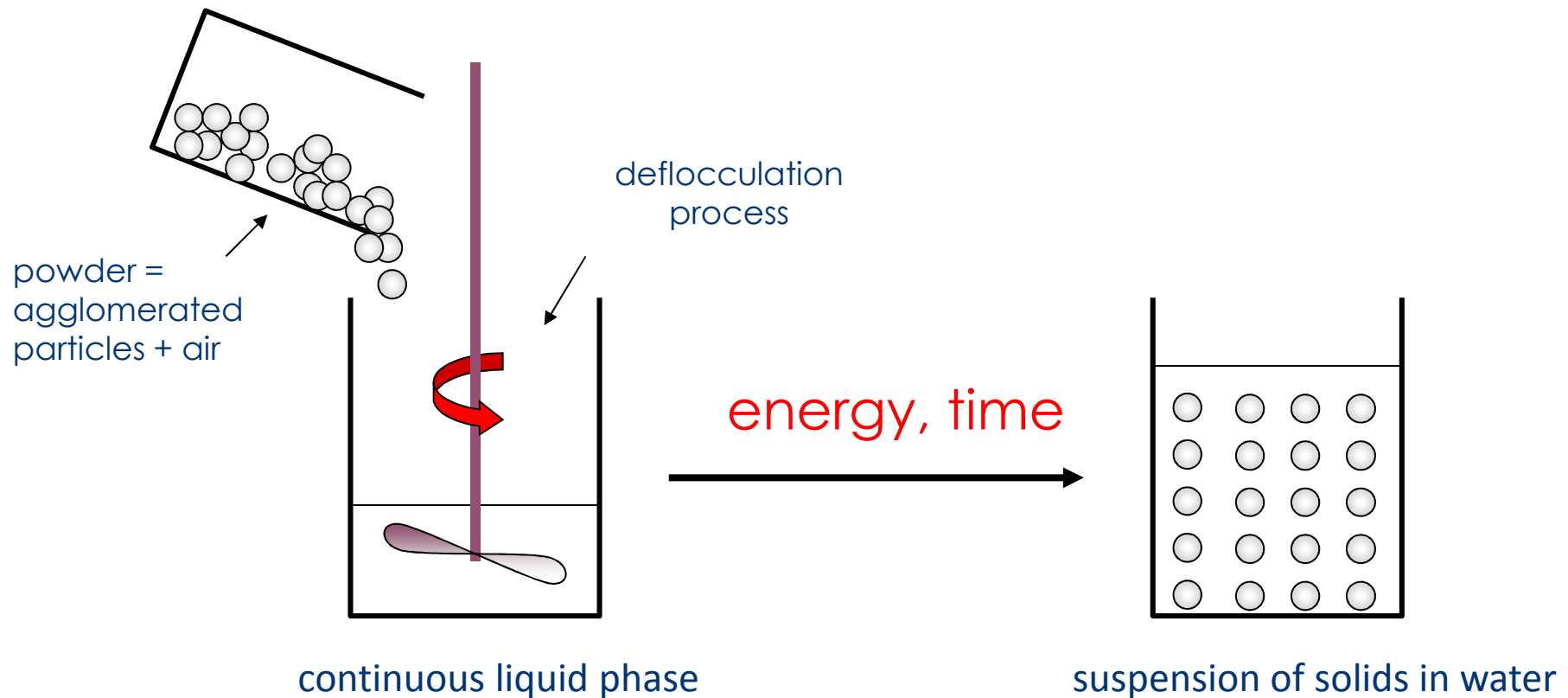


DISPERSING AGENTS

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FILLERS AND PIGMENTS DISPERSION

dispersion of solid particles in water



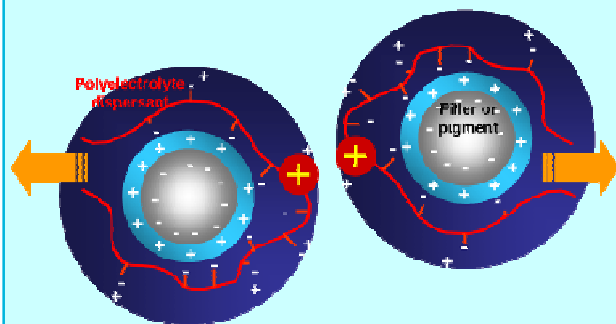
PIGMENT STABILIZATION STRATEGIES

- Long distance for mineral
- In-can stabilization
- Productivity/ Cost effective

Short distance
TiO₂ late flocculation
Problem solving

Short and long distance
For mineral or organic
Universal/Industrial Coatings

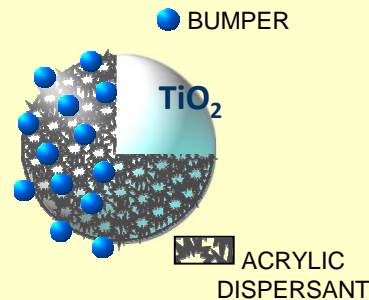
Acrylic based ionic dispersant



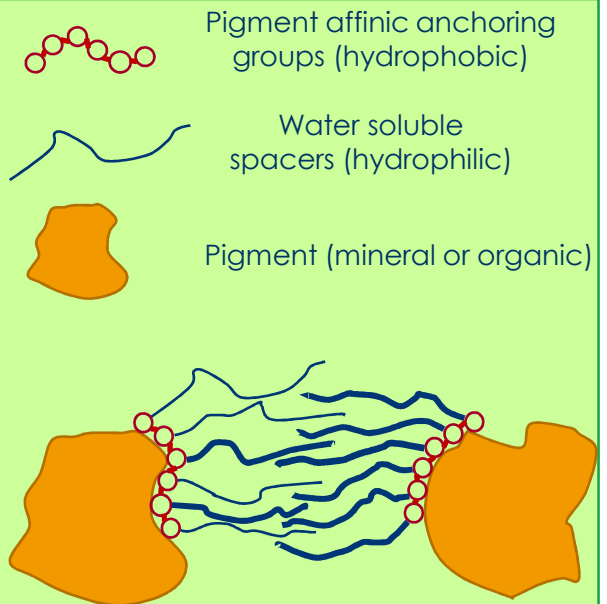
Electrostatic repulsion

Pigment is coated with the most adapted acrylic dispersant

Addition of a bumper that will create a layer of hard spheres around the polyacrylate layer



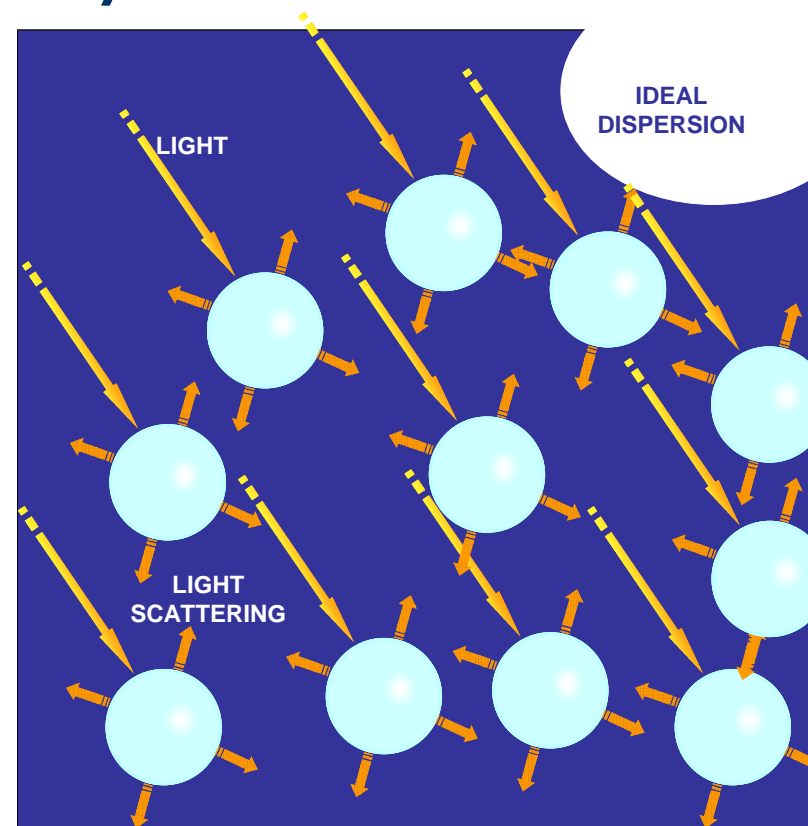
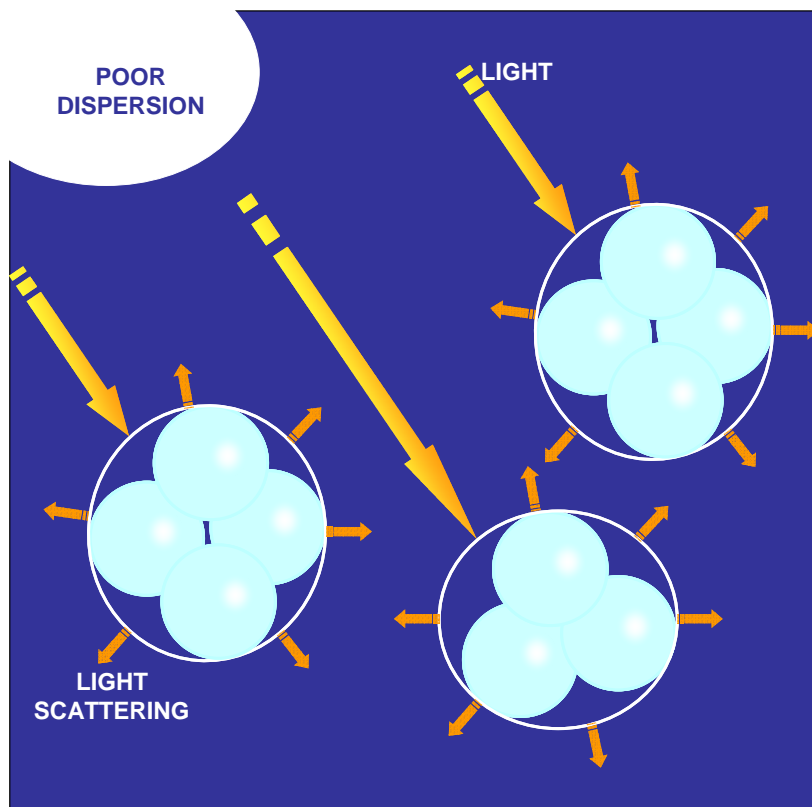
Co-dispersant approach



Steric stabilization

FILLERS AND PIGMENTS DISPERSION

optical efficiency



light diffraction



opacity

DISPERSION : COATEX DISPERSING TECHNOLOGIES

Homopolymers

ECODIS™

- ECODIS™ for cost effective dispersion and stabilization in medium to high PVC paints
- ECODIS™ for optimum ease of formulation and storage stability

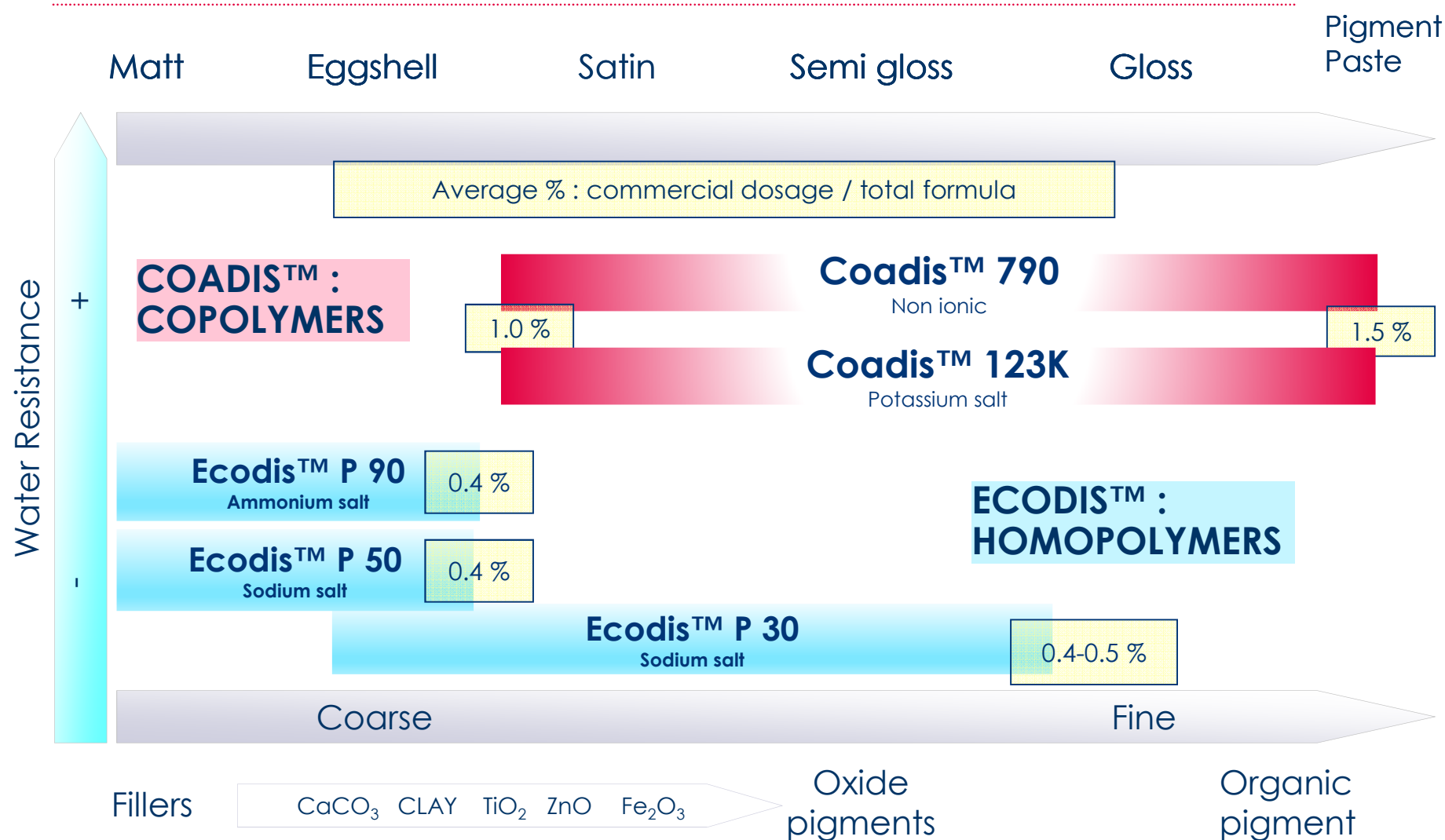
Copolymers

COADIS™

- COADIS™ for high quality coatings, from medium to low PVC formulations
- COADIS™ to improve gloss, compatibility and water resistance

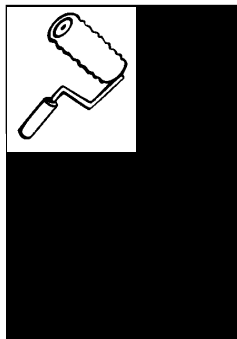
Both technologies can be used in combination

DISPERSANTS TECHNOLOGIES

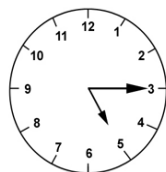


DISPERSANT - EXTERIOR MATT PAINT - IMPROVE EARLY RAIN RESISTANCE

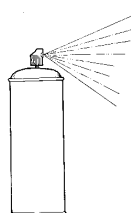
1 - White paint is applied on a black surface



2 – wait 30 minutes



3 - Water is sprayed on the fresh coating



60% PVC exterior wall paint

With Coadis™ 123K



Resistant

Reference with polyacrylate



NOT resistant



Better early rain resistance with Coadis™ 123K

DISPERSANT - EXTERIOR MATT PAINT - IMPROVE ACID RAIN RESISTANCE

60% PVC exterior wall paint

Coadis™123K

Ammonium salt



NO traces

Visual Traces

Basic processes:

- ◆ Prepare acid rain solution :
(nitric acid and sulfuric acid)

=> pH = 3.5
- ◆ Mix paint with 4% iron red
- ◆ Brush paint on cement panels with 200µm film.
- ◆ Put panel lying on the wall.
- ◆ Drop acid rain solution on the panel for at least 40 times.
- ◆ Panel visual observations.



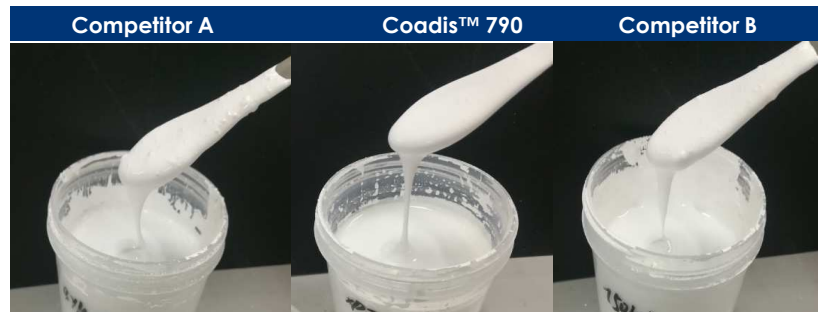
Better acid rain resistance with Coadis™ 123K

COADIS™ 790 : TiO₂ SLURRIES

Component	WT%
DI water	18.3
PG	5
Organoclay	0.2
Defoamer	0.1
Dispersant	1.4
TiO ₂	75
Total	100

Test results		Competitor A*	Coadis™ 790	Competitor B
Overnight	6rpm	24 833	24 333	25 500
	60rpm	5 117	4 800	5 521
1 week @50°C	6rpm	21 500	18 167	28 667
	60rpm	5 333	4 317	5 600
1 month @50°C	6rpm	26 667	17 333	26 000
	60rpm	6 617	4 300	4 300
	Aspect	Some hard settling	Good	Some hard settling

* Market reference

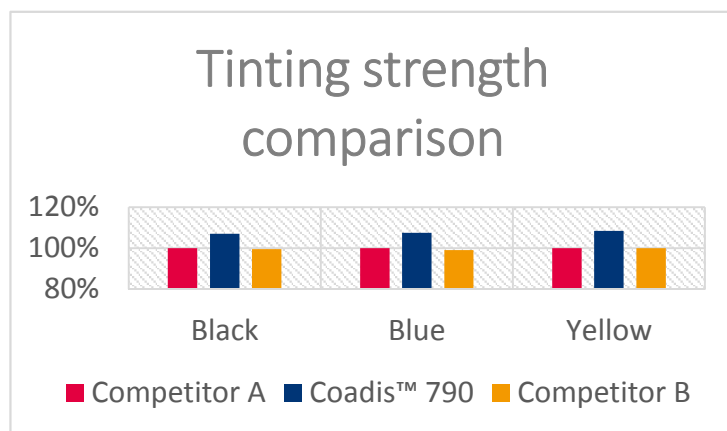
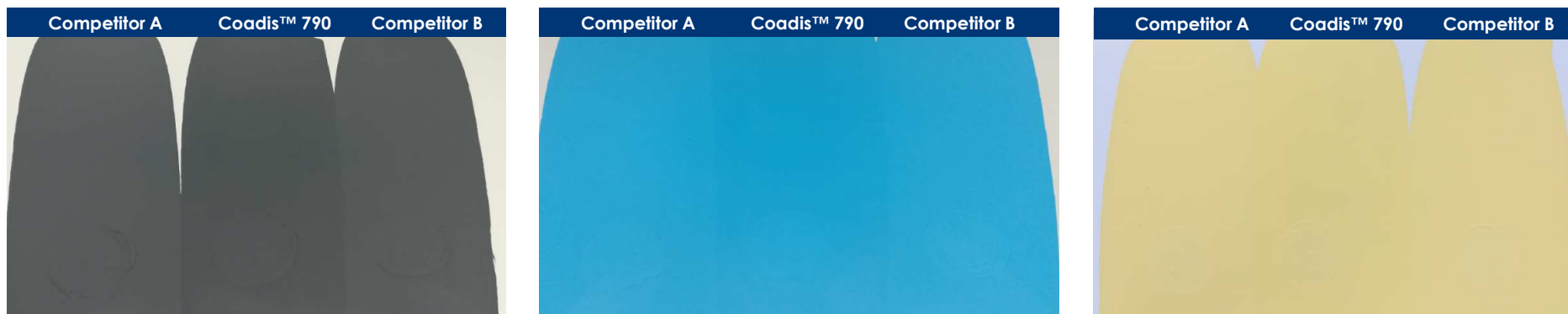


❖ **Coadis™ 790** shows better **deflocculation efficiency** and **excellent storage stability**.

❖ After 1 month storage at 50°C, Competitor products A and B exhibit lumps and hard settling. **Coadis™ 790** keeps **excellent flowability** and **no hard settling**

COADIS™ 790 – ECS 2019

COADIS™ 790 : COLOR DEVELOPMENT AND TINTING STRENGTH BASED ON TiO_2 SLURRIES:

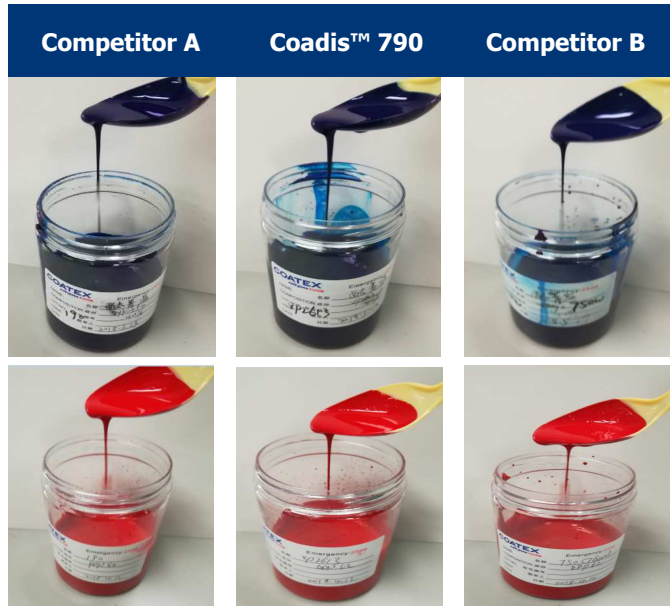


✦ Coadis™ 790 has an excellent compatibility with pigments and develops a better tinting strength

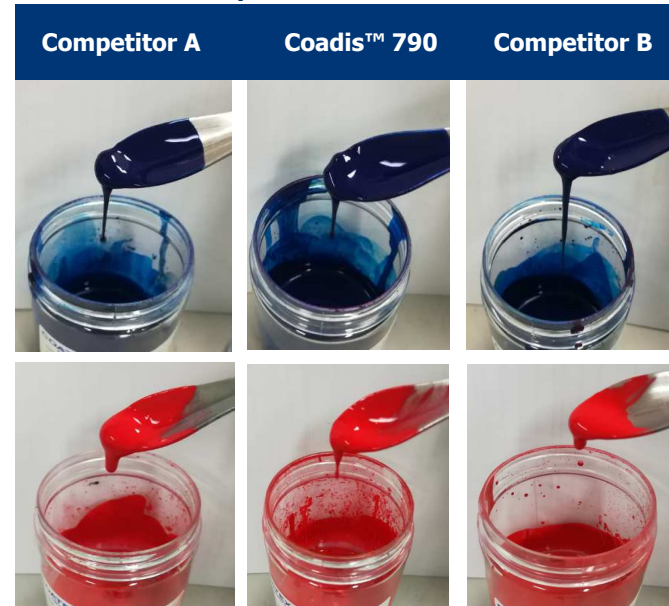
COADIS™ 790 – ECS 2019

COADIS™ 790 : VARIOUS PIGMENTS CONCENTRATES STORAGE STABILITIES

50°C for 1 week



Room Temp. for 6 month



- ❖ All samples show good **viscosity reduction** and **flowability**
- ❖ Coadis™ 790 also exhibits an **excellent storage stability**

COADIS™ 790 – ECS 2019

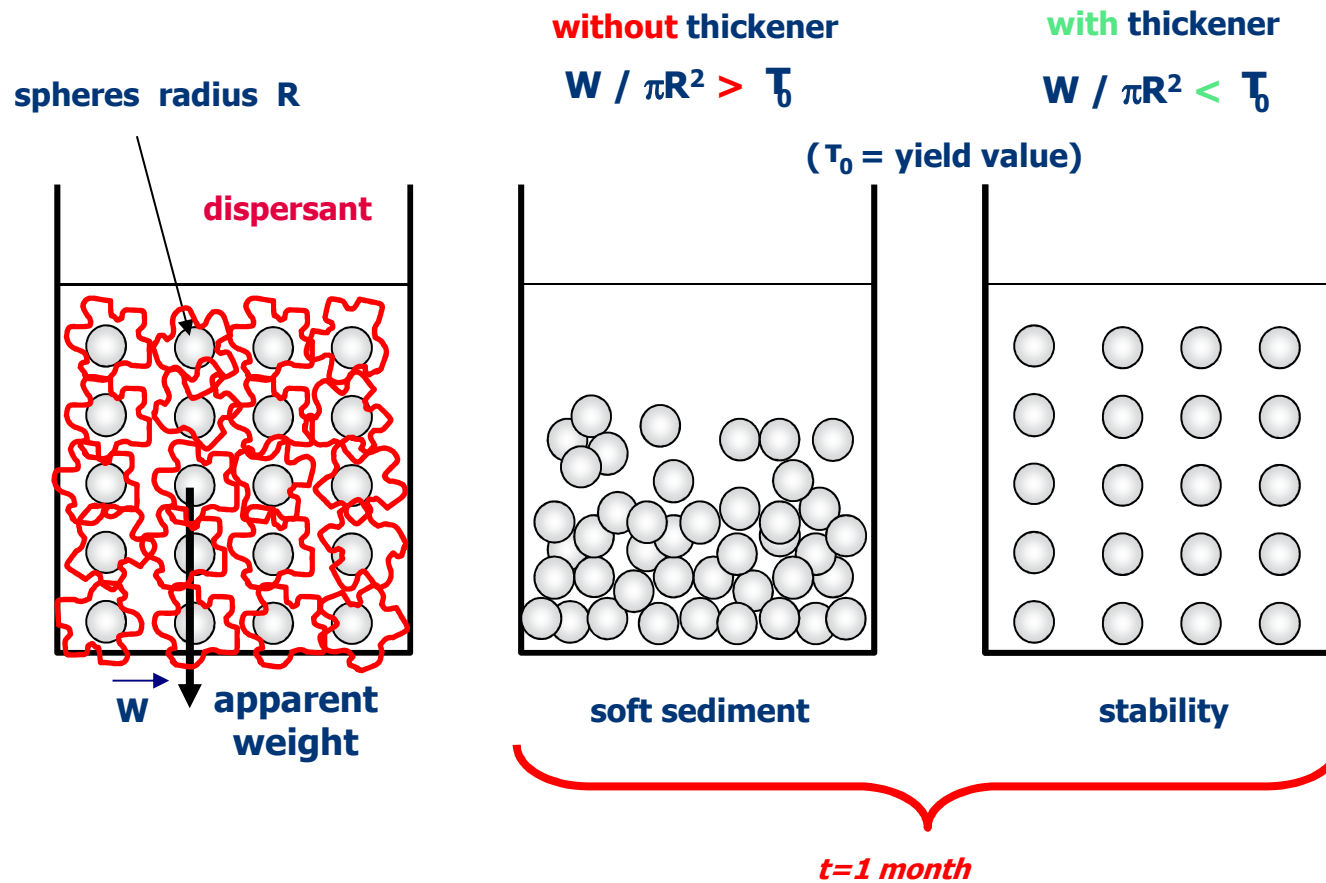
DISPERSANTS : PIGMENT PASTE – COMPARISON OF DIFFERENT CHEMISTRIES

✦ Carbon black @ 51%

✦ 3 different chemistries of dispersing agent : same dosage 5,2% (dry / dry)

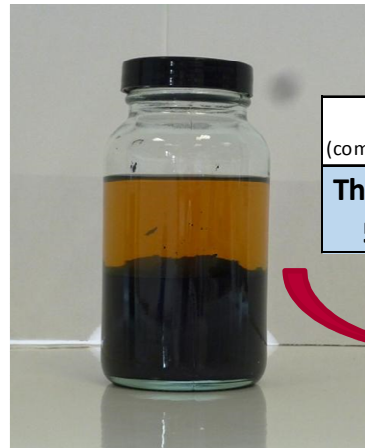


SEDIMENTATION : VISCOSITY EFFECT



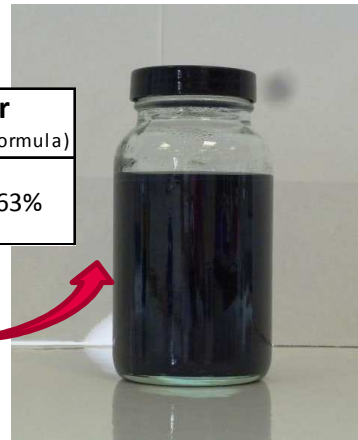
BLACK IRON OXIDE SLURRY (50%) : STABILIZATION

0,58% Ecodis™ P30
after 24h @ 23°C



Thickener (commercial/total formula)	
Thixol™ 53L	0,63%

With 0,63% Thixol™ 53L
until 1 week storage



With 0,63% Thixol™ 53L
after 1 month storage



Brookfield viscosities	t0 @23°C	after 24h @23°C
10 rpm (mPa.s)	5050	5820
100 rpm (mPa.s)	780	900

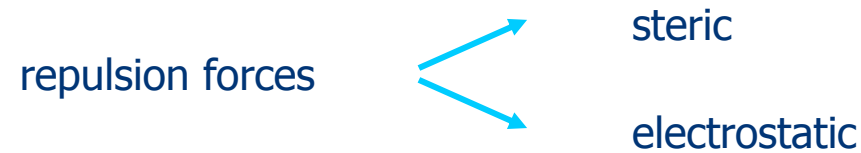
after 1 week @23°C
6400
960

after 1 month @23°C
6200
640

Very little syneresis with Thixol™ 53L at room temperature after 1 month

STABILIZATION OF THE SUSPENSIONS : DISPERSANT AND THICKENERS

1- in order to compensate the Van der Waals attraction



2- in order to compensate the sedimentation forces





 **RHEOLOGY**

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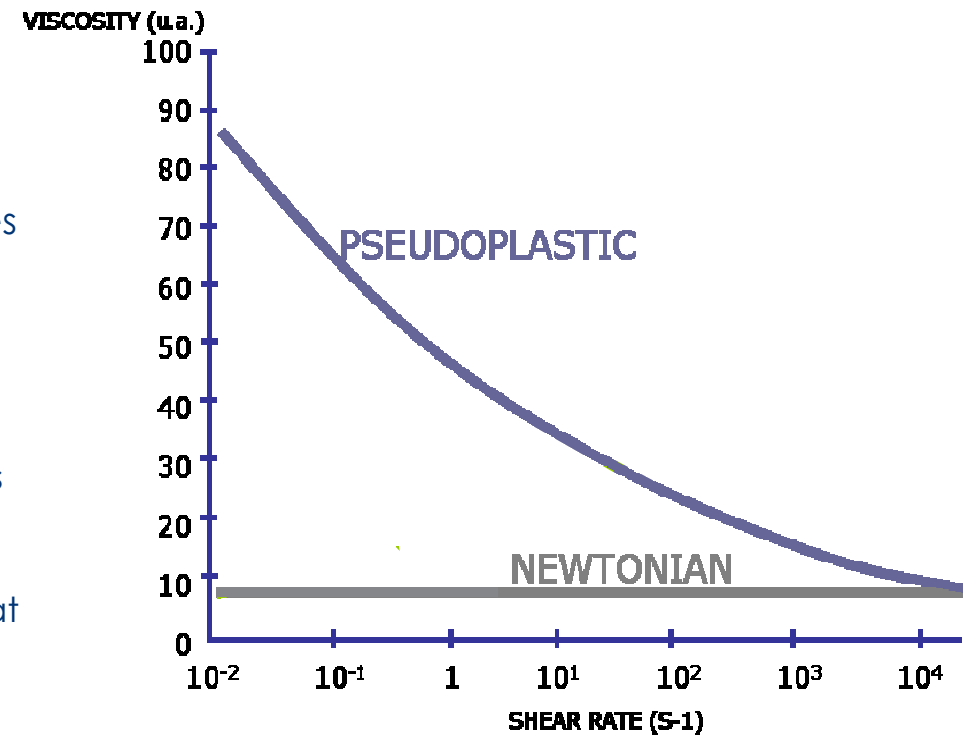
RHEOLOGICAL PROFILES

Newtonian profile:

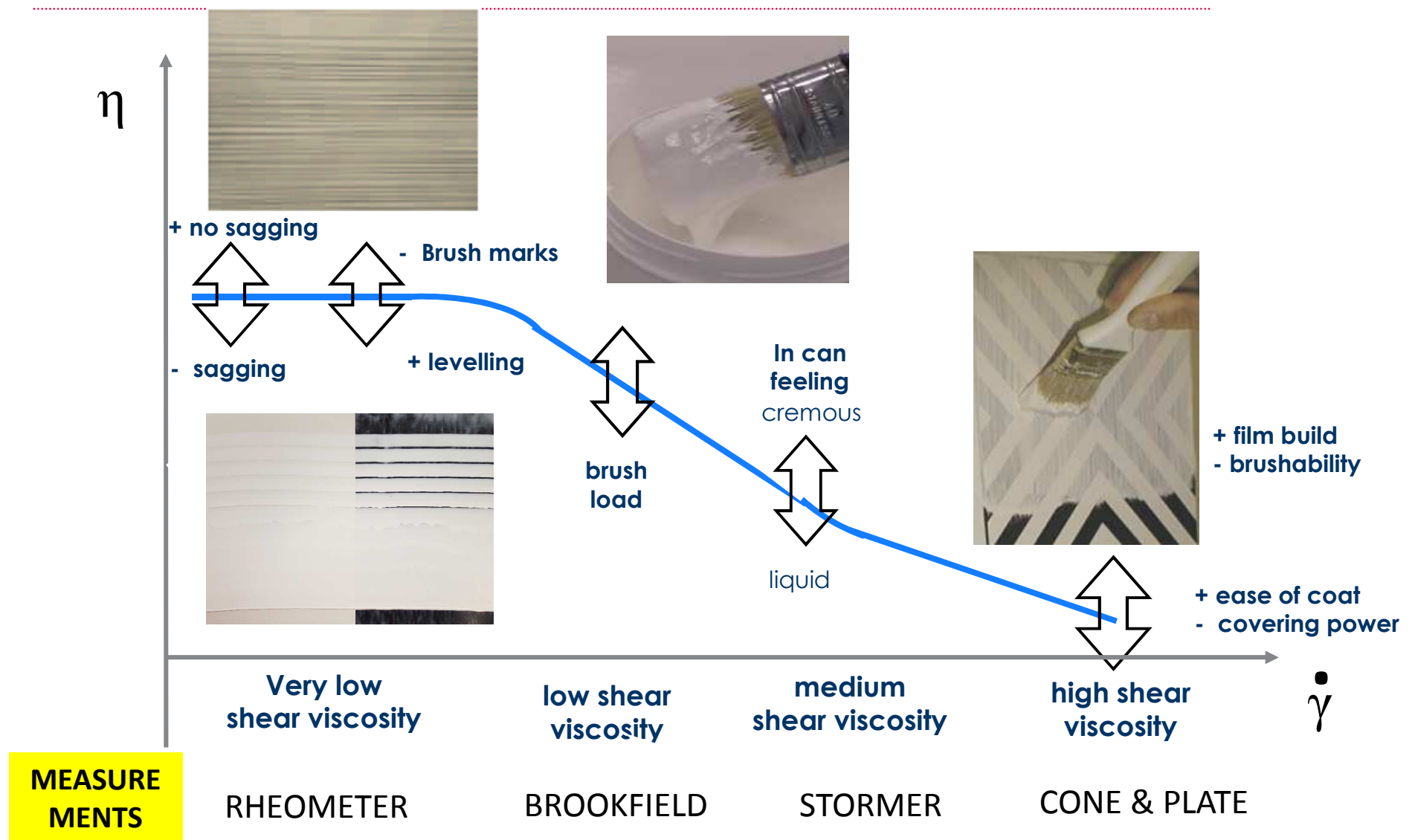
- ❖ Viscosity remains stable whatever the shear rates
- ❖ Varnishes, lacquers, glossy paints naturally tend to exhibit a Newtonian type rheology profile that should enhance leveling properties

Pseudoplastic or shear thinning profile:

- ❖ Viscosity decreases as the shear rate increases
- ❖ Waterborne formulations naturally tend to exhibit a pseudo plastic type rheology profile that should be properly tuned with the use of appropriate thickeners



RHEOLOGY AND APPLICATION PROPERTIES





THICKENERS : MECHANISMS

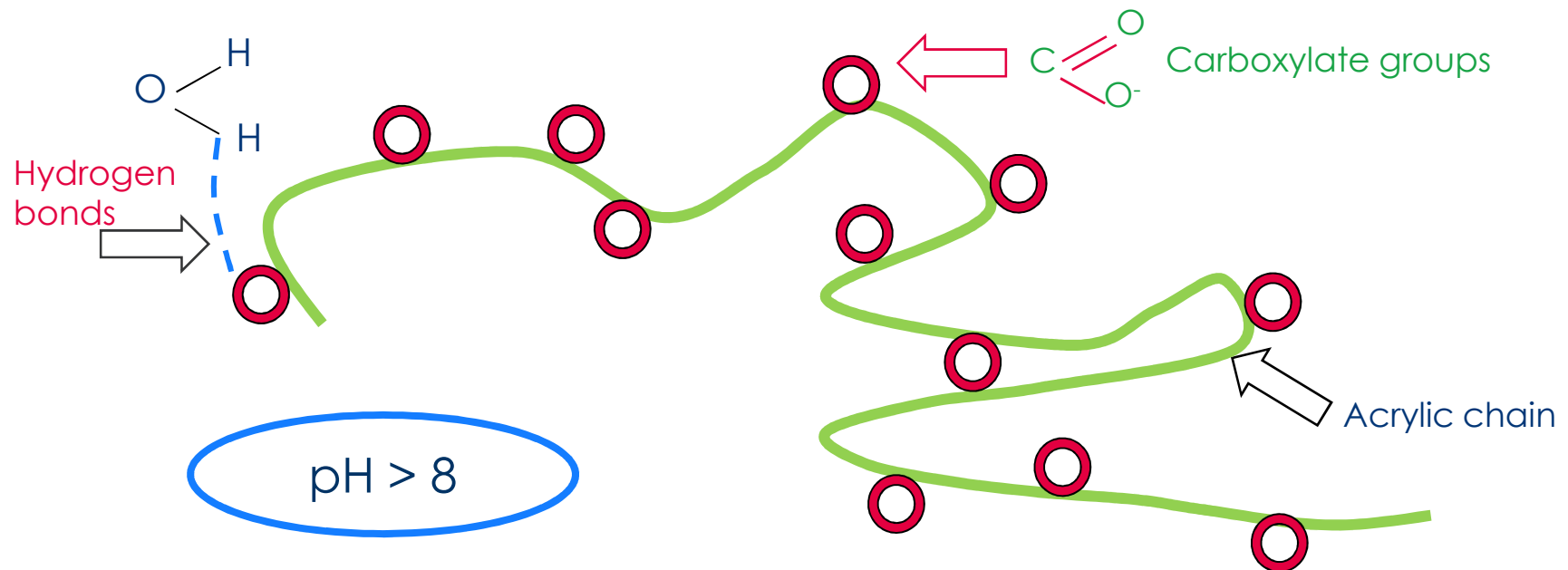
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THICKENERS TECHNOLOGIES: GEL EFFECT

ASE (Alkali Swellable Emulsion) \Rightarrow acrylic polymers in water emulsion

Neutralization of the acid groups using an alkali to get the polymer soluble in water

Resulting anionic groups trap water molecules in hydrodynamic volumes of entangled polymers by hydrogen bonds, generating a gel



Gel \Rightarrow Low shear viscosity get increased

THICKENERS TECHNOLOGIES: ASSOCIATIVE EFFECT

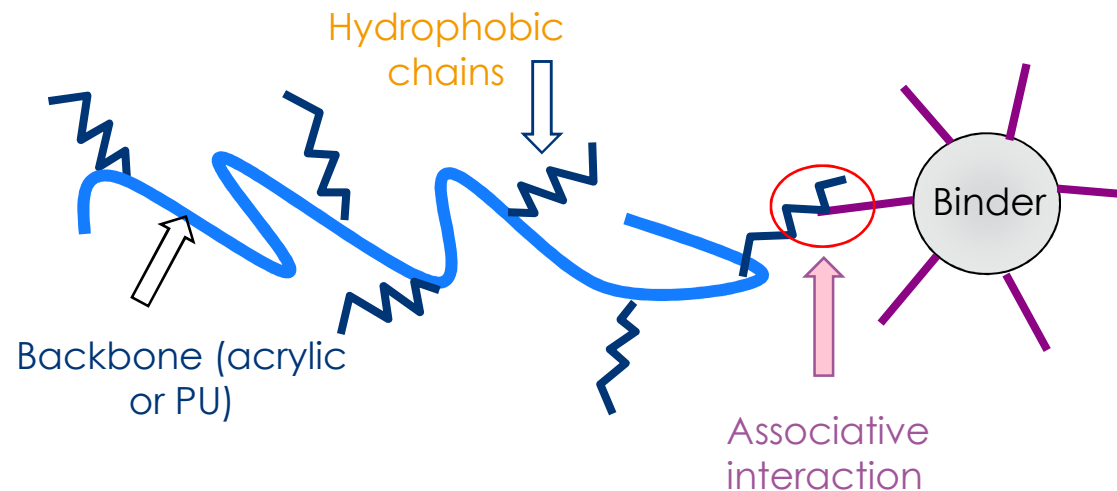
ASSOCIATIVE

⇒ HASE or HEUR

⇒ viscosity at high shear rate.

Hydrophobic chains react with binder's particles by adsorption at their surface or by ion-dipole interaction

The created bonds generate a given resistance against higher shear stress



Associative effect=> High shear viscosity increase

THICKENERS TECHNOLOGIES: ASSOCIATION EFFECT

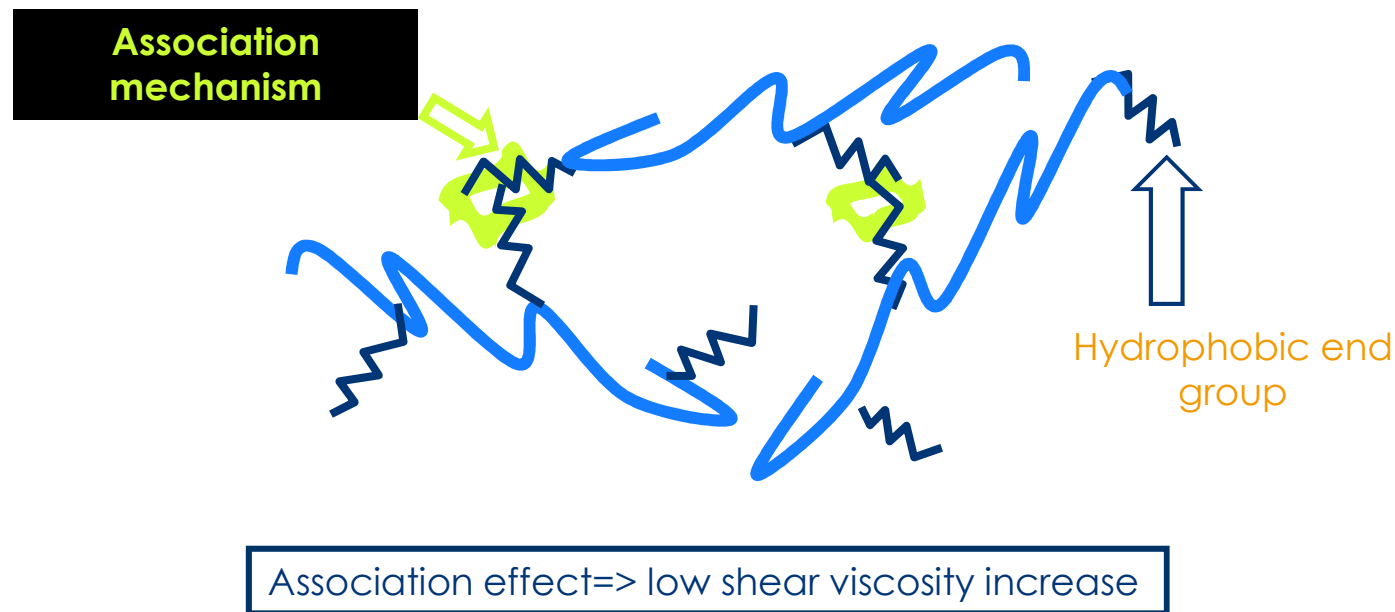
ASSOCIATION

⇒ HASE or HEUR

⇒ viscosity at low shear rate

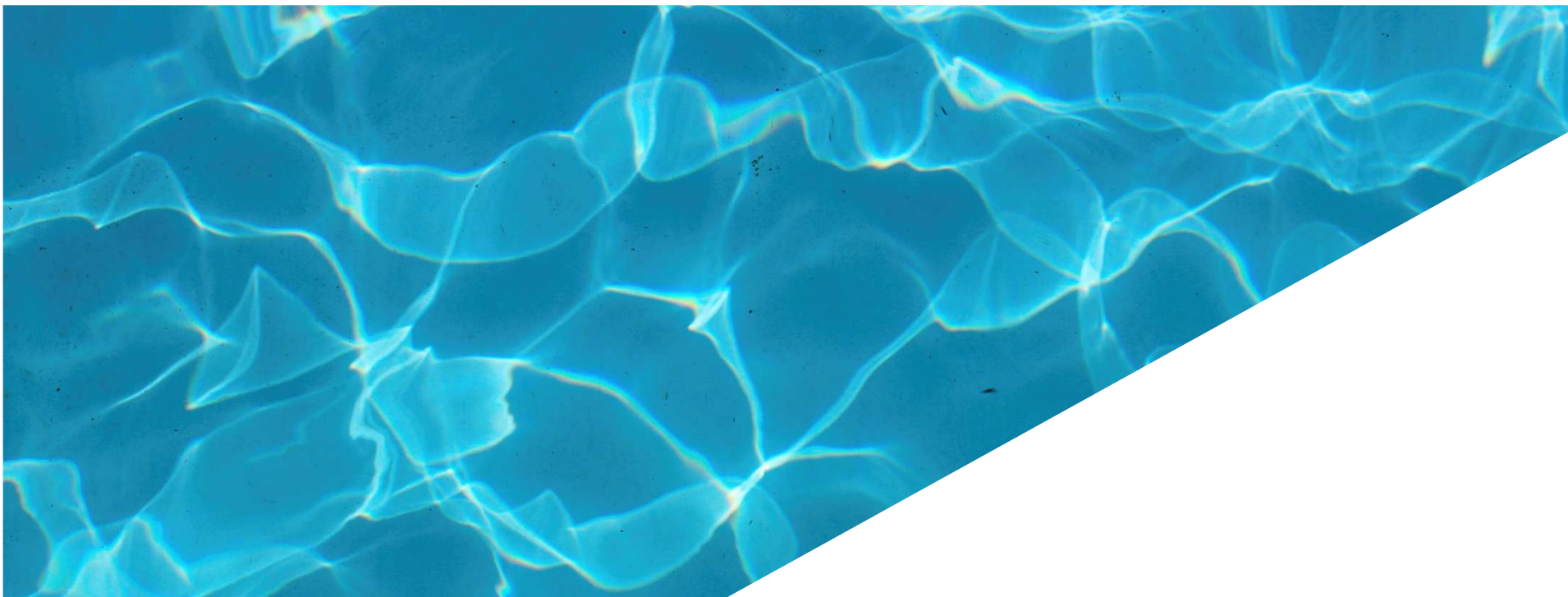
Well selected hydrophobic end groups contribute to form a hydrophobic network structuring the aqueous system and boost viscosities at low shear rate

This network is intended to break up temporarily under prolonged shear and to form again after a given rest time, generating a real thixotropic effect



THICKENING MECHANISMS – RHEOLOGY – APPLICATION

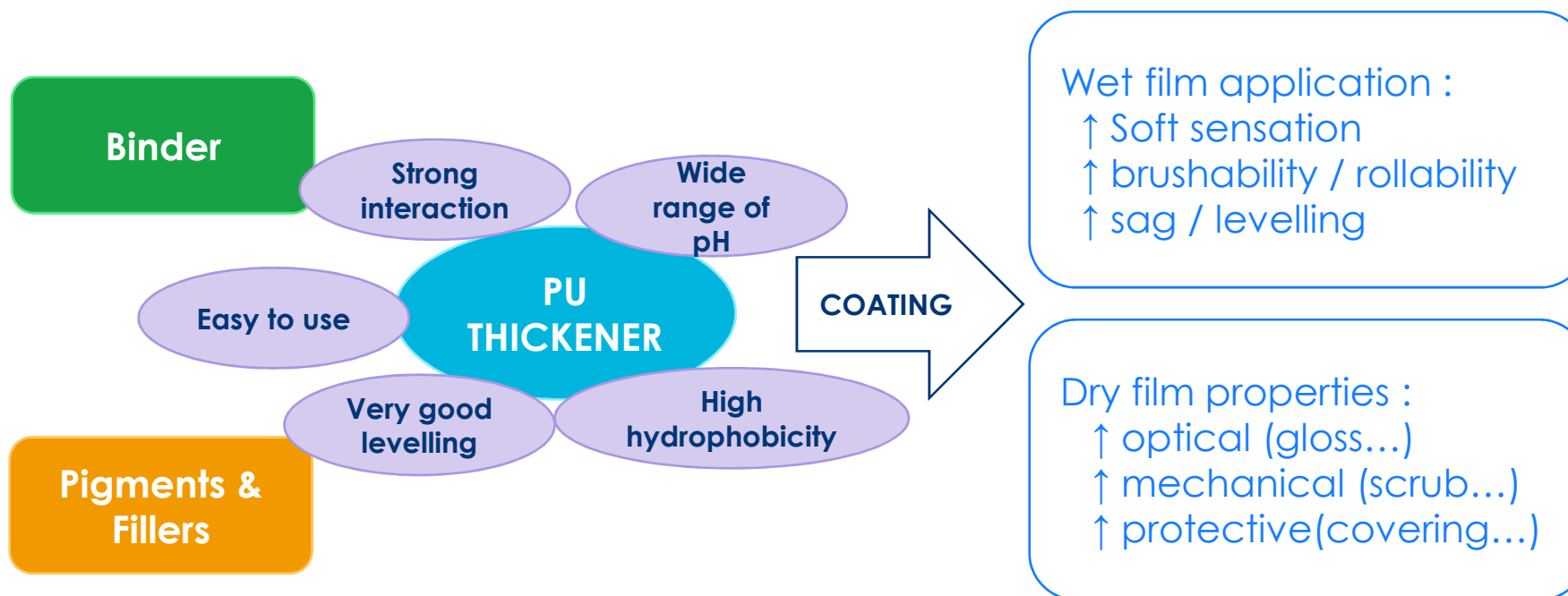
Rheology	Pseudoplastic	Balanced	Newtonian
Mechanism	Gel effect (acrylics) or Majority of Self association (HEUR)	Binder / self association	Binder association
Shear rate	Low and medium	Medium and high	High
Property	In can body	In can body and flow	High flow



THICKENERS : HEUR

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INTRODUCTION: WHY HEUR THICKENERS?



❖ PU thickeners are more dedicated for high/premium quality paints

THICKENERS TECHNOLOGY: COAPUR™ LINE

Polyurethane platform



Acrylic platform

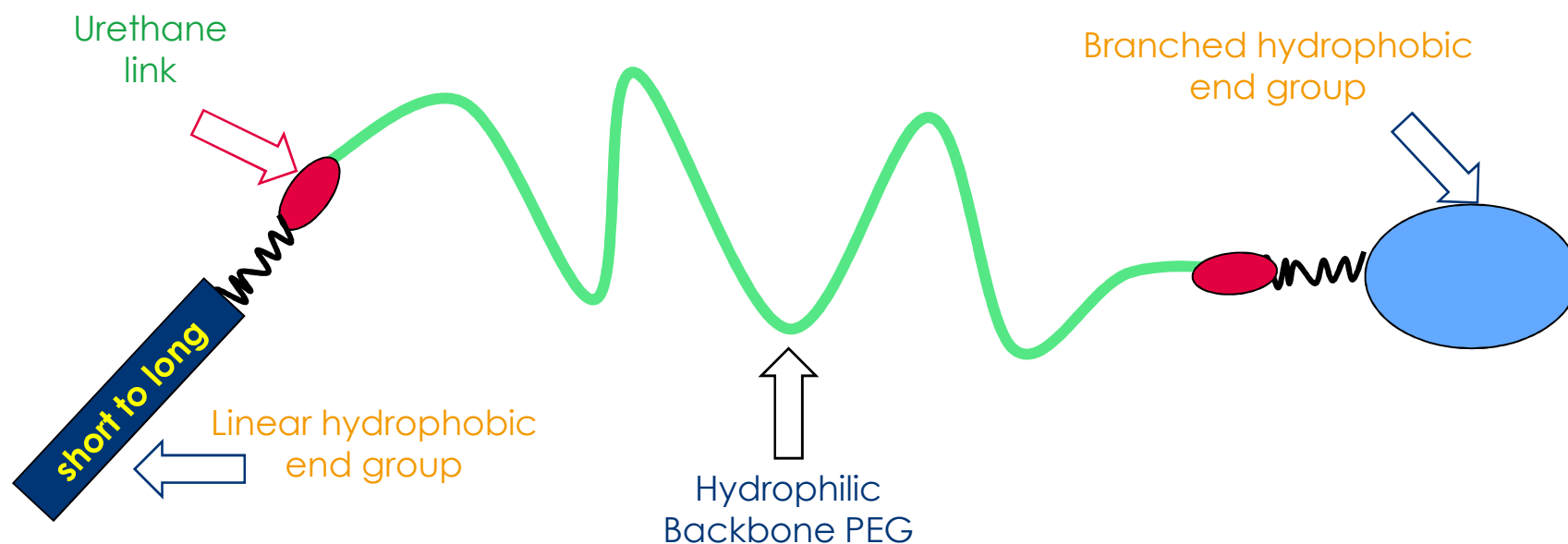


- **Solvent free** polyurethane thickeners
- **COAPUR™ highly effective** series, covers a broad spectrum of rheology profiles, **from Newtonian to pseudoplastic**
- **COAPUR™ XS** series imparts unmatched properties : **color acceptance, easy use** in alkyd emulsion based paints
- COAPUR™ and COAPUR™ XS series deliver exceptional **flow and leveling**
- **VOC free, APEO free, heavy metal free**

THICKENERS TECHNOLOGY: COAPUR™ LINE

HEUR (Hydrophobic Ethoxylated URethane)

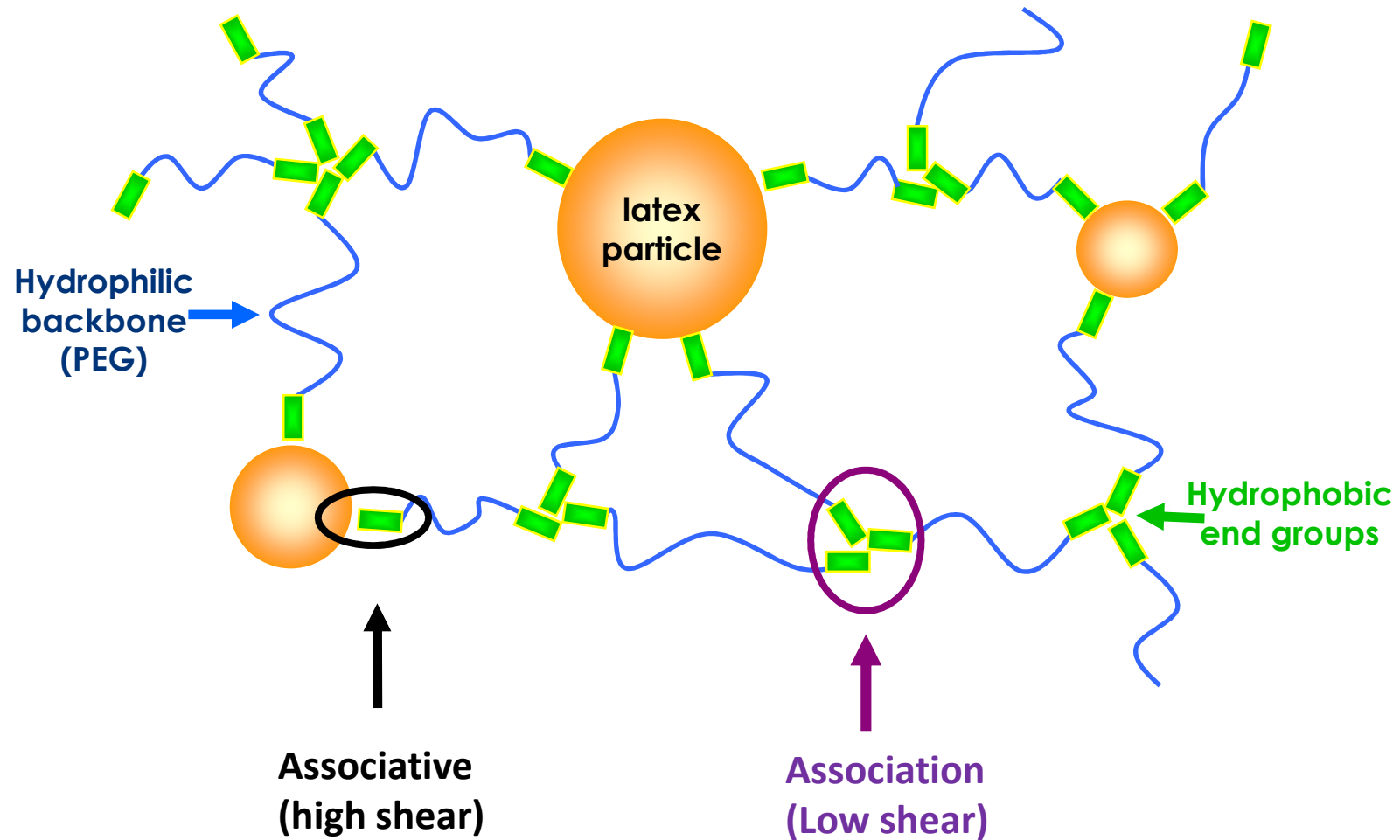
⇒ polymers with a hydrophilic core grafted at both ends with hydrophobic groups of well selected size/shape by a urethane bond



Thickening is obtained at:

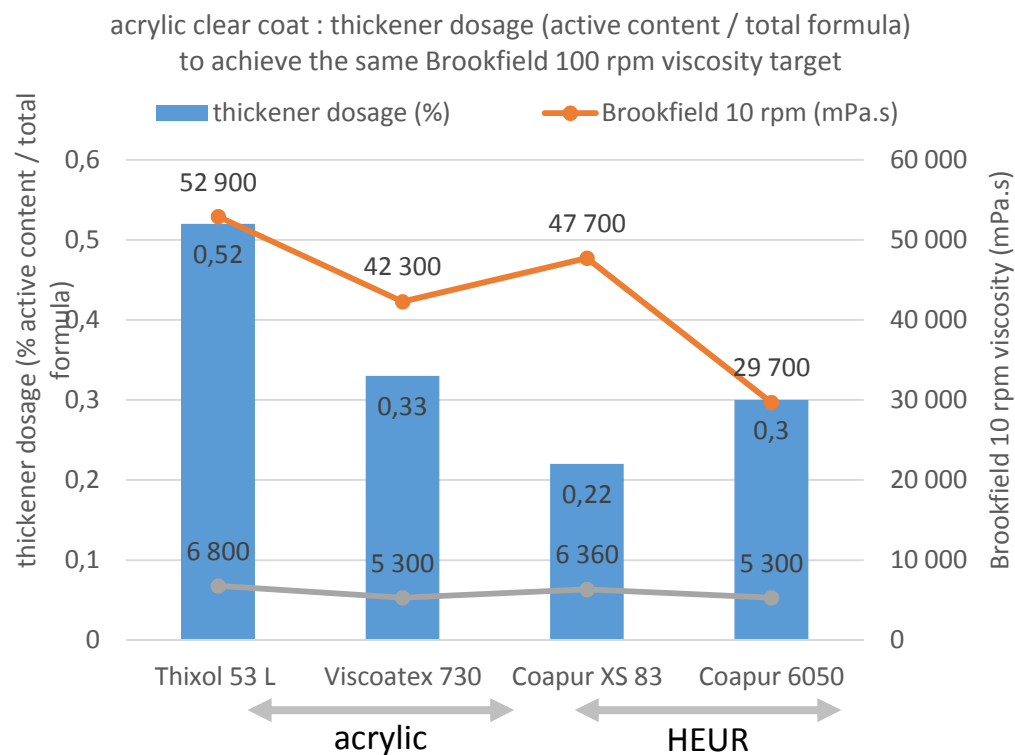
- high shear rates through the associative mechanism
- low shear rates through the association mechanism

HEUR : THICKENING MECHANISMS



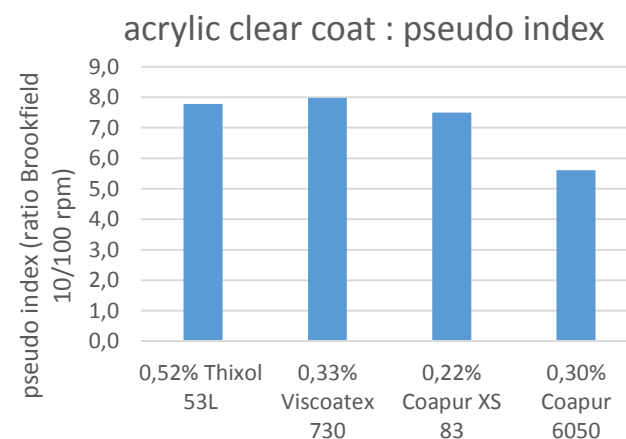
PSEUDOPLASTIC THICKENERS IN AN ACRYLIC CLEAR COAT

→ Thickener dosage to achieve the same low shear viscosity target : Brookfield 100 rpm = 6000 mPa.s after 24h @ 23°C



→ Acrylic Clear coat : binder ratio

water (g)	60
acrylic binder (g)	300



- ❖ Coapur XS83 provides similar low shear viscosities compared to acrylic thickeners with lower dosage
- ❖ Coapur XS83 provides similar sprayability behaviour (similar pseudo index) compared to acrylic thickeners

PSEUDOPLASTIC THICKENERS IN AN ACRYLIC CLEAR COAT – DRIP TEST

→ Each clear coat presents the same low shear viscosity : Brookfield 100 rpm = 6000 mPa.s



PSEUDOPLASTIC THICKENERS IN AN ACRYLIC CLEAR COAT – DRIP TEST

→ Each clear coat present the same low shear viscosity : Brookfield 10 rpm = 50000 mPa.s



Visual aspect of the clear coats after 4 min submitted to gravity flow

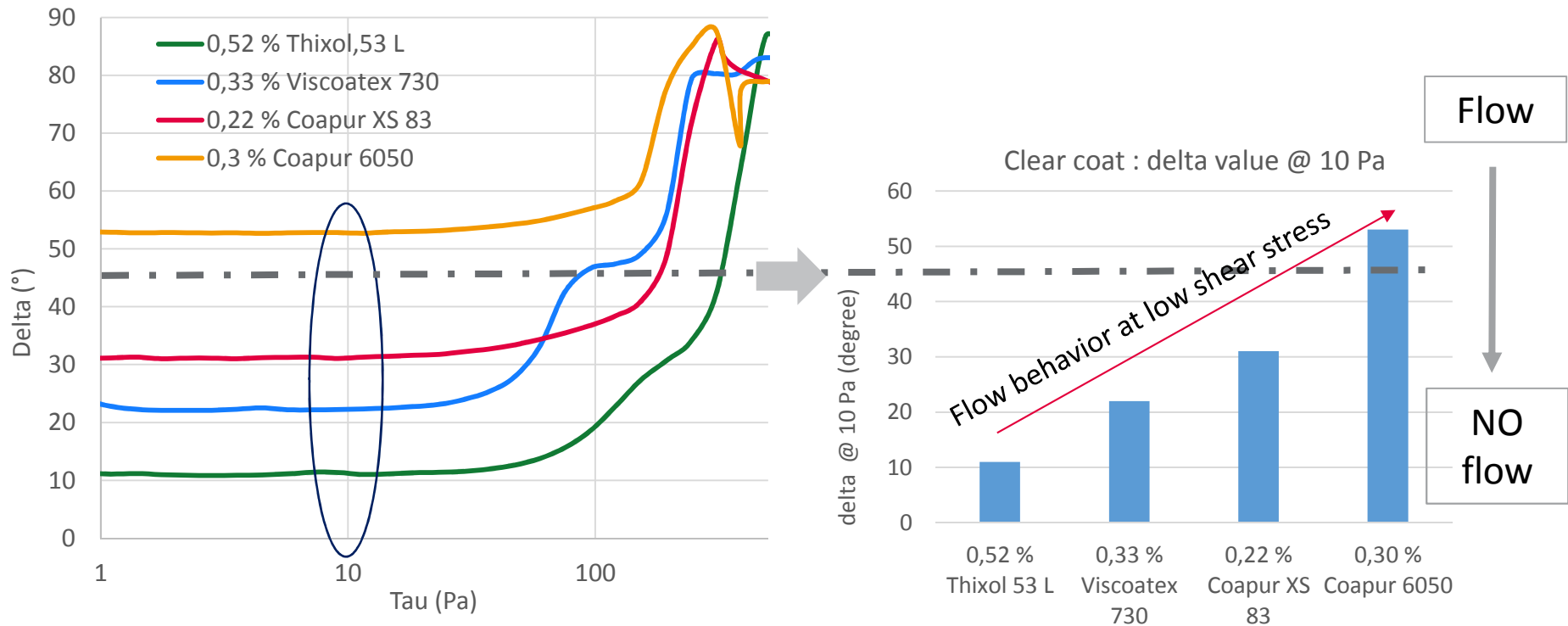
pseudoplastic thickeners	0,52% Thixol 53L	0,33% Viscoatex 730	0,22% Coapur XS 83	0,30% Coapur 6050
flow time (s)	no flow	234	109	47

Similar flow behaviour

❖ Clear coat formulated with Coapur XS83 presents similar flow at low shear stress compared to the one with Viscoatex 730

PSEUDOPLASTIC THICKENERS IN AN ACRYLIC CLEAR COAT - VISCOELASTICITY

→ Each clear coat presents the same low shear viscosity : Brookfield 10 rpm = 50000 mPa.s



❖ Clear coat formulated with Coapur XS83 presents similar flow at low shear stress compared to the one with Viscoatex 730

HEUR PSEUDOPLASTIC THICKENER - SEMI-GLOSS PAINT : FORMULATION

Raw materials	Coapur™ XS 83	Coapur™ 6050	Coapur™ XS 71
Water		18	
Sodium nitrate		0.05	
Sodium pyrophosphate		0.02	
Coadis™ 123 K		0.5	
Wetting agent		0.1	
Anti-foamer		0.05	
TiO ₂		18	
Water		22.43	
Styrene acrylic binder		35	
Coalescent		1.15	
Ammonium hydroxide (25%)		0.3	
Anti-foamer		0.05	
Biocide		0.15	
Fungicide		0.2	
HEUR thickener	1.68	1.68	2.4
Water		2	
Total (g)		100	

❖ Semi-gloss paint

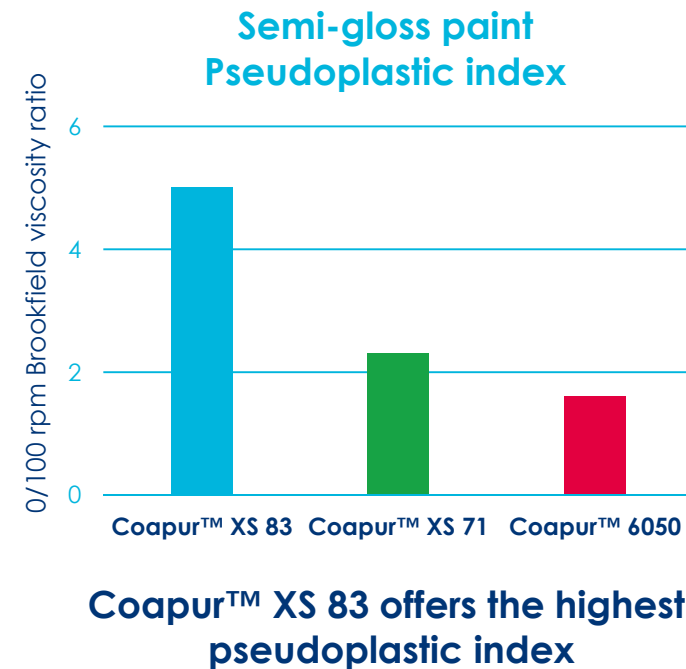
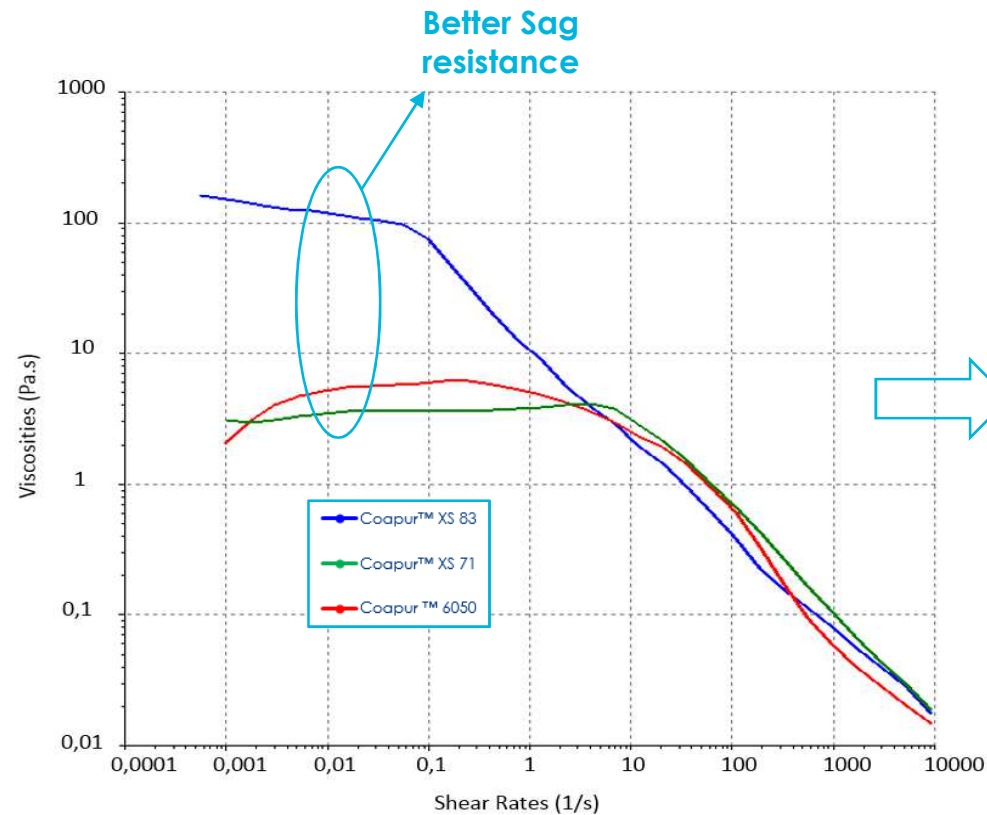
❖ PVC = 20%

❖ Stomer viscosities of the paints are adjusted => 90 KU at t24h - 25°C

❖ High shear viscosity was not specifically adjusted using high shear effective thickeners

Active thickener/total formulation weight	0.5	0.45	0.72
pH	8.6	8.6	8.6

HEUR PSEUDOPLASTIC THICKENER - SEMI-GLOSS PAINT : RHEOLOGICAL BEHAVIOR



❖ Coapur™ XS 83 provides a **strong pseudoplastic** behavior and therefore a **high sag resistance** potential

HEUR PSEUDOPLASTIC THICKENER - SEMI-GLOSS PAINT : SAG RESISTANCE

❖ Sag resistance: *ASTM D4400 standard*

After 20% dilution with water



❖ Coapur™ XS 83 provides a good sag resistance after 20% water dilution

HEUR PSEUDOPLASTIC THICKENER - SEMI-GLOSS PAINT : SAG RESISTANCE

❖ **Sag resistance:** *ASTM D4400 standard*

After 40% dilution with water



❖ **Coapur™ XS 83 provides a fair sag resistance after 40% water dilution**

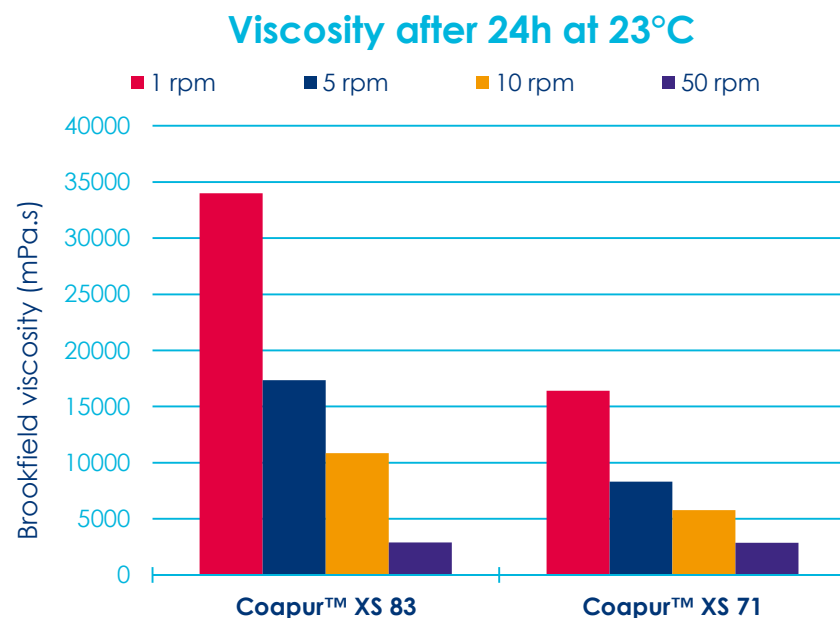
PU PSEUDOPLASTIC THICKENER - WB EPOXY/AMINE PRIMER: FORMULATION

Anticorrosive primer Epoxy/amine industrial waterborne paint		Parts
Part A	Water	11,5
	Dispersing agent	1,3
	Antifoam	0,4
	Wetting agent	0,5
	Red pigment	6,5
	Zeeosphere	5,8
	White pigment	5,8
	Anticorrosive pigment	9,0
	Lamellar filler	0,9
	Ancarez® AR555 (epoxy aqueous resin)	38,6
Total Part A = 80.3 parts		

Part B	Anquamine® 419	10,6
	Dowanol™ PM	3,1
Total Part B = 16.7 parts		

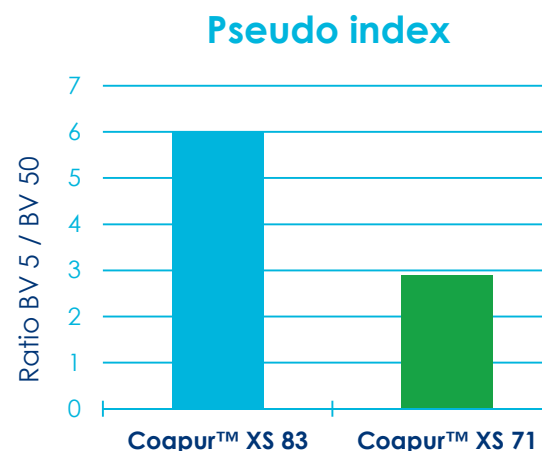
PART A	Unthickened paint	Coapur™ XS 71	Coapur™ XS 83
% as supplied on	-	1.24	0.85
% active content	-	0.2	0.25

PU PSEUDOPLASTIC THICKENER - WB EPOXY PRIMER: VISCOSITIES AFTER 24H @ 23°C



→ Coapur™ XS 83 provides very high viscosities at low shear rates

→ Sprayable industrial paint:
pseudo index



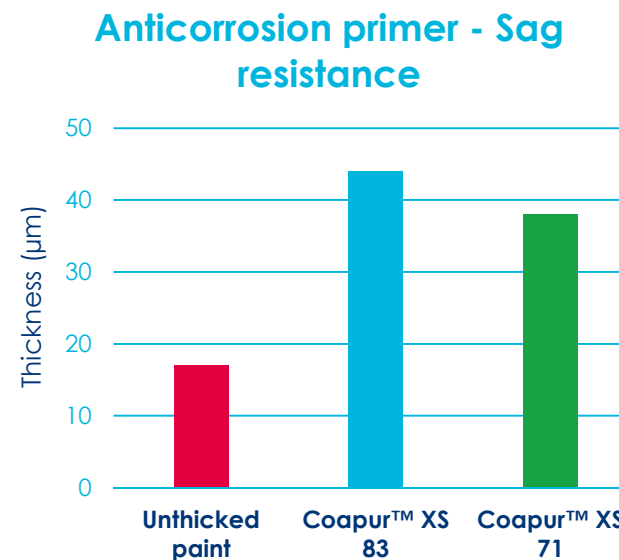
→ Coapur™ XS 83 has a high pseudo index

❖ Coapur™ XS 83 provides very pseudoplastic profile

PU PSEUDOPLASTIC THICKENER - WB EPOXY PRIMER: SAG RESISTANCE

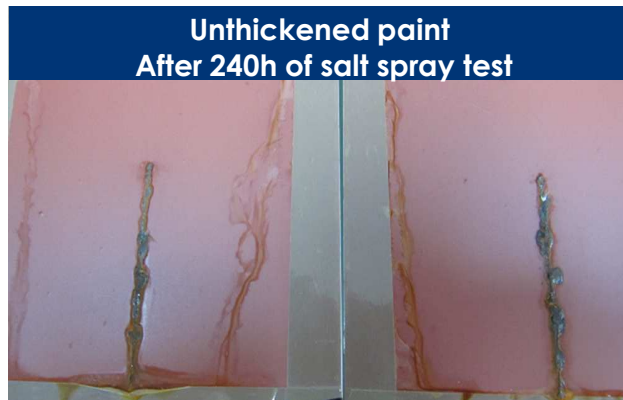
❖ Paints formulation: viscosity adjustment before spraying

Unthickened paint		Coapur™ XS 83	Coapur™ XS 71
% as supplied on Part A		0.85%	1.24%
% as supplied on Part A + Part B		0.7%	1.06%
% active content on Part A + Part B		0.22%	0.19%
Viscosity DIN4 Cup Viscosity	<u>after</u> adjustment with water	62" (1.3% of water added)	60" (0% of water added)



❖ Coapur™ XS 83 provides the **best sag resistance** compared to the control

PU PSEUDOPLASTIC THICKENER - WB EPOXY PRIMER: SALT TEST – 240H



❖ All paints show the same corrosion effect

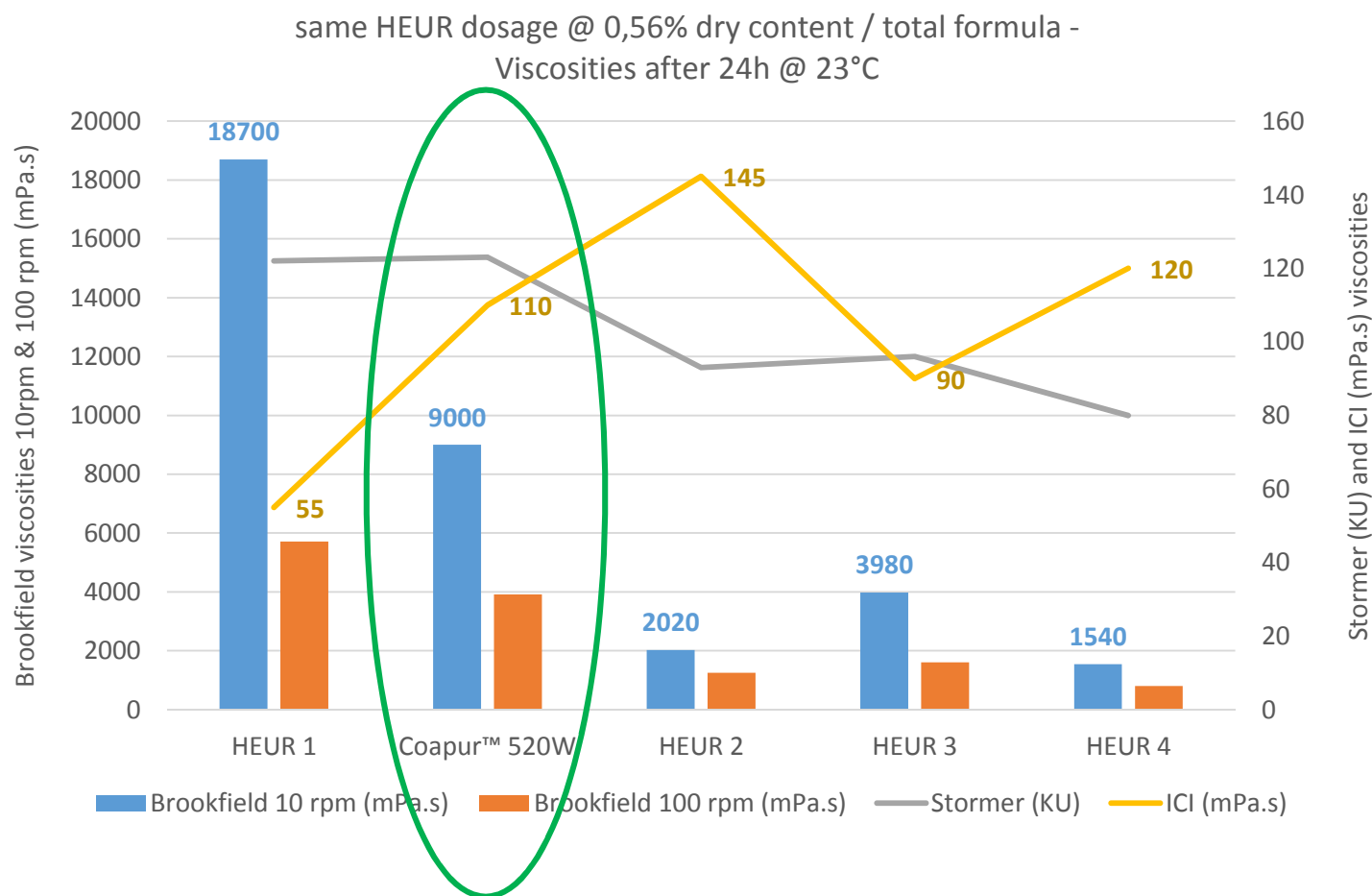
COAPUR™ 520W : ACRYLIC SATIN PAINT

❖ Acrylic satin paint low VOC – PVC = 32%

acrylic satin paint (g) - PVC = 32%	HEUR 1	Coapur™ 520W	HEUR 2	HEUR 3	HEUR 4
Water	140	140	140	140	140
Coadis BR 3	6	6	6	6	6
biocide	2	2	2	2	2
TiO2	160	160	160	160	160
Omyacoat 850 OG	141	141	141	141	141
Encor 2506	425	425	425	425	425
Water	20	20	20	20	20
NaOH 20%	0,5	0,5	0,5	0,5	0,5
defoamer	2	2	2	2	2
Water	34	34	34	34	34
HEUR	31,2	28,7	30,3	28,1	28,1
water	36,3	39,7	38,0	41,8	41,4
NaOH 20%	1,3	0,4	0,4	0,2	1,5
<i>total satin paint (g)</i>	<i>1000</i>	<i>1000</i>	<i>1000</i>	<i>1000</i>	<i>1000</i>

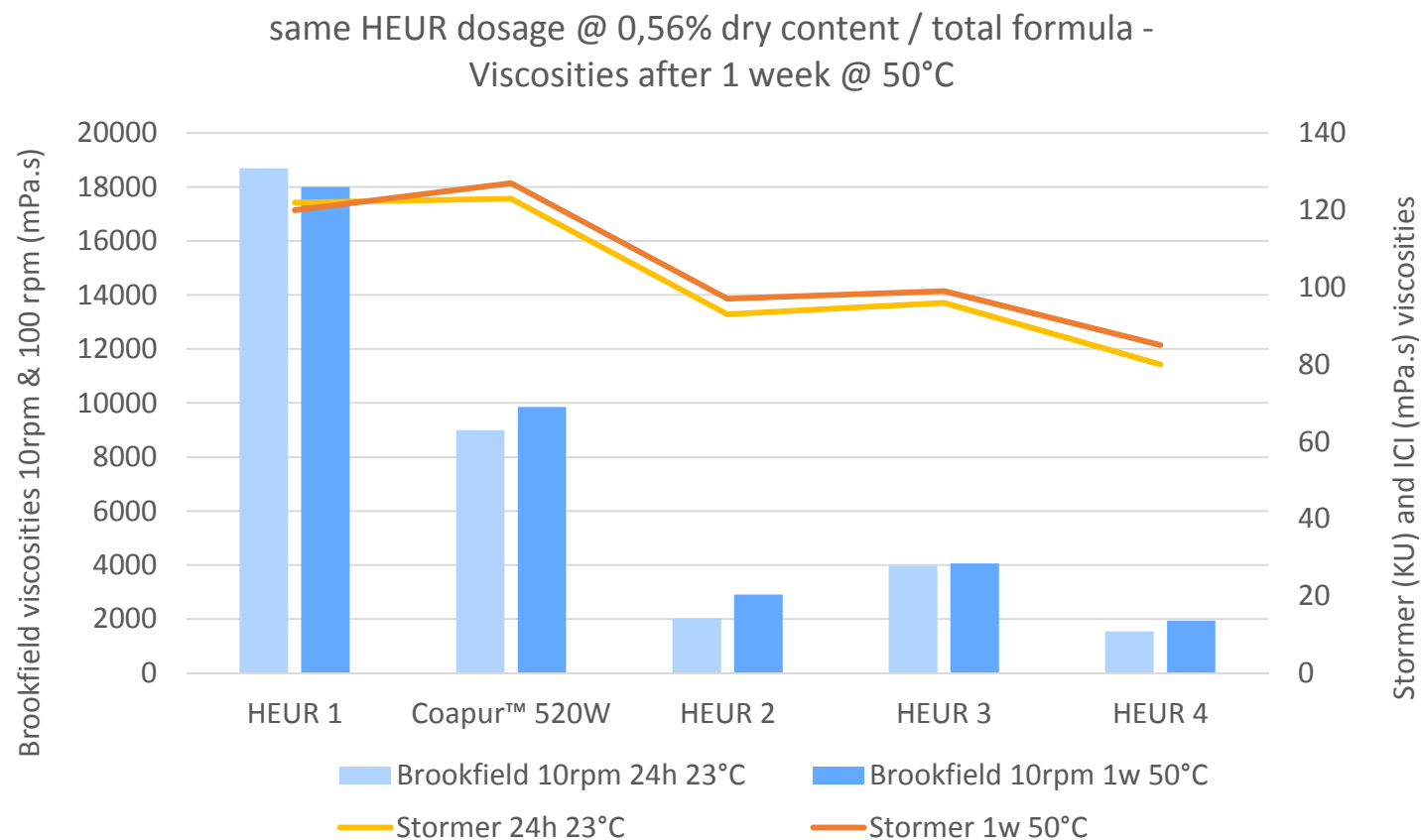
❖ Same HEUR dosage for all paints : 0,56% dry content / total formula

COAPUR™ 520W : ACRYLIC SATIN PAINT - VISCOSITIES MEASUREMENTS T=24H



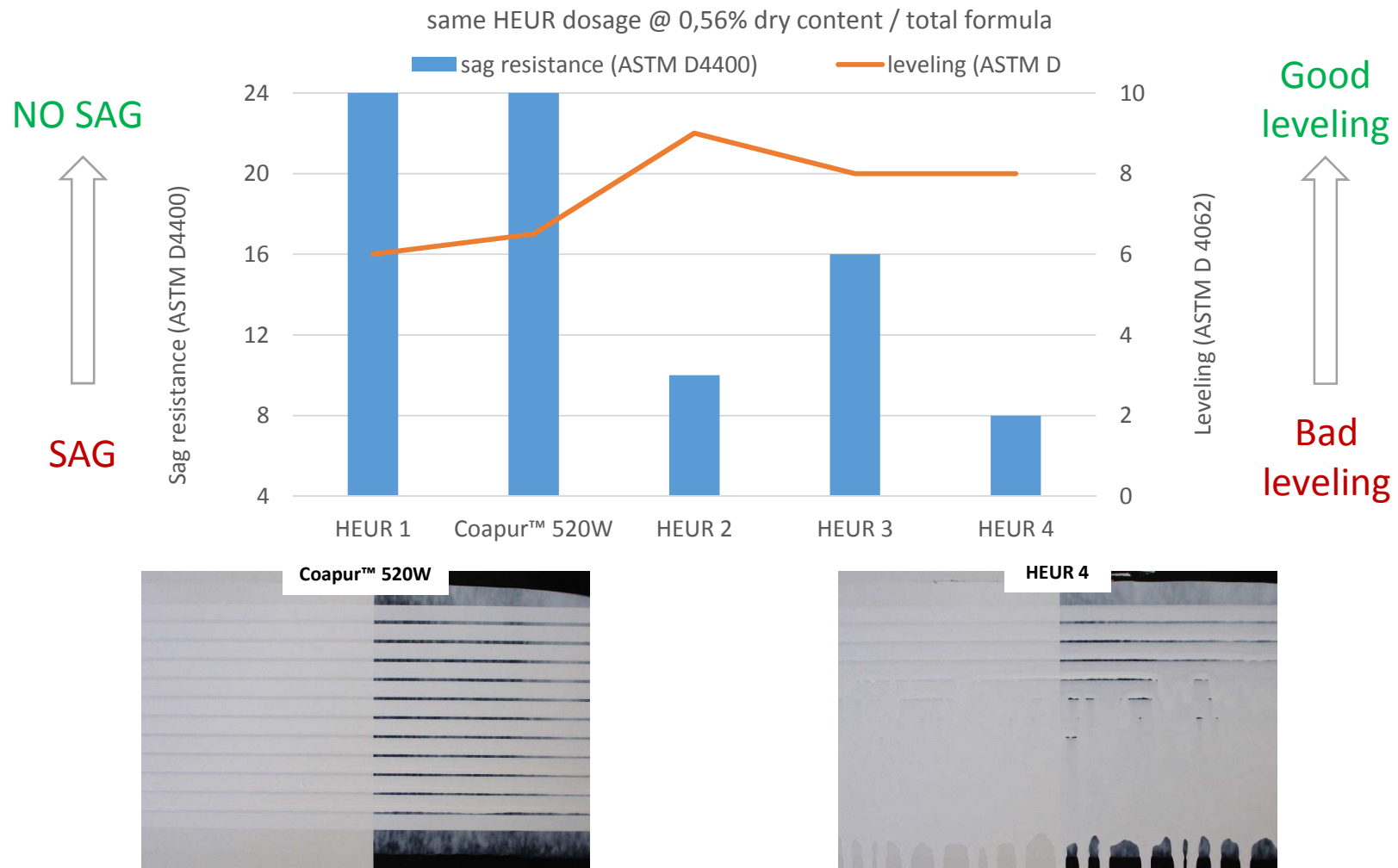
Coapur™ 520W shows the best balance between low shear and high shear viscosities with nice contribution to medium shear viscosity

COAPUR™ 520W : ACRYLIC SATIN PAINT - STORAGE STABILITY 1WEEK @ 50°C



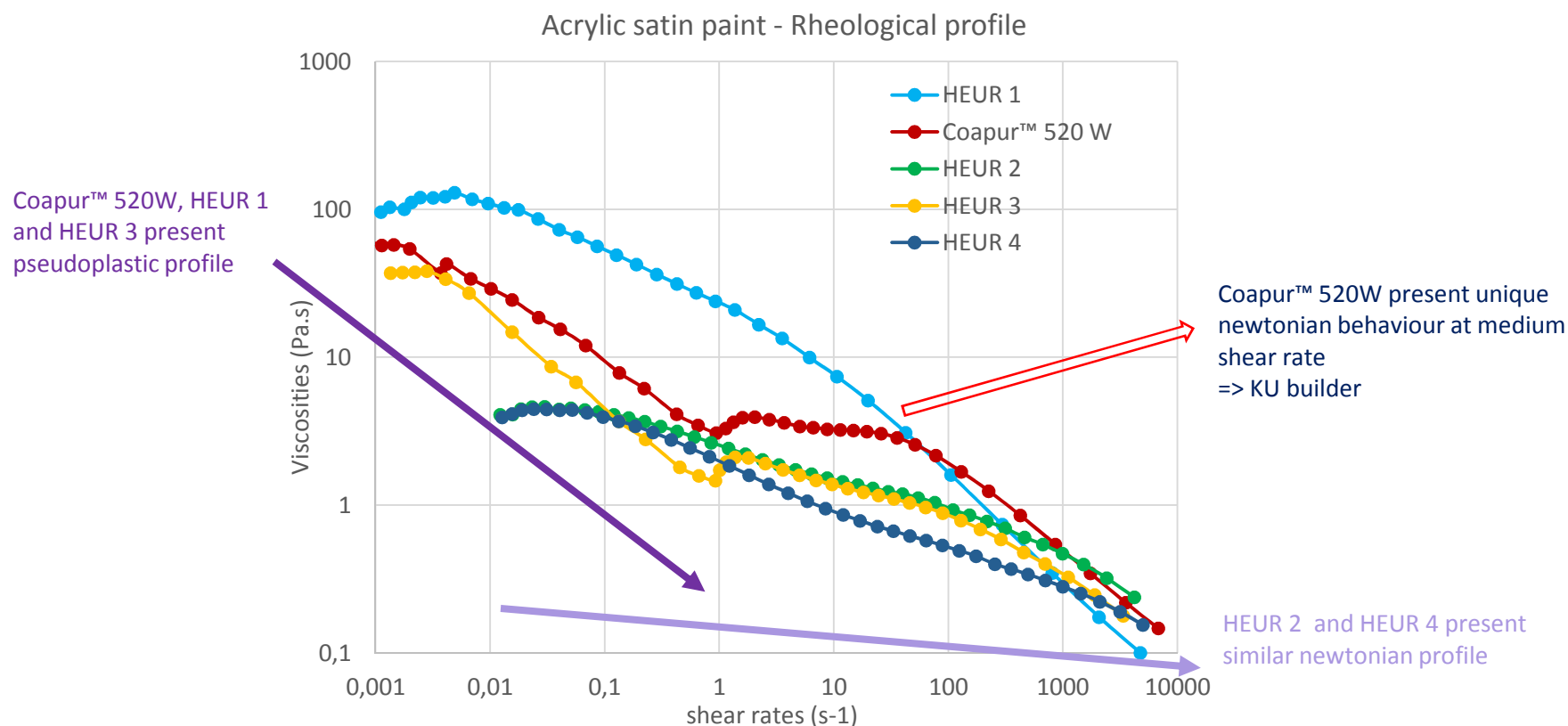
Coapur™ 520W provides excellent storage stability

COAPUR™ 520W : ACRYLIC SATIN PAINT - LEVELING AND SAG RESISTANCE



Coapur™ 520W provides the best balance between sag resistance and leveling

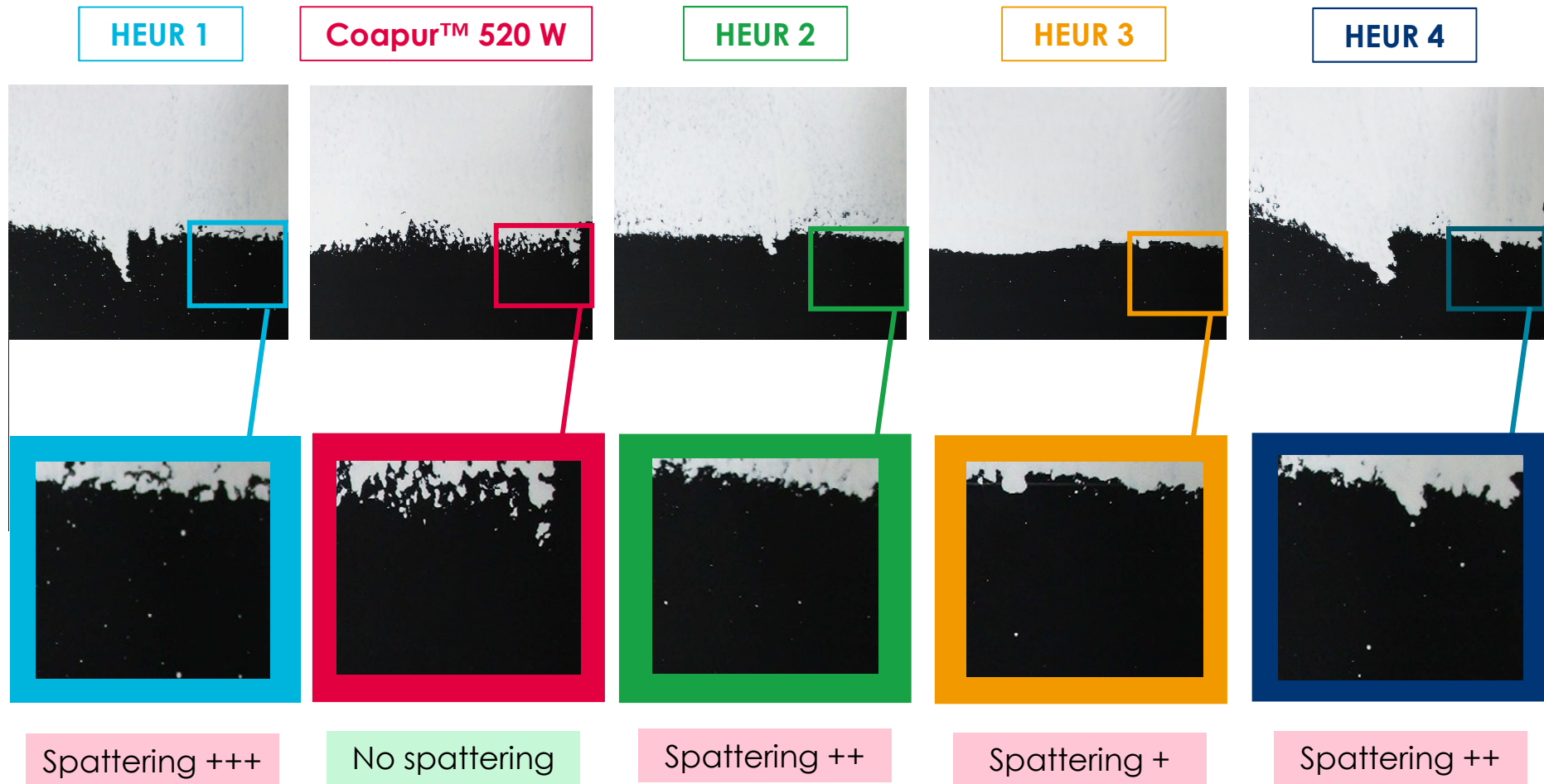
COAPUR™ 520W : ACRYLIC SATIN PAINT - RHEOLOGICAL PROFILES



❖ Coapur™ 520W shows unique flow curve :

- Pseudoplastic at very low shear rate => Good sag resistance
- Newtonian at medium shear rate => Cremous behaviour during hand stirring and nice tool load

COAPUR™ 520W : ACRYLIC SATIN PAINT – SPATTERING WITH ROLLER APPLICATION



❖ Coapur™ 520 W provides the **best spattering resistance**

NEWTONIAN PU THICKENER IN A MATT PAINT - FORMULA

❖ Thickeners adjusted to achieve the same viscosity targets after 24h @ 25°C :

	Ref matt paint Without ICI builder	Paint formulated with ICI builder
Water	195	195
NH4OH (28%)	1,5	1,5
Ecodis P90	4	4
Acticide MBS	2	2
Tego 825	1	1
TiO2 rutile	120	120
Omyacarb 2AV	183,3	183,3
Omyacoat 850 OG	184	184
Acronal S 790	240	240
MPG	10	10
Texanol	10	10
ASE thickener: Viscoatex 730	6,5	4,5
PU Thickener: newtonian	/	x
Water	1000-x	1000-x
Total paint (g)	1000	1000

Viscoatex 730 => Brookfield :

Pseudoplastic acrylic thickener used to control low shear viscosities

Newtonian PU => ICI builder :

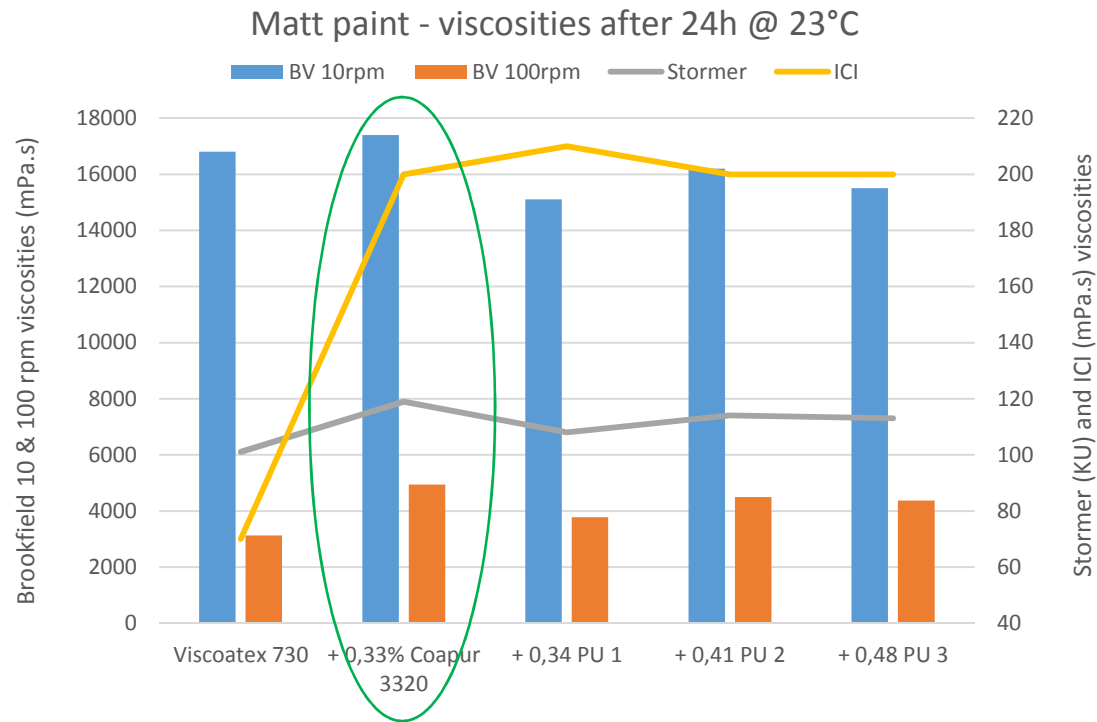
PU thickener with newtonian profile used to achieve a given high shear viscosity measured with ICI viscosimeter

❖ Viscoatex 730 => low shear viscosity : Brookfield 10 rpm = 16000 mPa.s

❖ PU ICI builder => high shear viscosity target : ICI = 2 P

NEWTONIAN PU THICKENER IN A MATT PAINT - VISCOSITIES T24H @ 25°C

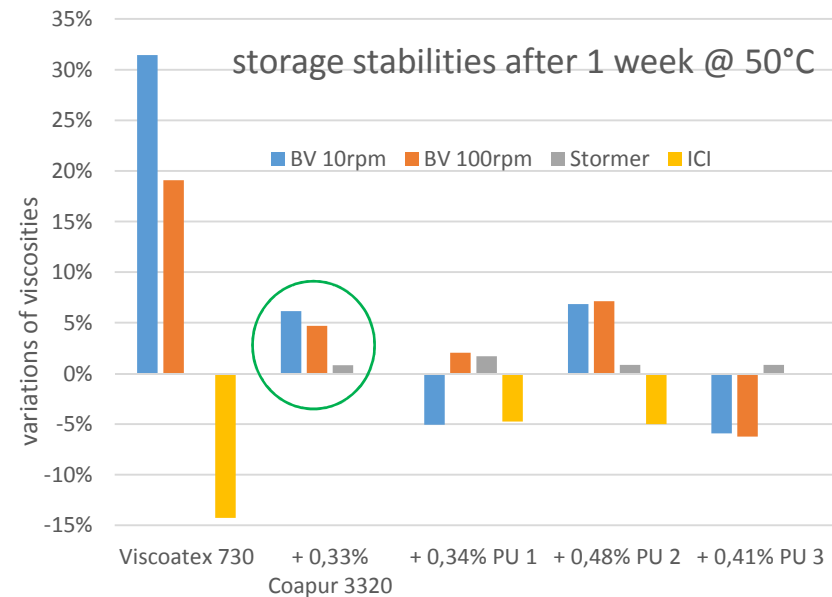
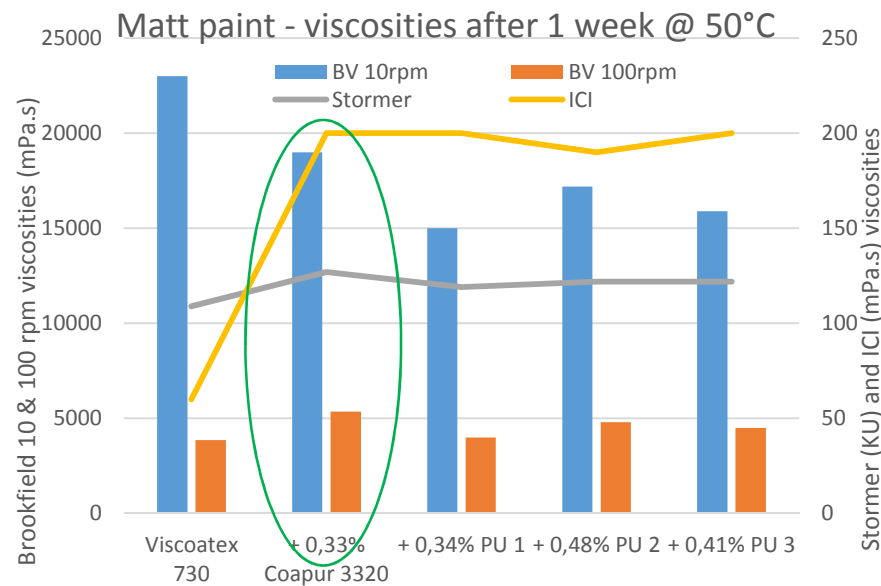
- ❖ Dosage of acrylic pseudoplastic thickener is the same in all combinations : 0,14% dry / total paint
- ❖ Dosage of ICI builder is adjusted to achieve the same high shear viscosity : ICI = 2 P



❖ The best thickener combination is achieved with 0,14% Viscoatex 730 + 0,33% Coapur 3320

NEWTONIAN PU THICKENER IN A MATT PAINT - VISCOSITIES T 1WEEK @ 50°C

❖ High shear viscosity target : ICI = 2P

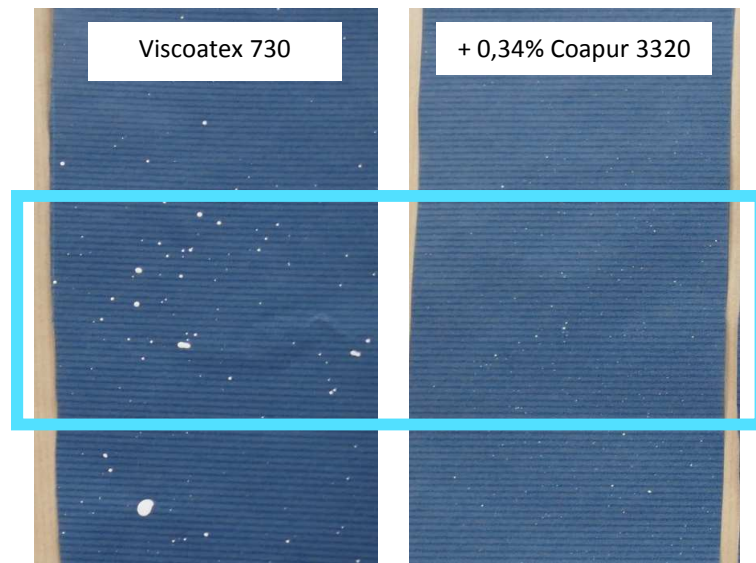


❖ Coapur 3320 : more efficient ICI builder and best contribution to achieve very stable matt paints

NEWTONIAN PU THICKENER IN A MATT PAINT : APPLICATION PROPERTIES

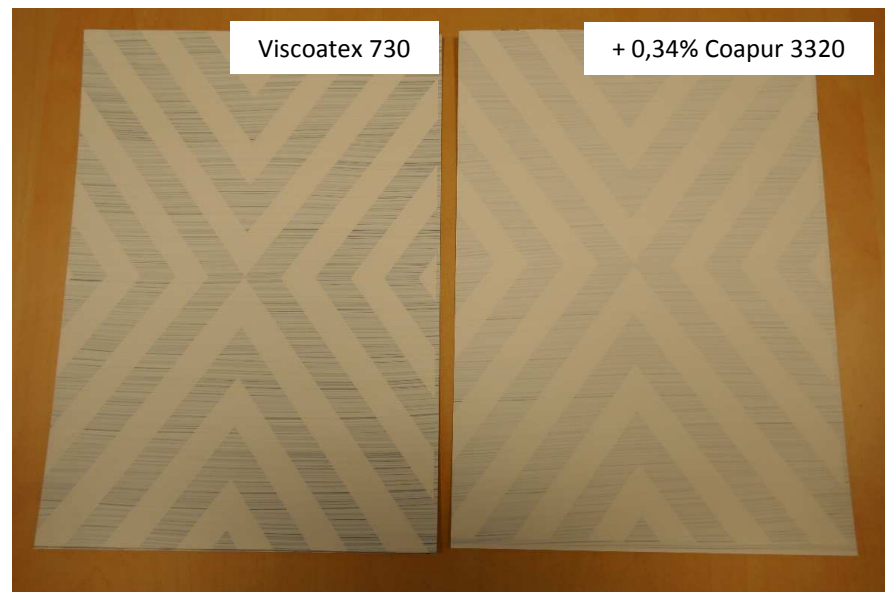
❖ High shear viscosity target : ICI = 2P

SPATTERING



❖ Less spattering when Coapur 3320 is added to the matt paint formulation

HIDING / COVERING / FILM BUILD



❖ The use of Coapur 3320 enhances the covering of this matt paint

NEW HEUR THICKENERS : THICKENING MECHANISMS – RHEOLOGY – APPLICATION

Rheology	Pseudoplastic	Balanced to Newtonian	Newtonian
Mechanism	Majority of Self association (HEUR)	Binder / self association	Binder association
Shear rate	Low and medium	Medium and high	High
Property	In can body	In can body and flow	High flow



Coapur™ XS83



Coapur™ 520W



Coapur™ 3320



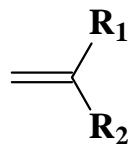
THICKENERS : ACRYLICS

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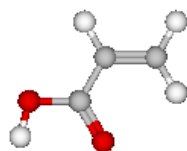
THICKENERS TECHNOLOGIES : ACRYLICS

Specific Monomers

- Specific monomers synthesis



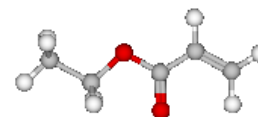
R₁ and R₂ induce specific properties



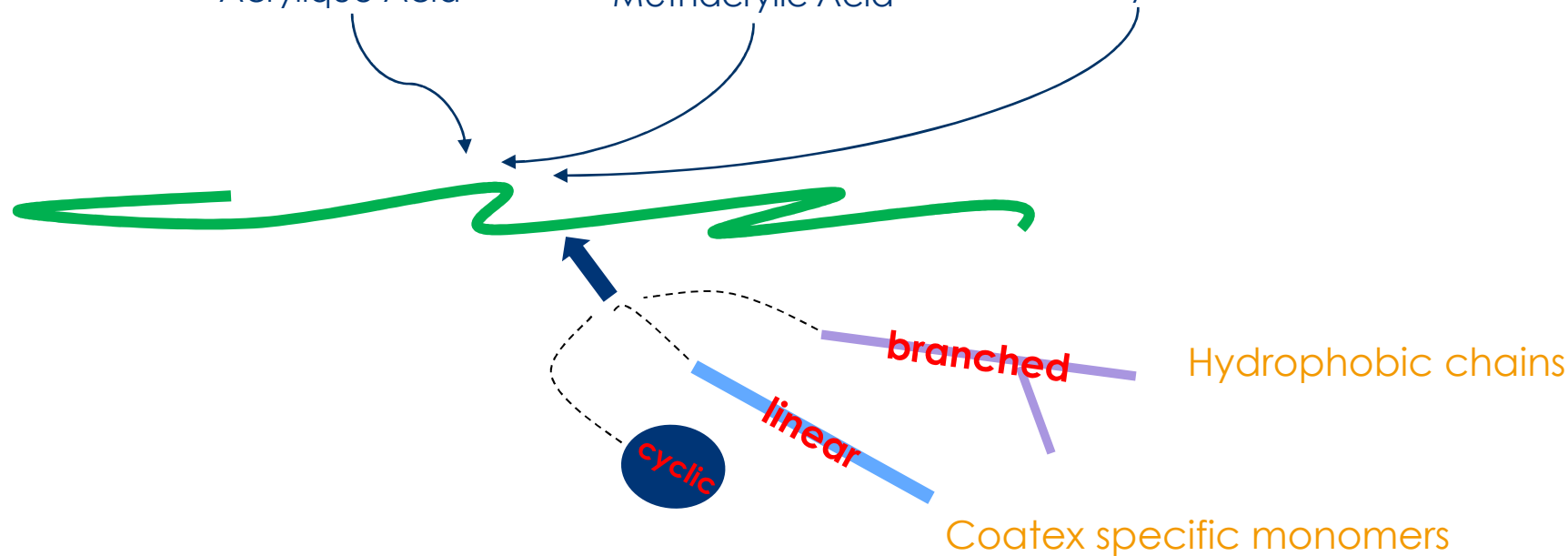
Acrylic Acid



Methacrylic Acid



Acrylic Esters



THICKENERS TECHNOLOGY: ACRYLICS



- Acrylic thickener turning water in a gel
- In can viscosity, sag & settling control
- THIXOL™ part of the range providing an unique thixotropic behavior



- Associative acrylic thickeners with outstanding **effectiveness**
- Wide range of rheology profiles from **pseudo plastic to Newtonian**
- Added properties such as **better in can appearance**, tool load, **settling** and **syneresis control**
- **Improved compatibility** with organic and inorganic pigments thus optimum results in tinted systems
- Excellent environment profiles (VOC & APEO free)

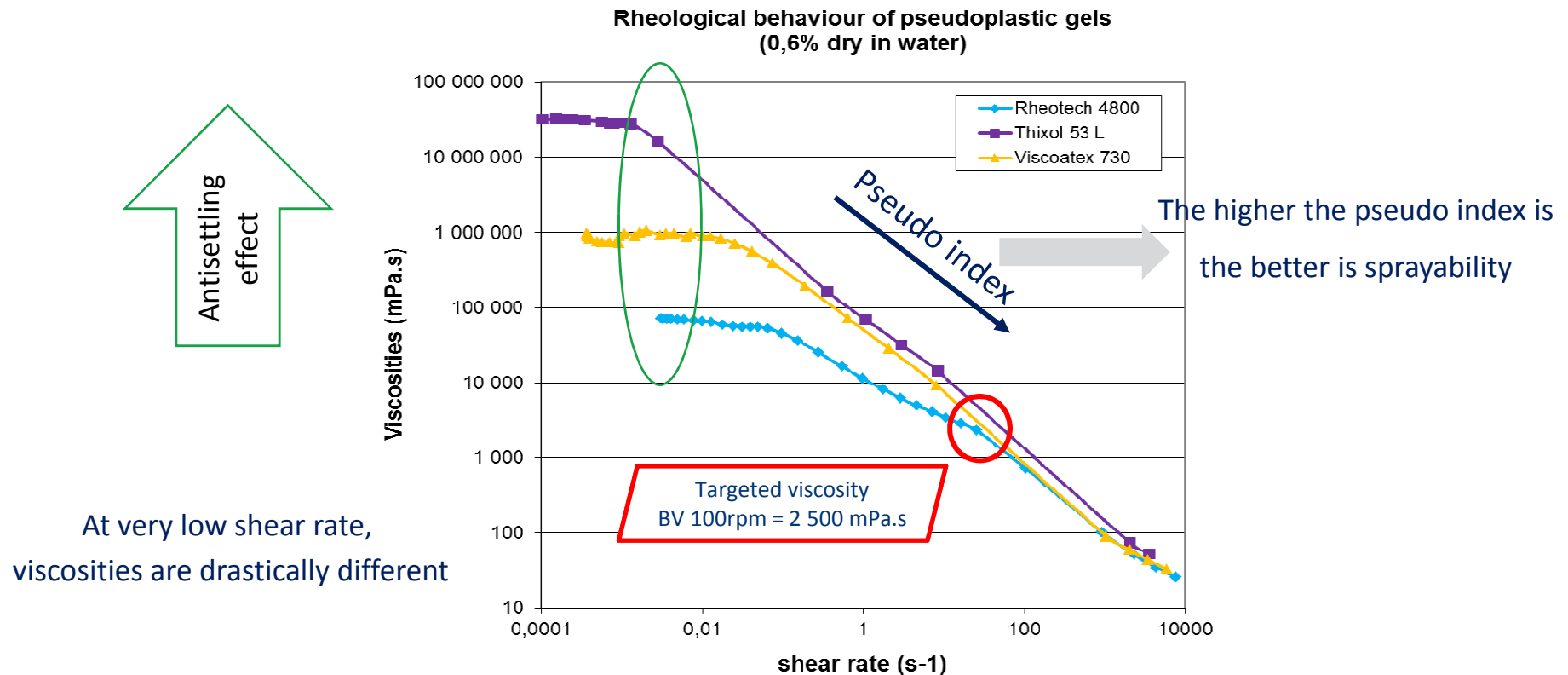
THE DIFFERENT GEL EFFECTS OF ACRYLIC THICKENERS



Same formulations, same concentrations

- ◆ 0.6% dry/total formula
- ◆ Viscosity target @24h and 23°C :
Brookfield @100rpm = 2 500 mPa.s

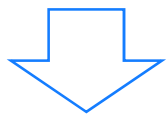
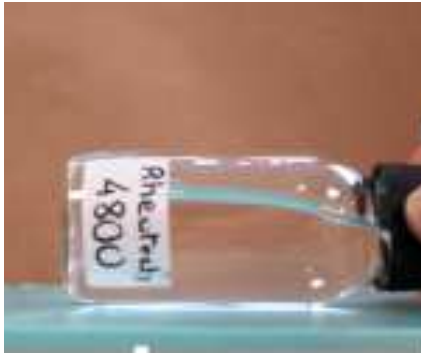
PSEUDOPLASTIC ACRYLIC THICKENERS – GEL EFFECT



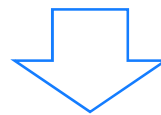
- ❖ Anti settling effect related to very low shear viscosities
- ❖ Good sprayability related to high pseudo index

PSEUDOPLASTIC ACRYLIC THICKENER – WATER GEL : VISUAL ASPECT

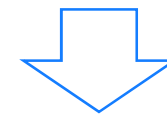
- ❖ 3 water gels formulated with the same thickener dosage : 0,6% dry/total gel
- ❖ Same low shear viscosity target : Brookfield 100rpm after 24h @ 23°C = 2500 mPa.s



Liquid gel



Hard gel



Elastic gel

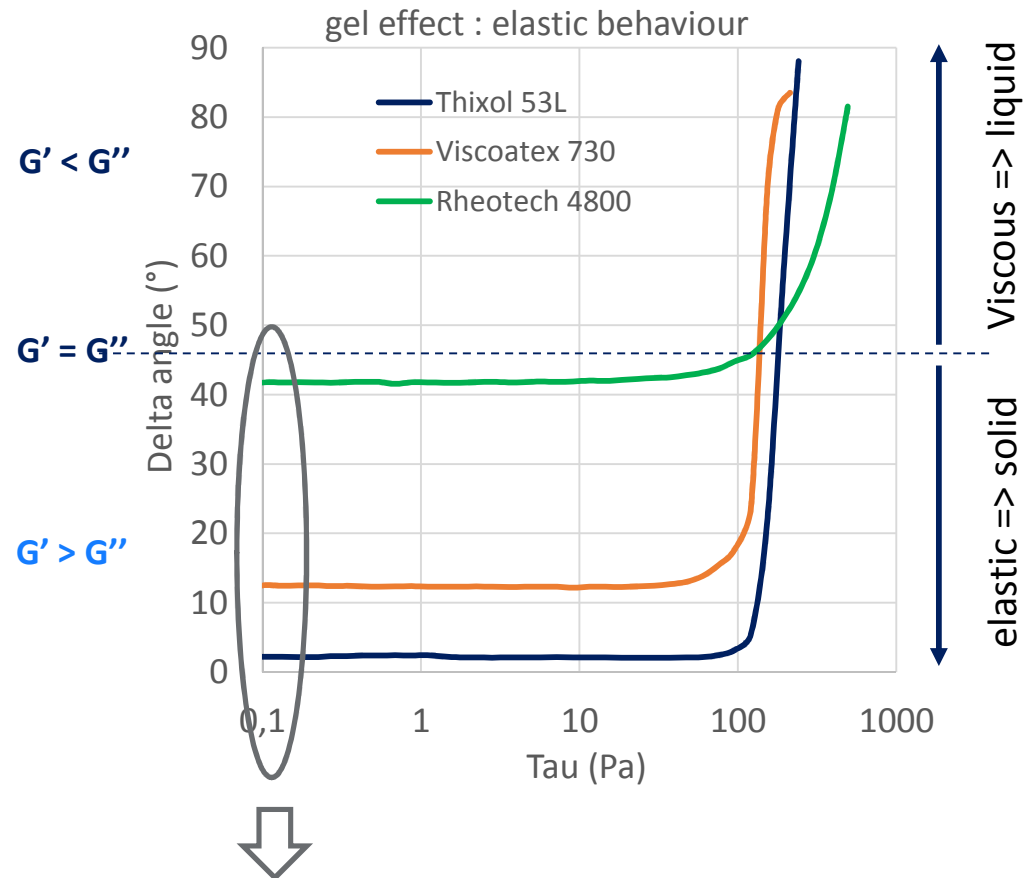
PSEUDOPLASTIC ACRYLIC THICKENERS - WATER GELS : TEXTURE AT REST

$$\tan \delta = \frac{G''}{G'}$$

G'' = viscous modulus (Pa)
 G' = elastic modulus (Pa)

Hydrophobically modified thickeners (HASE and PU) show $G'' > G'$ or G'' close to G'
 ⇒ 'soft' gel looks like a very **viscous liquid** with some flowability

Viscoatex™ 730 and Thixol™ 53L present $G' > G''$
 ⇒ 'hard' gel : looks like a **solid**



❖ Gel texture related to delta values at very low shear stresses

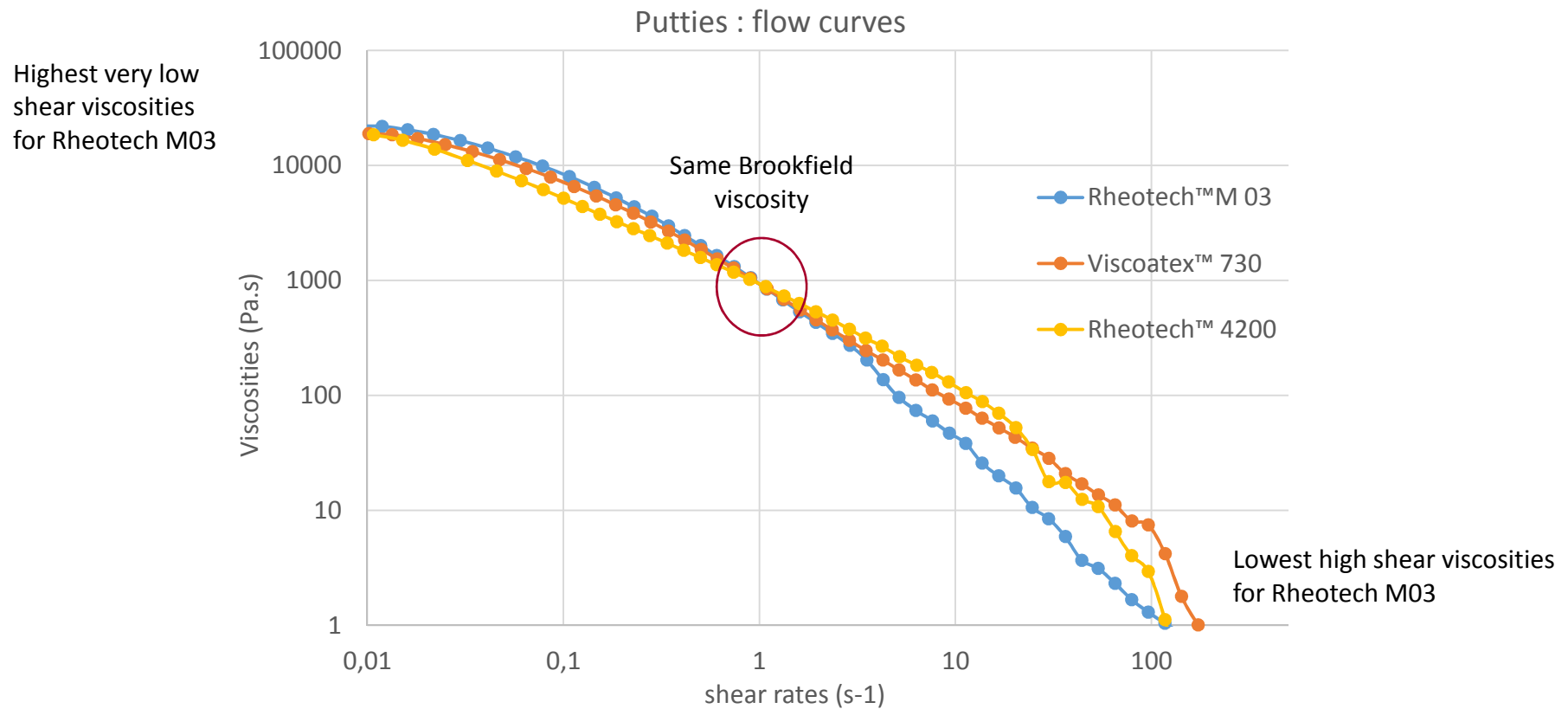
THICK COATINGS : PUTTY FORMULATION

- ❖ Thickener efficiency : dosage adjusted to achieve the same low shear viscosity
- ❖ Viscosity target : Brookfield 5 rpm @ t24h = 450 000 mPa.s

putty formulation	ingredients
Water	233,5
NaOH 20%	2,3
Biocide	1,6
TiO2	10
CaCO3 (40µm)	714
Styrène Acrylic Binder	20
Defoamer	0,6
Thickener at 30% S.C.	X
NaOH 20%	0,7
Water	qsp 1kg
Total (g)	1000

PUTTIES : RHEOLOGICAL PROFILES

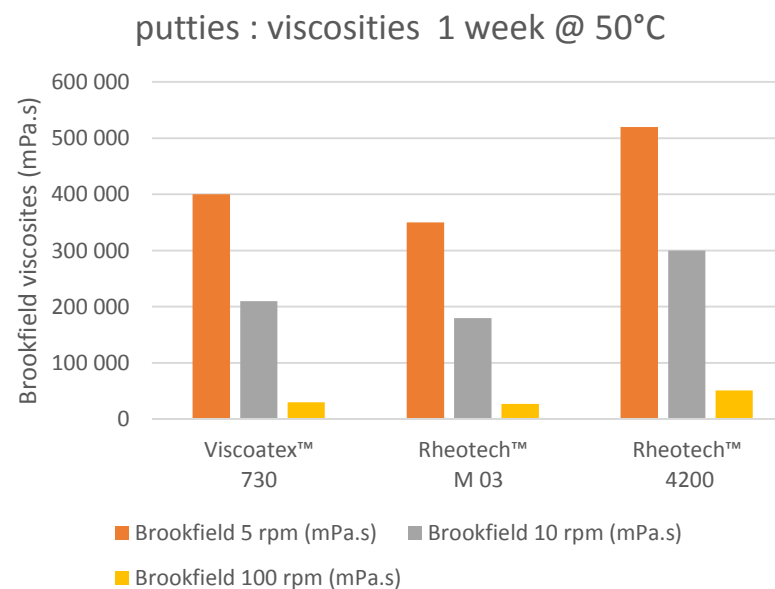
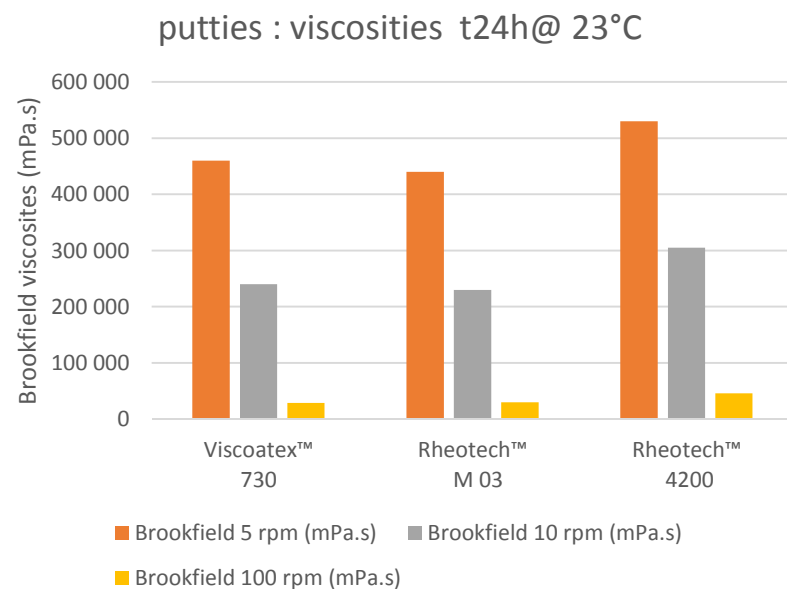
✦ Viscosity target : Brookfield 5 rpm @ t24h = 450 000 mPa.



✦ All putties present similar rheological pseudoplastic profiles

PUTTIES : VISCOSITIES

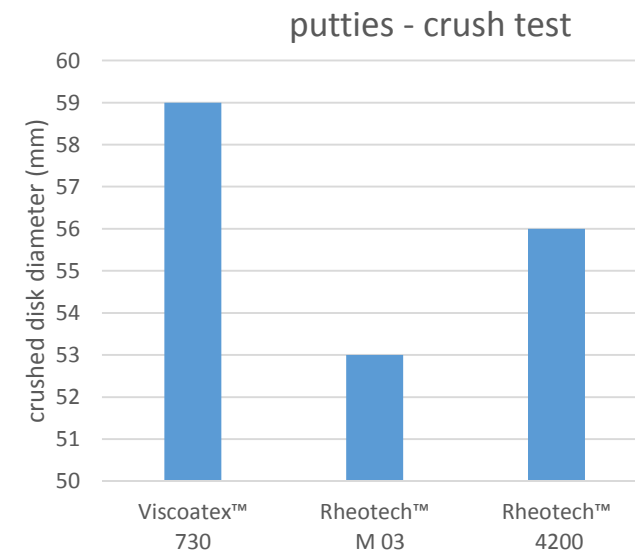
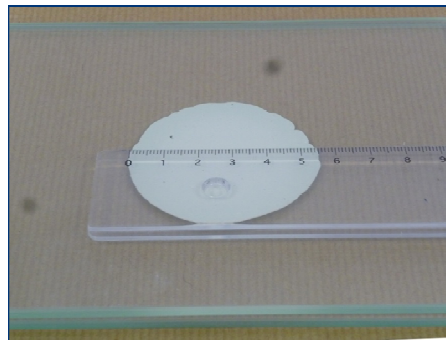
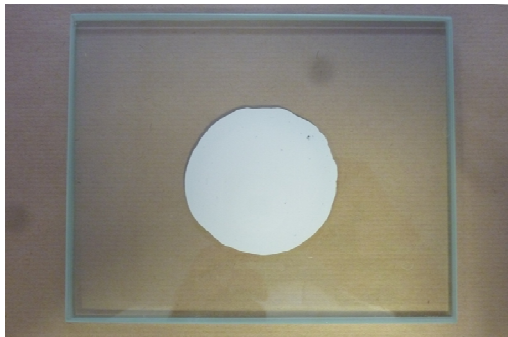
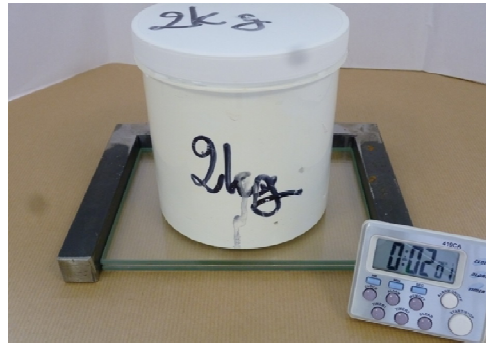
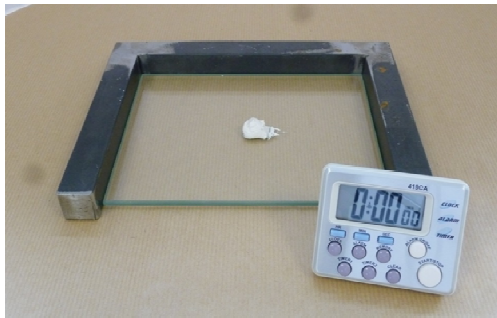
✦ Viscosity target : Brookfield 5 rpm @ t24h = 450 000 mPa.s



✦ Putties formulated with Rheotech 4200 remain very stable

PUTTIES : CRUSH TEST

❖ Viscosity target : Brookfield 5 rpm @ t24h = 450 000 mPa.s



❖ Putty formulated with Rheotech™ MO3 presents the best resistance to crush

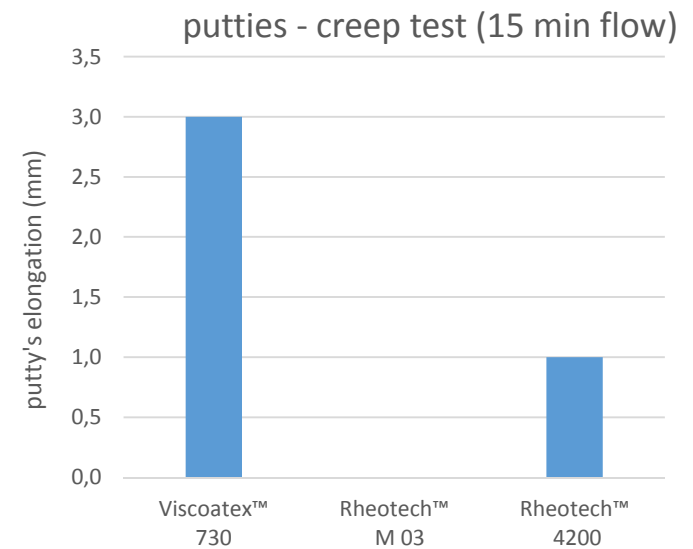
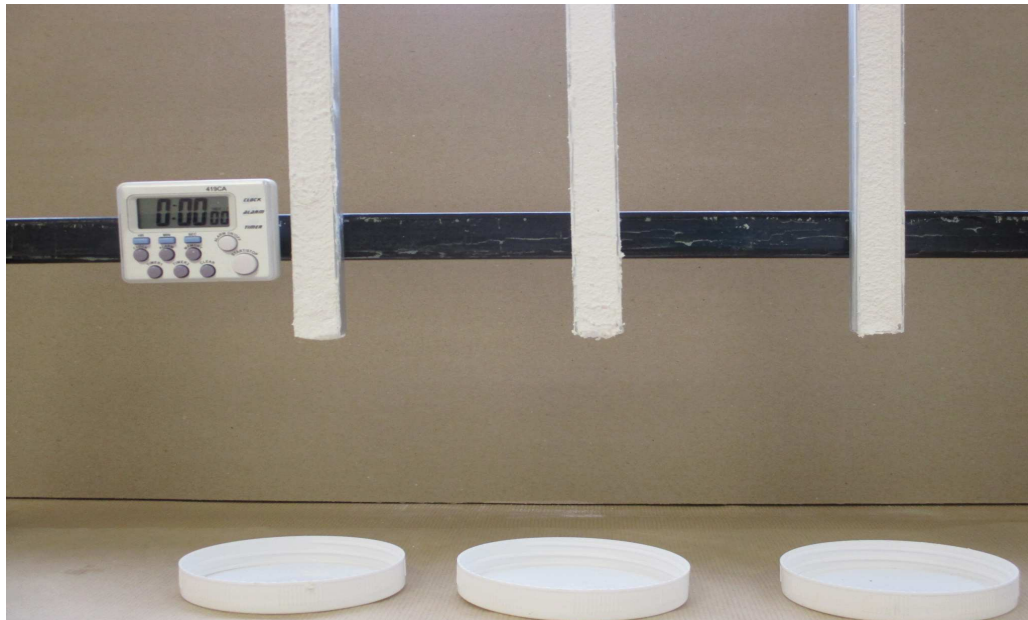
PUTTIES : VERTICAL FLOW

❖ Viscosity target : Brookfield 5 rpm @ t24h = 450 000 mPa.s

Rheotech
4200

Rheotech
M03

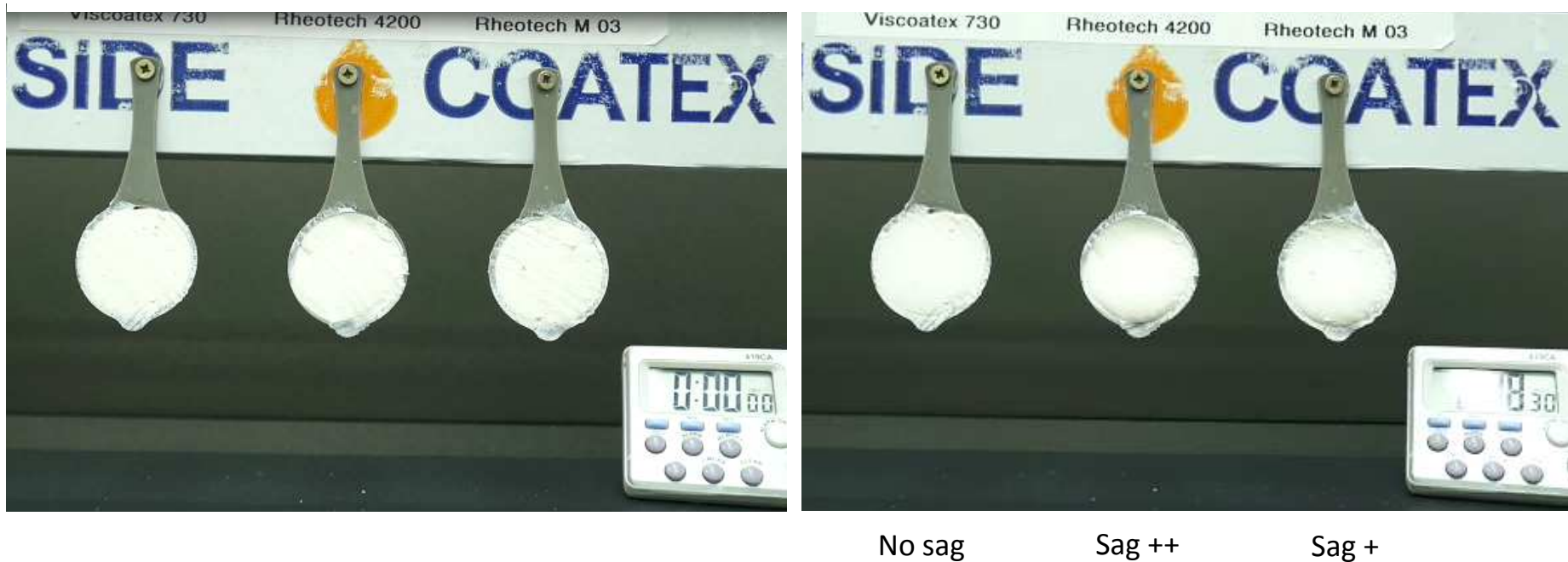
Viscoatex
730



❖ Putty formulated with Rheotech™ M03 presents the best resistance to creep

PUTTIES : DRIP TEST

- ✦ Viscosity target : Brookfield 5 rpm @ t24h = 450 000 mPa.s
- ✦ 1.5 cm deep cup filled vertically with the putty
- ✦ Visual assessment after 18 min flow : sag resistance



✦ Best compromise smooth behavior / resistance to drip for putty formulated with Rheotech™ MO3

PUTTIES : SPATULA TEST

✦ Viscosity target : Brookfield 5 rpm @ t24h = 450 000 mPa.s

Rheotech M03

Rheotech 4200

Viscoatex 730

t0



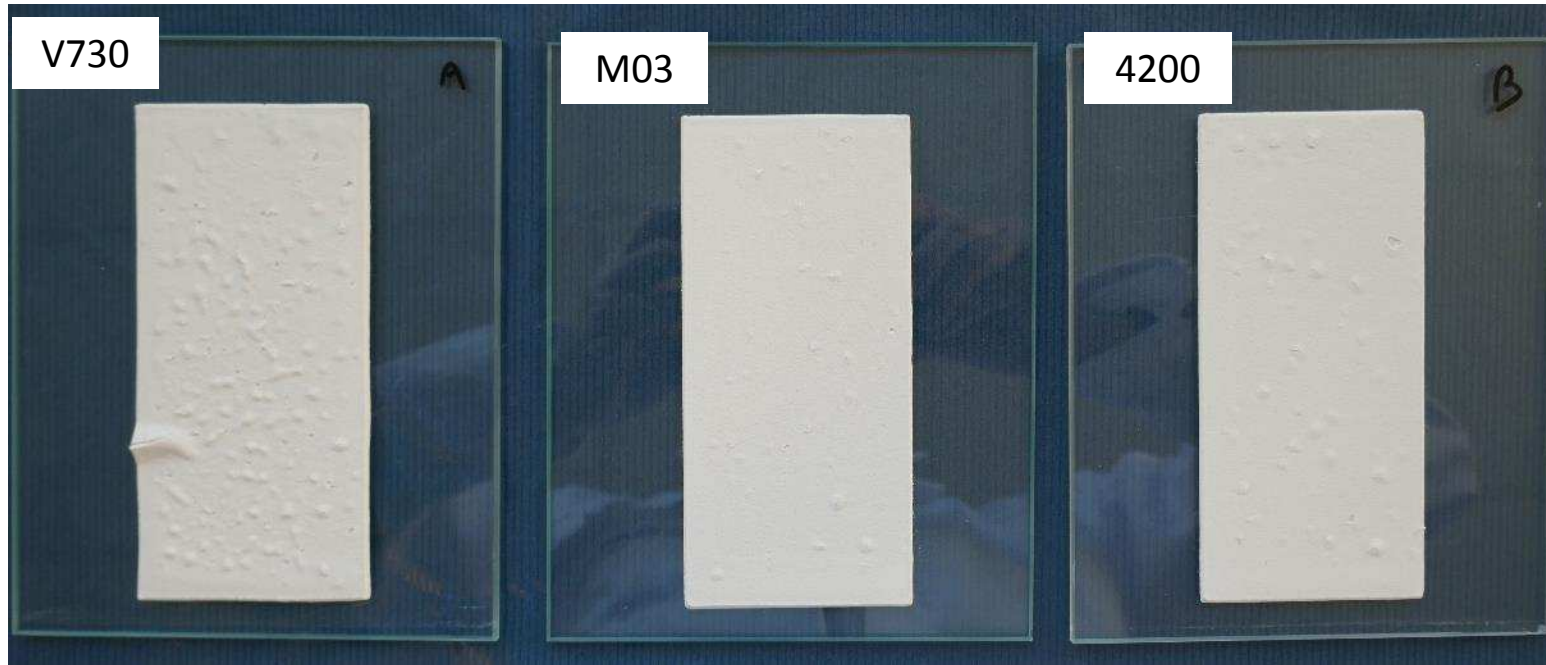
t60s



✦ All putties show similar recoveries

PUTTIES : WATER RESISTANCE

✦ Viscosity target : Brookfield 5 rpm @ t24h = 450 000 mPa.s



✦ Putty formulated with Rheotech™ M03 presents the best water resistance

ACRYLIC THICKENERS : PUTTIES

✦ Viscosity target : Brookfield 5 rpm @ t24h = 450 000 mPa.s



✦ Putties formulated with Rheotech™ MO3 present very good mechanical properties as well as excellent water resistance



COATEX ADDITIVES RANGE TABLES

COATEX
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COATEX ADDITIVES RANGE: DISPERSANTS

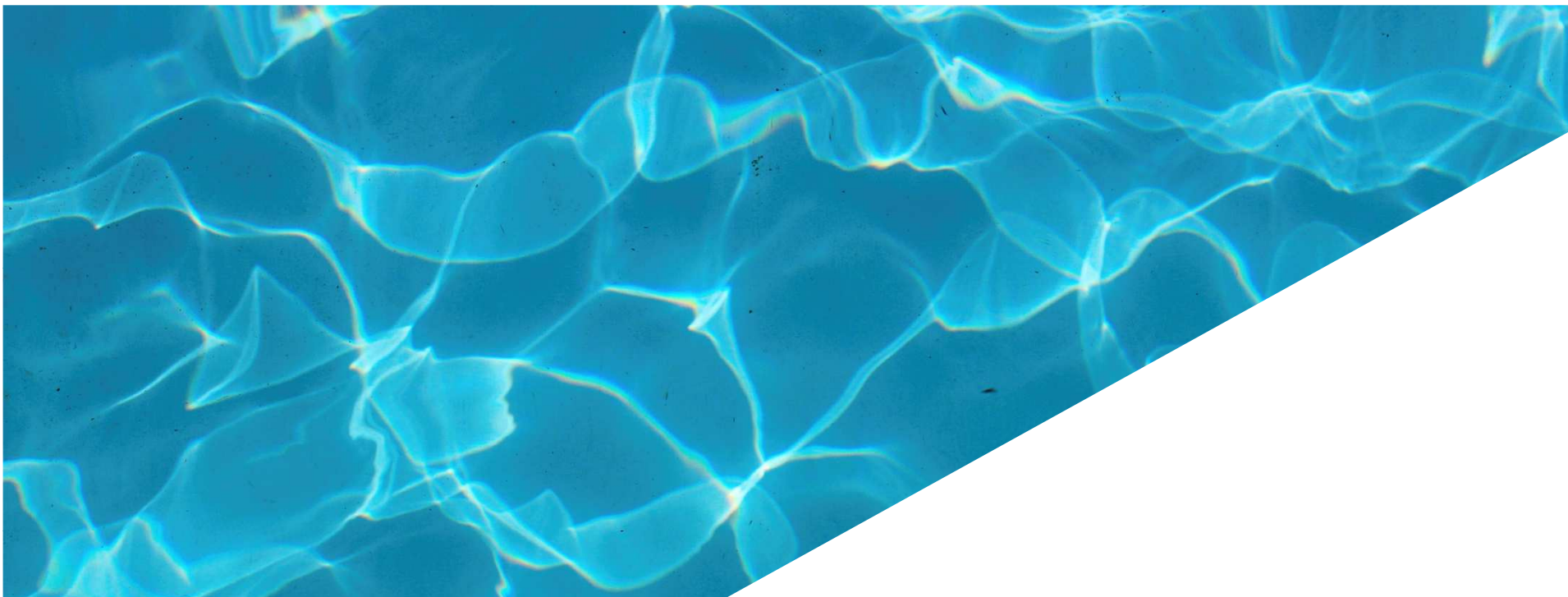
Name	Characteristics *										Use								
	Nature	Solvent	Appearance	Solids Content %	Polyphosphate replacement	High PVC	Solvent free	Water resistant	Low level of use	Dispersant of mineral pigments	Dispersant of CaCO ₃	Dispersant of TiO ₂	Dispersant of Fe ₂ O ₃	Dispersant of ZnO	Clay dispersant	Dispersant of organic pigments	pH of use	APEO free	Examples of Application
Coadis™ A 122	Sodium Salt of an Acrylic Copolymer	Water	Liquid	35		○	●		●	●	○	●	●	○		5-14	●		Paints and coatings containing ZnO
Coadis™ BR 3** Coadis™ BR 40***	Potassium salt of an Acrylic Copolymer	Water	Liquid	40		○	●	●	○	●	○	●	●	○	○	5-14	●		Gloss and semi-gloss paints Flat paints • Silicate paints Fe ₂ O ₃ , TiO ₂ dispersions
Coadis™ 123 K	Potassium salt of an Acrylic Copolymer	Water	Liquid	24		●	●	●		●	○	●	●	○	○	●	5-14	●	Water resistant flat paints and textured coatings • Gloss and semi-gloss paints Dispersions of organic pigments
Coadis™ 144 A	Ammonium salt of an Acrylic Copolymer	Water	Liquid	44		○	●	●	●	○	○	●			○	5-14	●		Eggshell to Gloss paints, TiO ₂ dispersions
Coadis™ 173 ^{New}	Sodium Polyacrylate	Water	Liquid	30		●	●	●	●	●	●	●	●	●	○	5-14	●		Roof coatings, Caulks & Sealants, Highly filled systems, ZnO containing systems
Coadis™ 335 A ^{New}	Ammonium Polyacrylate	Water	Liquid	36		●	●		●	●	●	●	○	○	○	5-14	●		Traffic paints and road marking
Coadis™ 352 N ^{New}	Sodium Polyacrylate	Water	Liquid	35		●	●		●	●	●	●	○	○	○	5-14	●		Traffic paints and road marking. Remarkable storage stability
Coadis™ BR 85	Polyalkoxylated Copolymer	Water	Liquid	35			●	●	○		○	●	○	○	○	○	5-14	●	Gloss alkyd emulsion TiO ₂ optimization (Bumper Technology™)
Coadis™ 790 ^{New}	Non-ionic Copolymer	Water	Liquid	40		○	●	●	●	●	○	●	●	●	○	●	2-14	●	Universal dispersant for organic and inorganic pigments: Industrial and architectural coatings, pigment pastes, Inks
Ecodis™ P 90	Ammonium Polyacrylate	Water	Liquid	40	●	●	●		●	●	●	○	○	○	○	5-10	●		Water resistant flat paints & Thick film coatings
Ecodis™ P 50	Sodium Polyacrylate	Water	Liquid	40	●	●	●		●	●	●	○	●	○	●		●		Odourless flat paints
Ecodis™ P 30	Sodium Polyacrylate	Water	Liquid	42	○	●	●		●	●	●	○	●	○	●	5-14	●		Odourless thick film coatings
Ecodis™ P 500 HR	Sodium Polyacrylate	Water	Liquid	40	●	●	●	○	●	●	●	○	●	○	○		●		Silicate paints

COATEX ADDITIVES RANGE: ACRYLIC THICKENERS

Name	Characteristics *						Examples of Applications
	Solvent	Appearance	Solids Content %	pH of use	Low VOC	Alkyl Phenol Ethoxylate Free	
Acrylic thickeners							
Viscoatex™ 46	Water	Liquid	32	> 8	●	●	Interior matt paints • Thick film coatings High strength adhesives
Viscoatex™ 730	Water	Liquid	30	> 8	●	●	Interior matt paints • Thick film coatings High strength adhesives Textured coatings
Thixol™ 53 L	Water	Liquid	30	> 8	●	●	Thick film coatings • Textured coatings Pigment pastes • Wood-stains
Associative acrylic thickeners							
Rheotech™ 2000	Water	Liquid	30	> 8	●	●	Gloss and semi-gloss paints Matt paints combined with another thickener
Rheotech™ 2800	Water	Liquid	30	> 8	●	●	Semi-gloss paints One coat matt paints
Rheotech™ 3800	Water	Liquid	30	> 8	●	●	Matt and semi-matt paints
New Rheotech™ 3900	Water	Liquid	30	> 8	●	●	Matt and semi-matt paints, limited post-thickening
Rheotech™ 4800	Water	Liquid	30	> 8	●	●	Matt paints Thick film and textured coatings
Rheotech™ M 02	Water	Liquid	30	> 8	●	●	Putties, plasters, gap fillers, textured paints, caulks and sealants, improved spatula feel and workability
New Rheotech™ M 03	Water	Liquid	30	> 8	●	●	Putties, plasters, gap fillers, textured paints, caulks and sealants. Lower water absorption than Rheotech™ M 02

COATEX ADDITIVES RANGE: POLYURETHANE THICKENERS

Polyurethane thickeners							
Coapur™ 6050	Water	Liquid	50	> 4	●	●	Waterproof membrane coatings Matt and anti-corrosion paints
Coapur™ 975 W <i>New</i>	Water	Liquid	17.5**	> 4	●	●	Matt and eggshell paints Satin to gloss paints combined with another thickener
Coapur™ 830 W Coapur™ 817 W	Water	Liquid	30** 17.5**	> 4	●	●	Eggshell to semi-gloss paints Matt and gloss paints combined with another thickener • Anti-corrosion paints
Coapur™ 520 W <i>New</i>	Water	Liquid	20	> 4	●	●	Eggshell to gloss paints VAE based paints • Matt paints combined with another thickener
Coapur™ 3025 Coapur™ 3020	Water	Liquid	25 20	> 4	●	●	Gloss to satin paints Wood coatings Matt paints combined with another thickener
Coapur™ 2025 Coapur™ 2020 W	Water	Liquid	25 20	> 4	●	●	Gloss to semi-gloss paints Lacquers and varnishes Matt paints combined with another thickener
Coapur™ 2501 <i>New</i>	Water	Liquid	20	> 4	●	●	Gloss to satin paints Lacquers and varnishes Matt paints combined with another thickener
Coapur™ XS 83 <i>New</i>	Water	Liquid	30**	> 4	●	●	Thick coatings • Textured paints Heavy duty and anti-corrosion paints Spray coatings
Coapur™ XS 71	Water	Liquid	17.5**	> 4	●	●	Waterproof membrane coatings Matt and anti-corrosion paints Wood stains
Coapur™ XS 22	Water	Liquid	25**	> 4	●	●	Gloss and semi-gloss alkyd emulsion paints



COATEX THICKENERS SELECTION GUIDE

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COATEX THICKENERS SELECTION GUIDE

Ranking

★: Suits to the application
 ★★: Imparting technical improvements
 ★★★: Advantageously impacting quality and/or cost effectiveness. Strongly recommended.

☐: in combination with another thickener

	Viscoatex™ 46	Viscoatex™ 730	Thixo™ 53 L	Rheotech™ 2000	Rheotech™ 2800	Rheotech™ 3800	New Rheotech™ 3900	Rheotech™ 4800	Rheotech™ M 02	New Rheotech™ M 03	Coapur™ 2025	Coapur™ 2020 W	New Coapur™ 2501	Coapur™ 3025	Coapur™ 3020	New Coapur™ 520 W	Coapur™ 830 W	New Coapur™ 817 W	New Coapur™ 975 W	Coapur™ 6050	New Coapur™ XS 83	Coapur™ XS 71	Coapur™ XS 22
General selection criteria																							
Low VOC (solvent free)	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
AlkylPhenolEthoxylate (APE) free	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Non pH dependant											•	•	•	•	•	•	•	•	•	•	•	•	•
Water/scrub resistance		•	•								•	•	•	•	•	•	•	•	•	•	•	•	•
Improved compatibility with pigment			•	•	•	•		•	•	•	•	•	•	•	•	•	•		•	•	•	•	•
Spray application	•	•	•			•		•	•	•								•	•	•	•		
Targeted rheological effect																							
Low shear (Brookfield)	•	•	•			•		•	•	•							•	•	•	•			
Medium shear (Stormer)				•	•	•		•	•	•						•	•	•	•	•	•	•	•
High shear (Cone & Plate)				•	•						•	•	•	•	•	•	•				•	•	

COATEX THICKENERS SELECTION GUIDE

Ranking

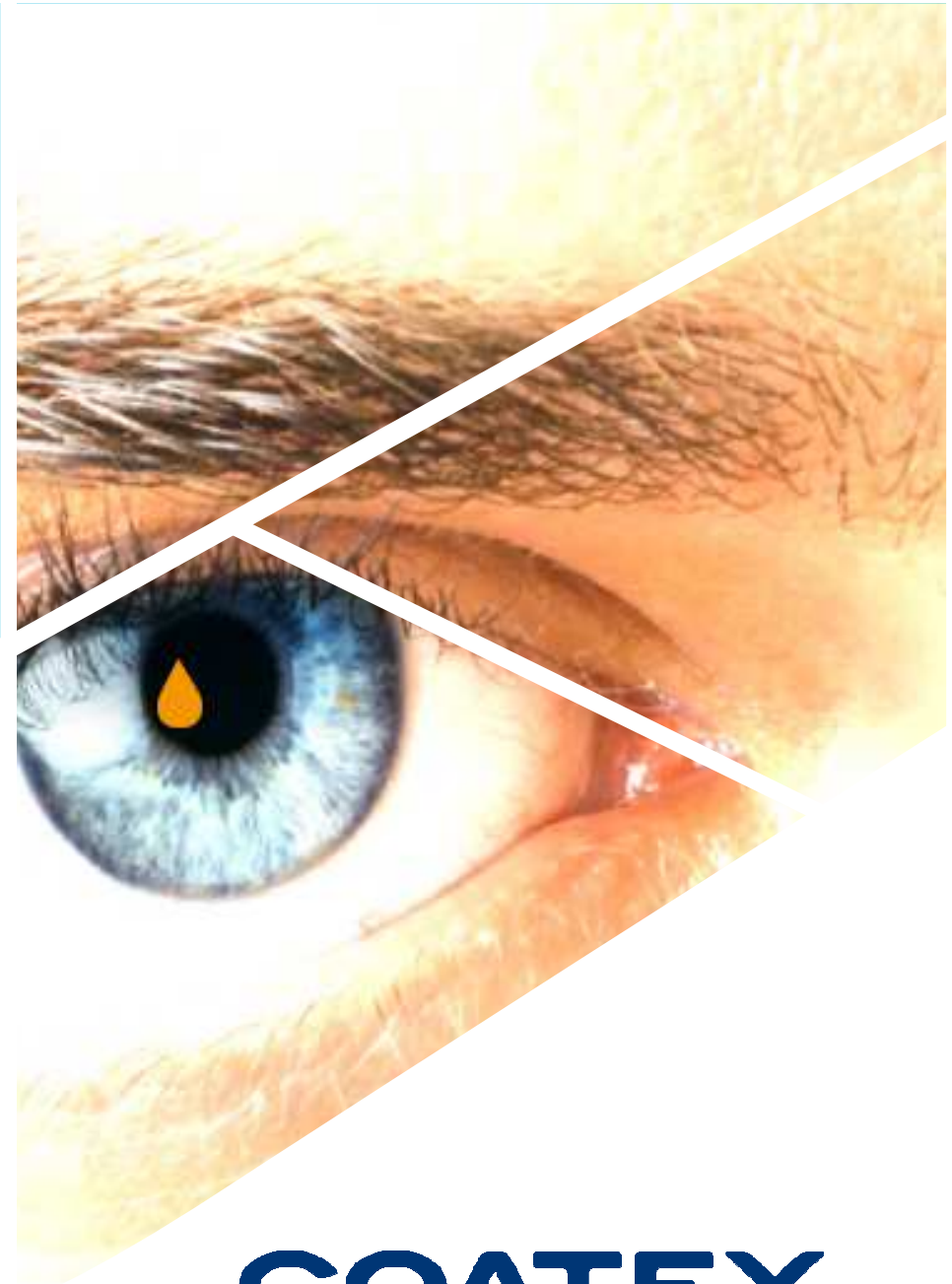
- ★: Suits to the application
- ★★: Imparting technical improvements
- ★★★: Advantageously impacting quality and/or cost effectiveness. Strongly recommended.

⌘: in combination with another thickener

Viscoatex™ 46			Viscoatex™ 730			Thixol™ 53 L			Rheotech™ 2000			Rheotech™ 2800			Rheotech™ 3800			New Rheotech™ 3900			Rheotech™ 4800			Rheotech™ M 02			New Rheotech™ M 03			Coapur™ 2025			Coapur™ 2020 W			New Coapur™ 2501			Coapur™ 3025			Coapur™ 3020			New Coapur™ 520 W			Coapur™ 830 W			New Coapur™ 817 W			New Coapur™ 975 W			Coapur™ 6050			New Coapur™ XS 83			Coapur™ XS 71			Coapur™ XS 22																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
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**THANK YOU FOR YOUR
ATTENTION**

**DO YOU HAVE ANY
QUESTIONS ?**



COATEX
ARKEMA GROUP