

Products

Business Fields

Senka is actively operating in many fields. Its technologies are used in a variety of fields ranging from textile processing to paper and pulp processing, water treatment, functional polymers, and antibacterial/antifungal treatment. While the activity of Senka is not well known to general consumers, its technological ability is highly rated in industry segments. Its chemical technologies are reliably supporting people's lives behind the scenes.

[Textile processing](#) P. 2



[Paper manufacture/processing](#) P.10



[Water treatment](#) P. 16



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[Antibacterial treatment, agriculture/gardening, and sanitation](#) P. 40



[Development articles](#) P. 41

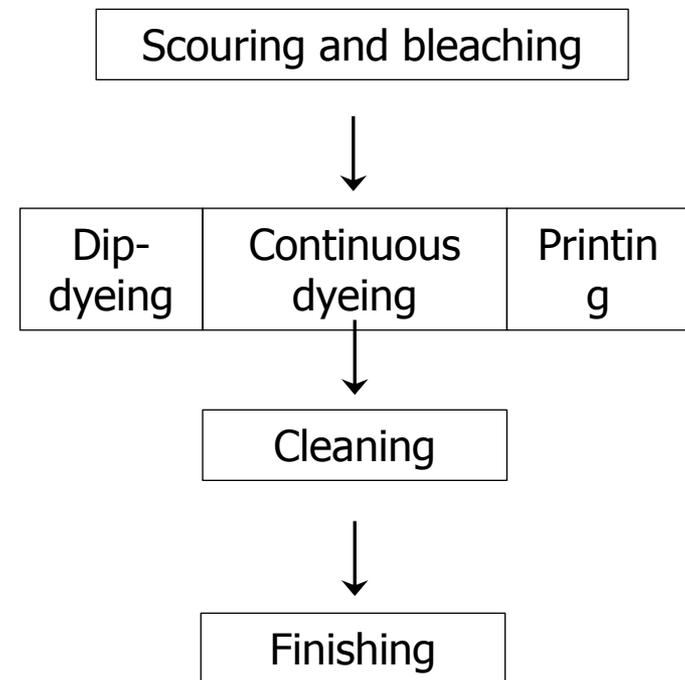


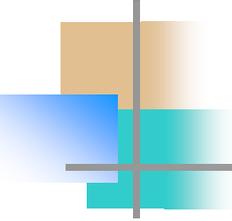
Textile Processing Field

Product lineup

- Scouring cleaners
- Dyeing-process chemicals
- Chemicals for printing
- Cationic fixing agents
- Anionic fixing agents
- Functional chemicals
- Antifoaming agents
- Deodorizing agents

Dyeing and finishing process





What is a Fixing Agent?

A fixing agent is a chemical agent used to improve the wet color fastness (to prevent dye from coming off). A fixing agent is used to increase wet color fastness (fastness to washing, sweat, and chlorine, and resistance to bleeding) of clothing and other textile products to a practically required level.

-> A fixing agent ensures conformance to the JIS and apparel standards.

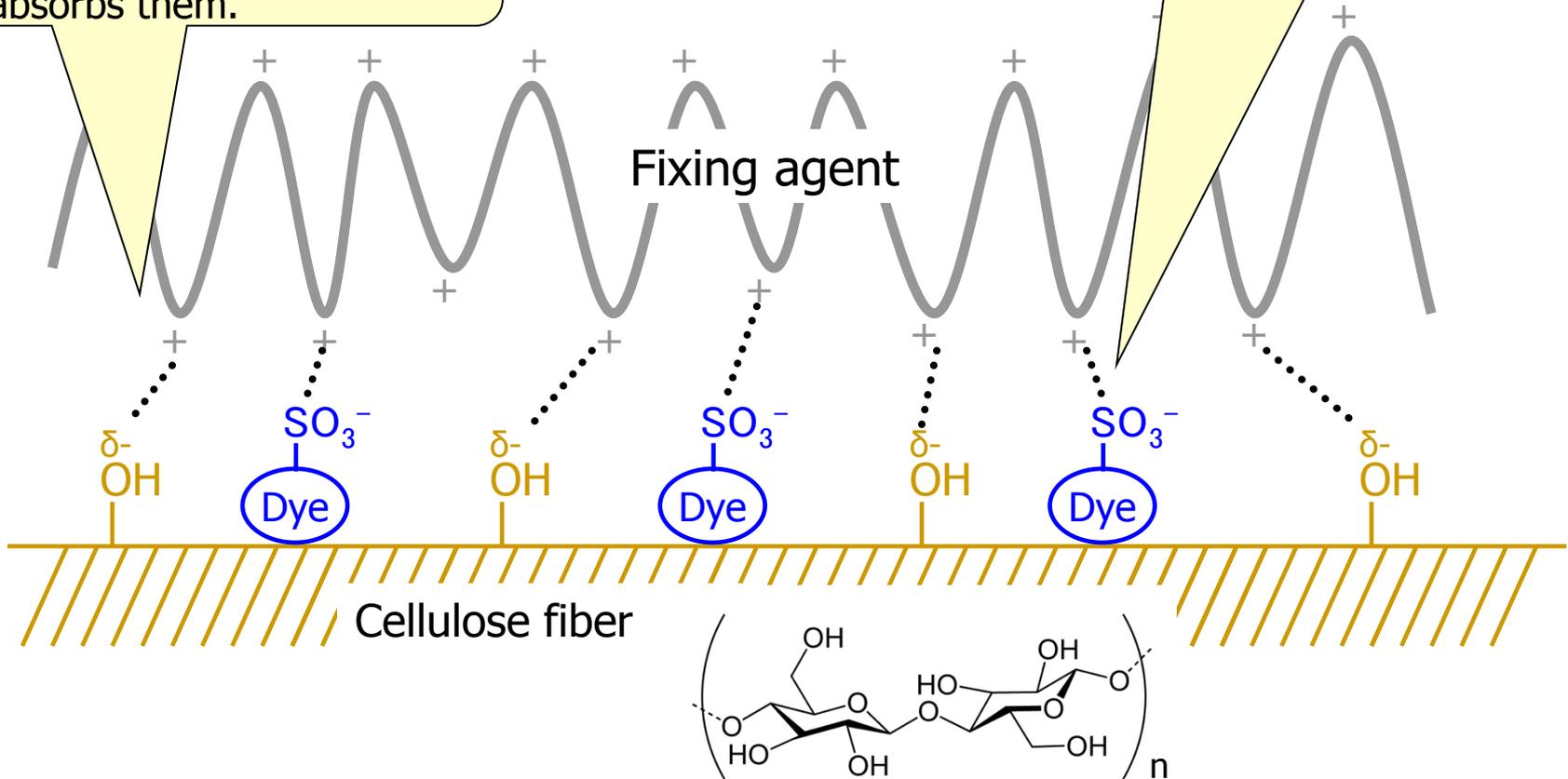
Cationic Fixing Agents for Cellulose

Type	Dye	Advantage	Disadvantage
Dicyandiamide	Direct	Excellent in preventing white areas from staining	Formalin contained
Polyamine	Direct	Excellent wet color fastness	Considerable discoloration during treatment Large decrease in fastness to chlorine and light
	Reactive (Dark colors)		
Polycationic	Reactive	No considerable discoloration during treatment No large decrease in fastness to light	(Large decrease in fastness to chlorine)
	Direct (Light colors)	No considerable discoloration during treatment No large decrease in fastness to chlorine and light	

How a Fixing Agent for Cellulose Fixes Dye

With an affinity for cellulose fibers, the agent absorbs them.

The agent binds dye through ion-binding and insolubilizes it.



Test Data on Fixing Agents (Wet Color Fastness)

		Cloth treated	Washing test (A-2)			Washing test (A-4)			Alkaline sweat test		
			Cloth tested	Brocade width	Silk	Cloth treated	Brocade width	Silk	Cloth treated	Brocade width	Silk
0	Untreated										
1	SENKAFIX 157										
2	SENKAFIX 401										
3	SENKAFIX 600										
4	SENKAFIX E-300										
5	SENKAFIX JOY-30										
6	CHERCUT CF-2										

Dye: [Kayacion Yellow E-CM 2% owf
 Kayacion Red E-CM 2% owf
 Kayacion Blue E-CM 2% owf

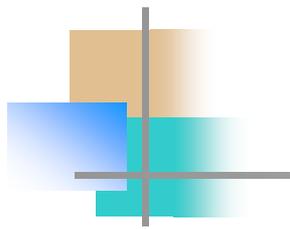
Fixing agents: For each agent, 4% owf treatment at 60°C for 20 minutes, with a bath ratio of 1:20

Light-fastness Improver SHINEGUARD W-51 NEW

Light-fastness test JIS L-0842					
		Cloth dyed with a cotton-knit reactive dye (dark color)		Cloth dyed with a cotton-knit reactive dye (light color)	
		Light applied	Shielded	Light applied	Shielded
Untreated					
SHINEGUARD W-51 NEW 5% owf					
SHINEGUARD W-51 NEW 7% owf					
SHINEGUARD W-51 NEW 10% owf					

Chlorine-fastness Improver

■ Change in color (blueness) after testing with 20 ppm of chlorine



Dye:
Procion Blue H-EGN
0.5% owf

	Chlorine-fastness test		
	Cloth treated	10 ppm	20 ppm
0			
1			
2			
3			
4			
5			
6			

Raw fabric

0. Untreated

1. SENKAFIX 157

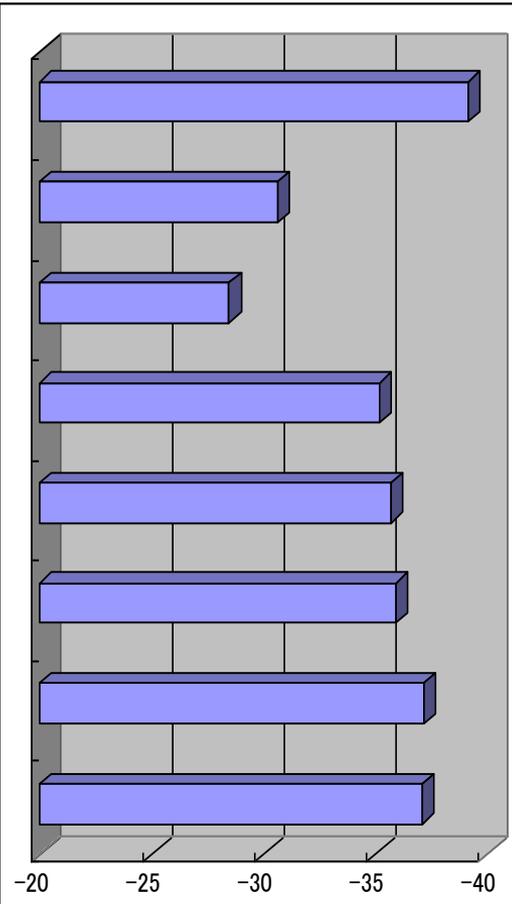
2. SENKAFIX 401

3. SENKAFIX 600

4. SENKAFIX E-300

5. SENKAFIX JOY-30

6. CHERCUT CF-2



Dye:
Sumifix Brilliant Blue GL conc
1.0% owf

	Chlorine-fastness test			Chlorine-fastness test (renown method)		
	10 ppm	20 ppm	Cloth treated	Cloth treated	10 ppm	20 ppm
Untreated cloth						
CHERCUT CF-2						

Deodorizing Agents SENKAMELSEN A-22 and N-19H

Test sample: Cotton knit (not mercerized, 40 single yarns, and mass per unit area: 205 g/m²)

Treatment conditions: SENKAMELSEN A-22: 15 g/L

SENKAMELSEN N-19H 6.0 g/L

Padding (1 dip, 1 nip, 100% pickup) -> Drying (at 120° C for 3 minutes)

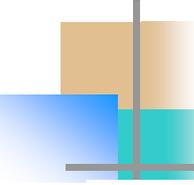
Washing conditions: 10 times using the simple process

	Nonenal		Isovaleric acid		Ammonia		Acetic acid	
	Unwashed	10 times of washing	Unwashed	10 times of washing	Unwashed	10 times of washing	Unwashed	10 times of washing
Untreated cloth	43%	61%	96%	99%	50%	51%	96%	95%
Cloth tested	86%	93%	99%	99%	89%	81%	96%	95%

Odor measuring method:

Nonenal and Isovaleric acid: Standard testing method (gas chromatography) certified by the Japan Textile Evaluation Technology Council

Ammonia and acetic acid: Our testing method based on the standard testing method (detector tube method) certified by the Japan Textile Evaluation Technology Council



Paper Manufacture/processing Field

The use of fixing agents, yield improvers, pitch controllers, discoloration inhibitors, and other chemicals eliminate problems that would be encountered in the paper manufacture processes.

[SENKA F series]

[SENKA F-300](#)

The SENKA F-300 is a fixing agent for direct and reactive dyes for paper. In the process of making colored paper, it can be internally added to improve the yield rate of the dye and to reduce the amount of dye flowing out to effluent.

[SENKA FK series]

[SENKA FK-103](#)

The SENKA FK-103, if added later to pulp slurry dyed with cationic and basic dyes, improves the water-fastness of the dye.

[PAPYOGEN series]

[PAPYOGEN P-105 and P113](#)

They are ink fixing agents for inkjet recording paper. The PAPYOGEN P-105 or P113, if applied to or impregnated into plain paper, prevents dye ink from blurring and improves water resistance.

[MILLIOGEN series]

[MILLIOGEN P-20](#)

The MILLIOGEN P-20 is a reactive wet strength agent. With alkali activation, it provides a very excellent capability of enhancing the wet strength compared with conventional polyamide resin.

[[PITCHNOL QG5A](#)]

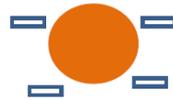
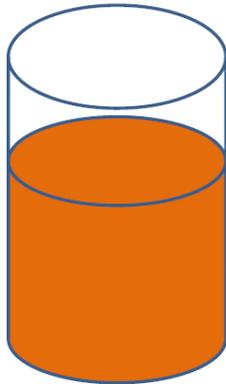
The PITCHNOL QG5A is a pitch controller composed mostly of water-soluble cationic polymers. It prevents pitch fractions from flocculating or adhering. Unlike surfactant-type controllers, it effectively controls pitch fractions even if it is in small amounts.

[[SENKAFLUORENCE P-58](#)]

The SENKAFLUORENCE P-58, if applied to pulp containing a fluorescent brightener, provides excellent fluorescence suppression. In addition, it does not cause much discoloration.

Fixing Dye Ink

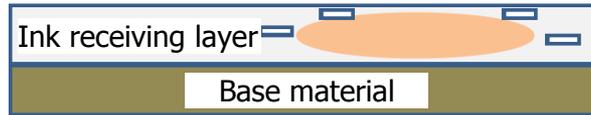
IJ dye ink



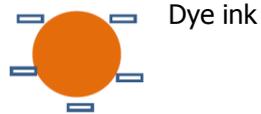
Ink is impregnated.



Ink blurs.

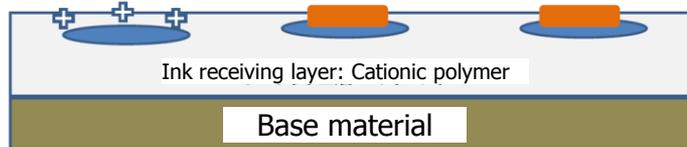


Brilliant, shiny colors
Excellent expression of neutral colors
in photographs and others
Likely to blur if printed on plain
paper
Vulnerable to water



Dye ink

No blur



Ink receiving layer: Ink absorber, fixing agent, and binder

Test Data on Fixation of PAPYOGEN-series IJ Inks

Test sample: Non-sizing paper

Treatment: 0.5 g/m² of sizing agent of + 1.5 g/m² of fixing agent

Conditions: Padding (60% pickup) -> drying (at 90°C for 2 minutes) -> printing

Printer: Canon MP-950

Ink: Canon 7e

Testing procedure: Printed paper is immersed in water.

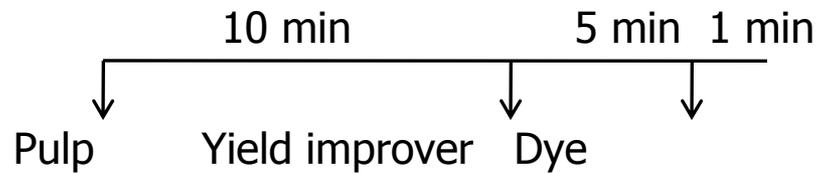
	After printing	After immersion		After printing	After immersion
Untreated			PAPYOGEN P-300 1.5 g/m ²		
PAPYOGEN P-105 1.5 g/m ²			UNISENCE CP-101 1.5 g/m ²		
PAPYOGEN P-271 1.5 g/m ²			UNISENCE CP-103 1.5 g/m ²		

Yield Test Data on the SENKA F Series

Test sample: NBKP

Dye: Kayarus Supre Red BWS

Process: Base weight of 50 g/m³

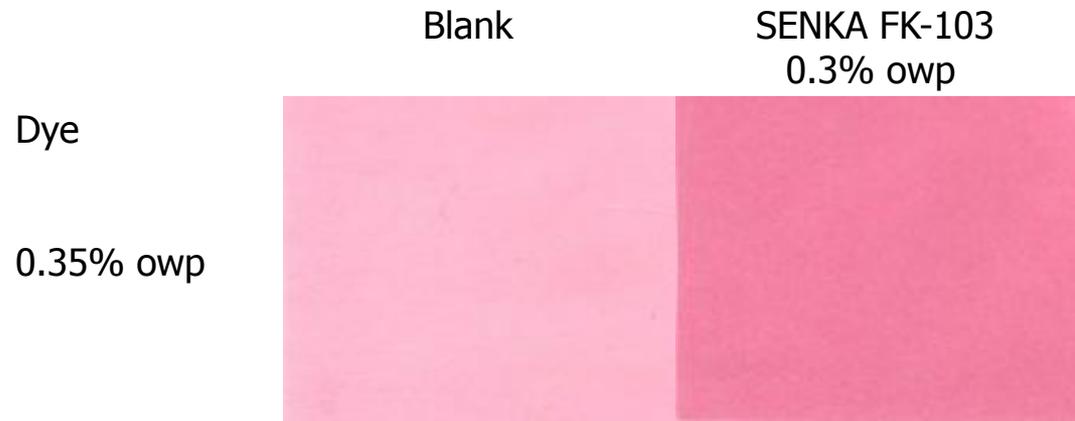
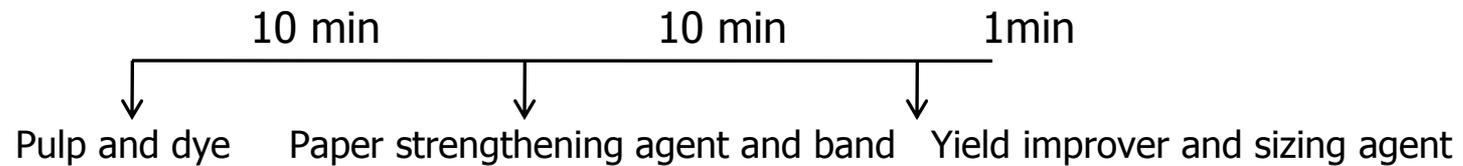


Yield Test Data on the SENKA FK Series (Cationic Dye)

Test: NBKP

Dye: Aizen Catilon Red BLH 200%

Process: Base weight of 80 g/m³



The SENKA FK-103 added to the blank increases the concentration approximately 40%.

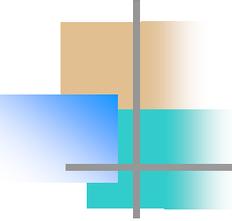
Fluorescent Dye Masking Test Data on the SENKAFLUORENCE P-58

Test sample: ADVANTEC filter No. 2

Treatment: Ratio between the fluorescent coating and SENKAFLUORENCE P-58 = 100:1 to 100:10

Testing procedure: In a darkroom, black light is applied.

NOx test (5 units)	Treated paper	Fading test (at 60° C for 20 hr)			NOx test (5 units)	Treated paper	Fading test (at 60° C for 20 hr)	
		Shielded	Light applied				Shielded	Light applied
				Base paper				
				Fluorescent coating: 100%				
				Fluorescent coating: 100 SENKAFLUORENCE P-58: 1				
				Fluorescent dye: 100 SENKAFLUORENCE P-58: 5				
				Fluorescent coating: 100 SENKAFLUORENCE P-58: 6				
				Fluorescent coating: 100 SENKAFLUORENCE P-58: 7				
				Fluorescent coating: 100 SENKAFLUORENCE P-58: 7.5				
				Fluorescent coating: 100 SENKAFLUORENCE P-58: 8				
				Fluorescent coating: 100 SENKAFLUORENCE P-58: 10				



Wastewater Treatment

Product lineup

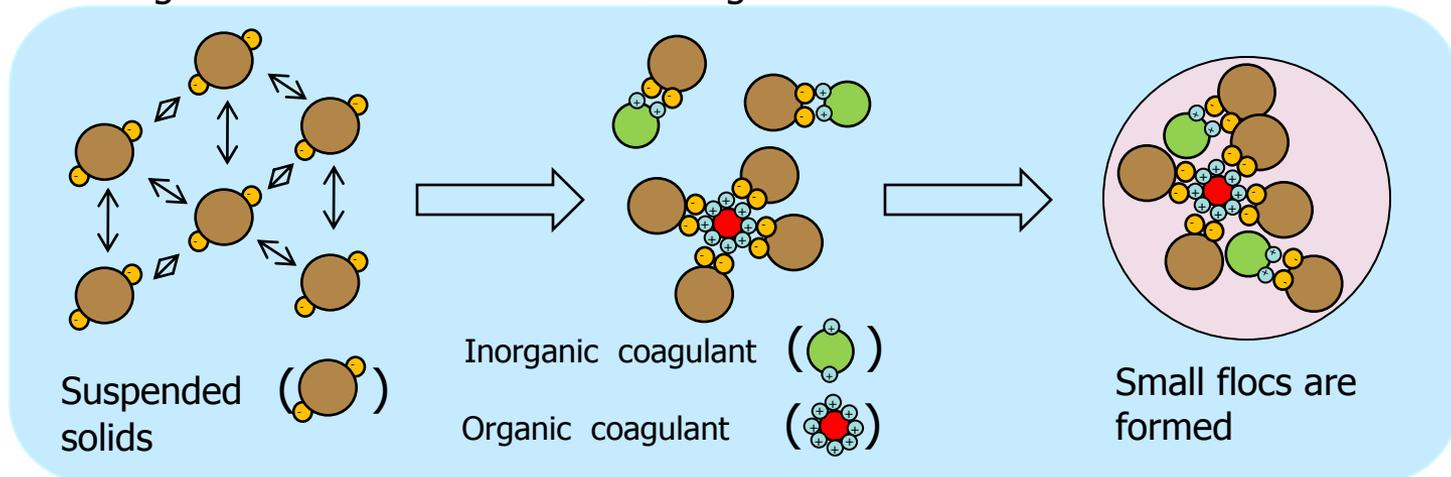
- Organic coagulants
- Decolorizers for colored waste water
- Polymeric flocculants
- COD reducers
- Antifoaming agents
- Simultaneous-type inorganic flocculants

How an Organic Coagulant Coagulates Substances

In wastewater treatment, it is necessary to remove colored, harmful, and suspended solids contained in waste water discharged from factories and offices by coagulating and flocculating such substances.

Coagulants $\left\{ \begin{array}{l} \text{Inorganic coagulants (aluminum sulfate, polyaluminum chloride, etc.)} \\ \text{Organic coagulants (ionic water-soluble polymers)} \end{array} \right.$

Compared with inorganic coagulants, organic coagulants in small amounts provide excellent coagulation performance by neutralizing surface charges of suspended solids, resulting in a decreased amount of sludge and reduced treatment costs.

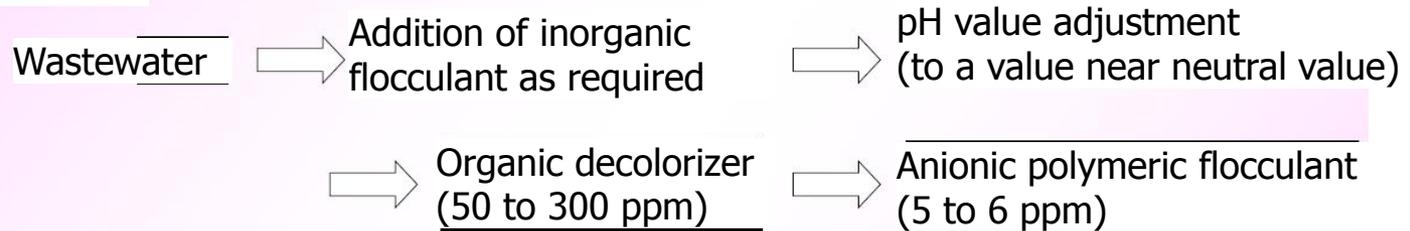


Wastewater Treatment Agent

Type	Form	Characteristics
[Polymeric flocculant] SENKA FLOCK series	Powder Reversed-phase emulsion	Many grades are available such as cationic, amphoteric, and anionic flocculants.
[Decolorizers for colored wastewater] SENKA FLOCK Z series	Liquid	They require combined use with aluminum sulfate, PAC, and the like. They flocculate colored components to decolorize wastewater.
[Organic coagulants] SENKA FLOCK DC series SENKA FLOCK DE series	Liquid	With smaller amounts of aluminum sulfate, PAC, and the like, they reduce sludge.
[Organic coagulants] COD reducing type SENKA FLOCK BM series	Liquid	They reduce COD in organic wastewater with smaller amounts of aluminum sulfate, PAC, and the like.
[Simultaneous-type inorganic flocculants] SUBSIDER series	Powder	With simultaneous addition, they flocculate substances. They can be used for various types of industrial wastewater and water containing paint and/or resin.

Decolorizers for colored wastewater

Usage

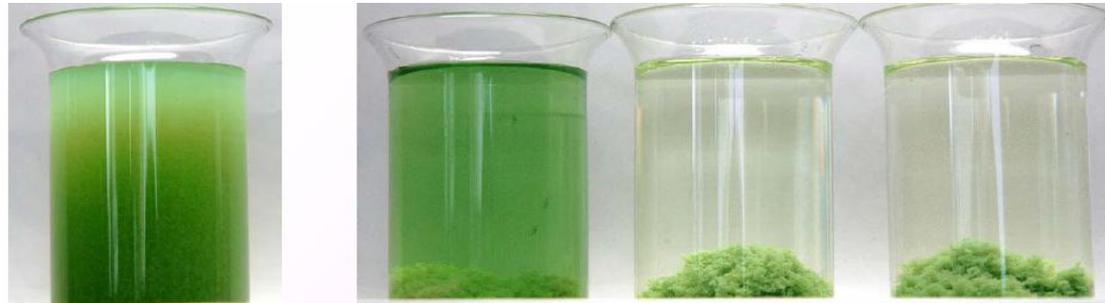


SENKA FLOCK Z series

Test example

Wastewater: Wastewater containing dye

Treatment process: Polyferric sulfate -> pH adjustment -> SENKA FLOCK Z-150C -> Anionic polymeric flocculant



Amount of SENKA FLOCK Z-150C added

Untreated water

No flocculant added

50 mg/L

100 mg/L

Sludge Reducer

Usage

Wastewater



Inorganic flocculant
(1000 to 3000 mg/L)



pH adjustment
(near the neutral value)



Organic flocculant
(50 to 200 mg/L)



Anionic polymeric flocculant
(3 - 5 mg/L)



SENKA FLOCK DC and DE series

Test example

①



②



③

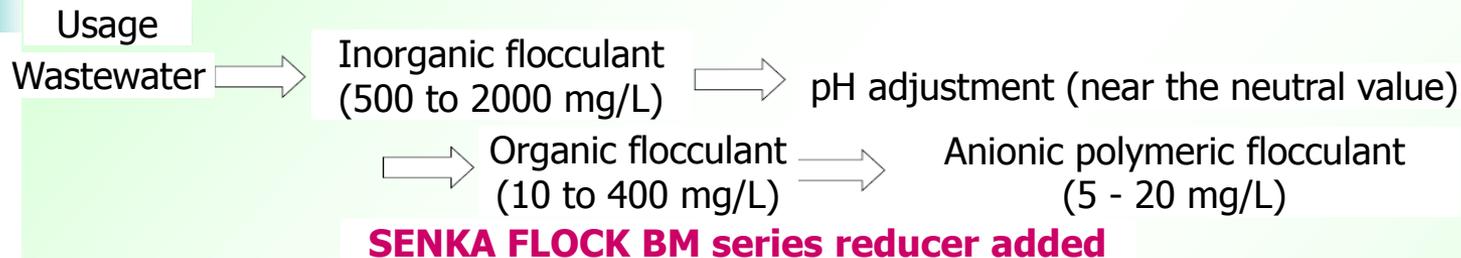


(1): Untreated water

(2): Polyferric sulfate (5000 mg/L) -> Anionic flocculant (3 mg/L)

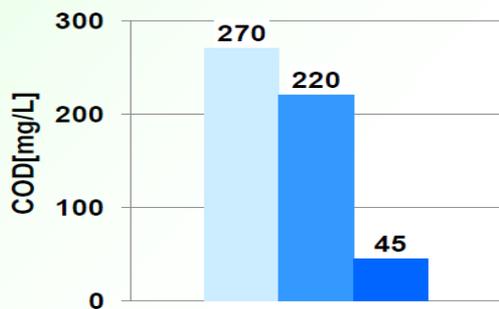
(3): Polyferric sulfate (2000 mg/L) -> SENKA FLOCK DC-60 (50 mg/L) -> Anion flocculant (3 mg/L)

COD Reducers of SENKA FLOCK BM series



COD test (filtrate)

Wastewater containing PVA



- Untreated water
- Inorganic (600 mg/L)
- Inorganic (600 mg/L) + SENKA FLOCK BM-20M (400 mg/L)

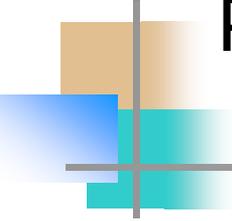
Wastewater containing nonionic surfactant



- Untreated water
- Inorganic (2000 mg/L)
- Inorganic (2000 mg/L) + SENKA FLOCK BM-80M (200 mg/L)

Wastewater that can be treated

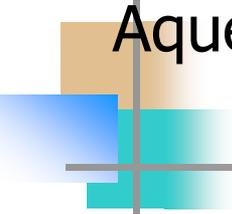
Wastewater containing PVA, nonionic surfactant, food, paper, cutting oil, etc.



Paint and Ink Field

Product lineup

- Ultraviolet absorber (aqueous-based emulsion type)
- Dryness controllers
- Many types of dispersants
- Thickeners (emulsion type)



Aqueous-based Ultraviolet Absorbers and Light Stabilizers of the SHINEGUARD Series

SHINEGUARD TA-04	Hydroxyphenyltriazine ultraviolet absorber
SHINEGUARD TA-22	Hydroxyphenyltriazine ultraviolet absorber
SHINEGUARD BZ-24	Benzotriazole ultraviolet absorber
SHINEGUARD HL-06	Light stabilizer (HALS)

Features of the SHINEGUARD-series Products

- Easily dispersed in water, they can be added to a variety of aqueous-based products.
- They stably disperse without separating or settling even if added to paint and the like.
- With an excellent light resistance, they keep paint films from deteriorating.
- Combined use of UVA and HALS further improves the light resistance.



Evaluation of the Light Resistance of the SHINEGUARD Series Products (1) (Dye IJ Printing)



No light applied

Light applied with
no SHINEGUARD product added

Light applied with a SHINEGUARD
product added

- * Ratio in weight between BZ-24 and HL-06 is 1:2.
- * Amount of coating: 9.0 g/m²
- * Coating -> printing -> testing (at 63° C for 50 hours)
using a fade meter

Evaluation of the Light Resistance of the SHINEGUARD Series Products (2) (Aqueous-based Wood Paint)

Clear urethane coat applied to a board

No SHINEGUARD product added { SHINEGUARD TA-22: 2%
SHINEGUARD HL-06: 2%



* Amount of SHINEGUARD added: express as the weight ratio (%) of SHINEGUARD to the resin solid content

* Test conditions: 11-month actual exposure

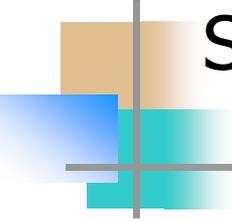
SENKA ACTGEL Series

Product	Type	Ionic character	Appearance	Composition	Solid content (%)	Product viscosity (mPa·s)	1% water solution pH	Recommended pH range
SENKA ACTGEL AP200	Self-thickening	Anionic	Milk-white emulsion	Polyacrylic alkali metal salt	35	600	7.5	7 to 10
SENKA ACTGEL AW200	Self-thickening	Anionic	Milk-white emulsion	Polyacrylic ammonium salt	35	600	7.5	7 to 10
SENKA ACTGEL NS100	Self-thickening	Nonionic	Milk-white emulsion	Polyacrylamide	35	500	6.5	6 to 9
SENKA ACTGEL CM100	Self-thickening	Cationic	Milk-white emulsion	Polymethacrylic acid ester	35	400	4	3 to 7

1) pH values of products in undiluted form

* The values above are representative values, not specification values.

* The product viscosities were measured at 25° C with a type-B rotational viscometer at 30 rpm.



SENKA ACTGEL Series (Gel-type Thickeners)

These series offer thickeners of a reversed-phase emulsion type (W/O type, water in oil). They use water-soluble polymers and therefore require no counteractive or the like. They can be directly added to water, water solutions, and aqueous-based emulsion to thicken them. As active constituents, they contain polymers of higher molecular weight, which in small amounts (no more than 1%) thickens liquid.

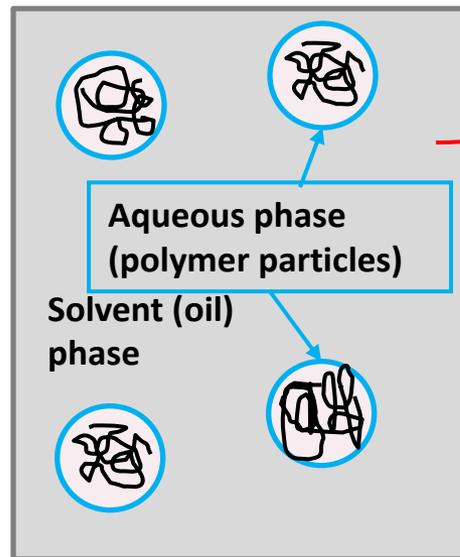
[Features of the SENKA ACTGEL Series]

- (1) With short-time agitation, they effectively thicken liquid.
- (2) When dissolved they do not form lumps like starch or gum-based thickeners.
- (3) With low stringiness, they provide a high level of thixotropy.
- (4) The series offer anionic, cationic, and nonionic thickeners, which can be used for a wide pH range and for many applications.

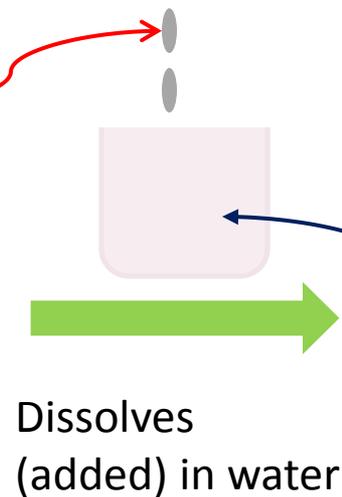
How a SENKA ACTGEL Product Increases Viscosity

In a SENKA ACTGEL thickener, water-soluble polymers are dispersed in an oil phase, a continuous phase. When the thickener is added to water, polymer articles dissolve (and expand) in water, developing viscosity (thickening the solution).

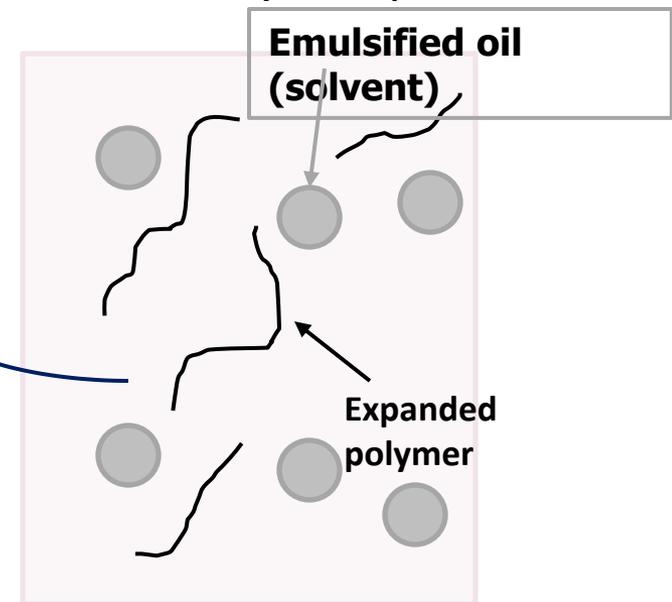
A SENKA ACTGEL product as is



Water-soluble polymers are dispersed in an oil phase, a continuous phase.

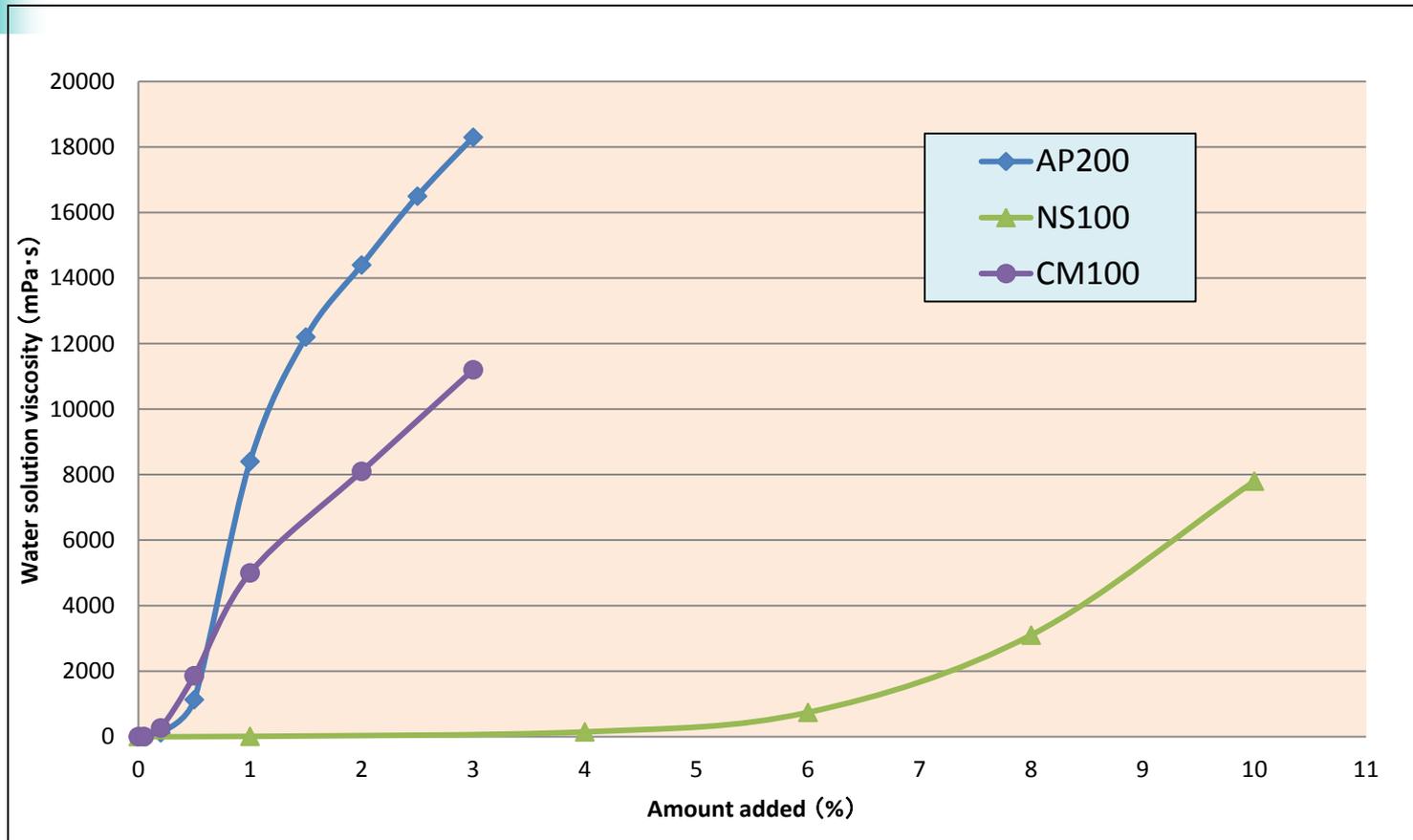


Viscosity developed



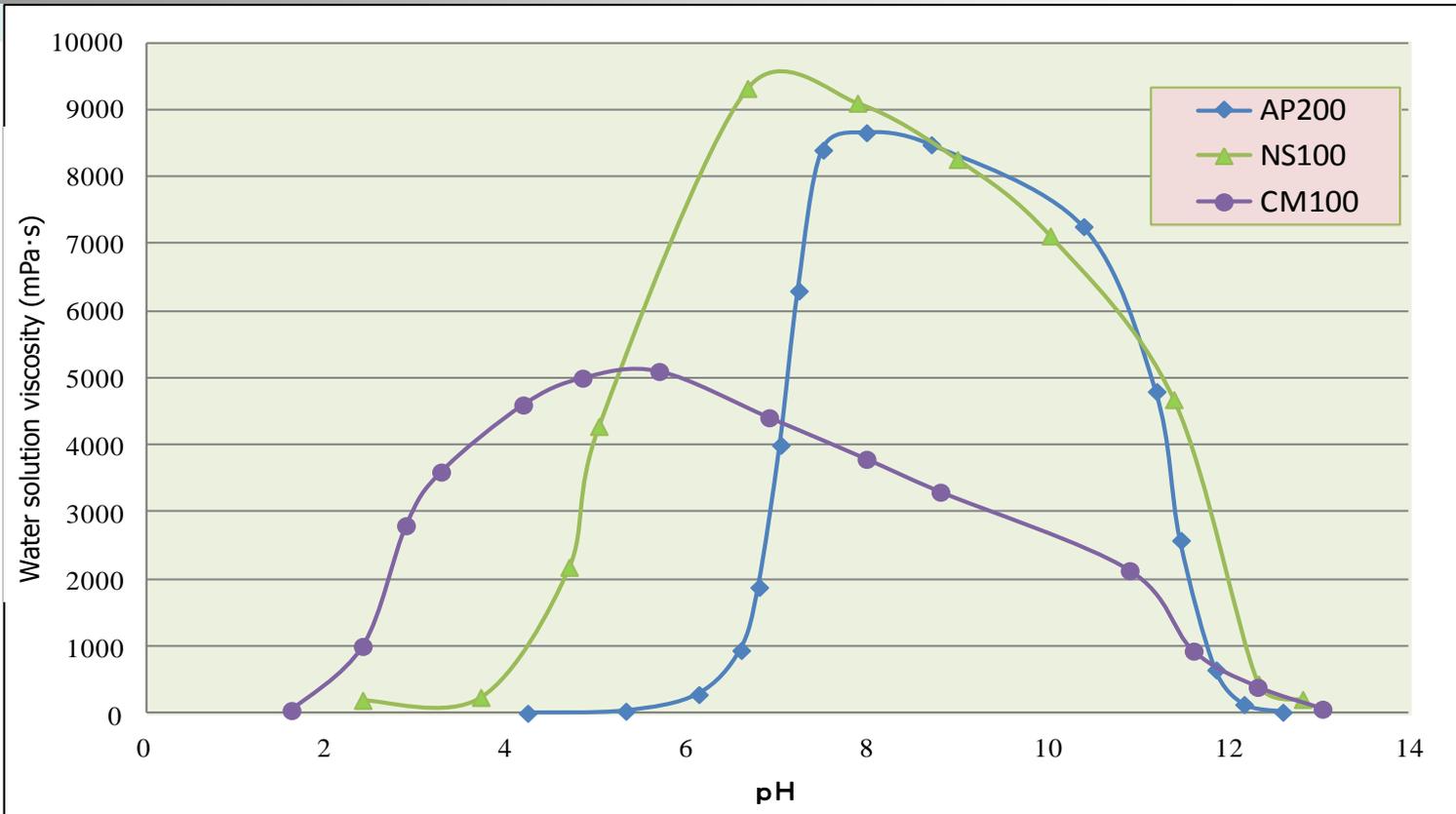
In water, water-soluble polymers expand, increasing viscosity. The oil phase (solvent) is emulsified in water.

Relationship between the amount of SENKA ACTGEL Series Added and Viscosity



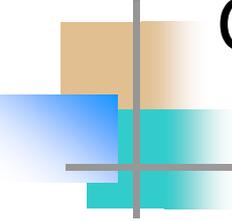
* Water solution viscosities were measured at 25° C with a type-B rotational viscometer at 30 rpm.

Relationship between the pH value of SENKA ACTGEL Series and Viscosity



* The viscosities of the water solutions were measured with the product added as is (1.0% for the AP200 and CM100 or 10% for the NS 100).

* Water solution viscosities were measured at 25°C with a type-B rotational viscometer at 30 rpm.



Cosmetic Field

Product lineup

- COSMUAT Series

- Polyquaternium-6

- (Solution of polychlorinated dimethyl methylene piperidinium)

- Polyquaternium-7

- (Solution of dimethyl diallyl ammonium chloride-acrylamide copolymer)

- Polyquaternium-22

- (Solution of dimethyl diallyl ammonium chloride-acrylic acid copolymer)

- Polyquaternium-39

- (Solution of acrylamide- acrylic acid- dimethyl diallyl ammonium chloride copolymer)

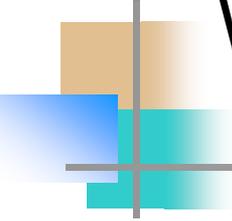
COSMUAT VH and VHL (Polyquaternium-7)

Features

- The product contains no paraben, an antiseptic component.
- It is added to haircare products to provide a balanced combination of gloss, smooth combing, and antistatic effect and make hair easy to condition during and after use.
- It is added to body and hand soaps and cleansing foam to provide a nice lather, moisture, smoothness.

Product	COSMUAT VH	COSMUAT VHL
Indicated carryover ingredients	Disodium hydrogen phosphate Sodium dihydrogen phosphate	Disodium hydrogen phosphate Sodium dihydrogen phosphate
Remarks	Normal product	Low molecular weight Excellent compatibility with base material

Appearance	Colorless, viscous liquid
Ingredients	Solution of dimethyl diallyl ammonium chloride- acrylamide copolymer
pH (undiluted)	Approx. 7.0
Solid content	Approx. 8%
Viscosity (undiluted / 25° C)	Approx. 5,000 to 15,000 Pa·s (COSMUAT VHL of approx. 15 to 35 mPa·s)
Structural formula	



Wood and Building Material Field

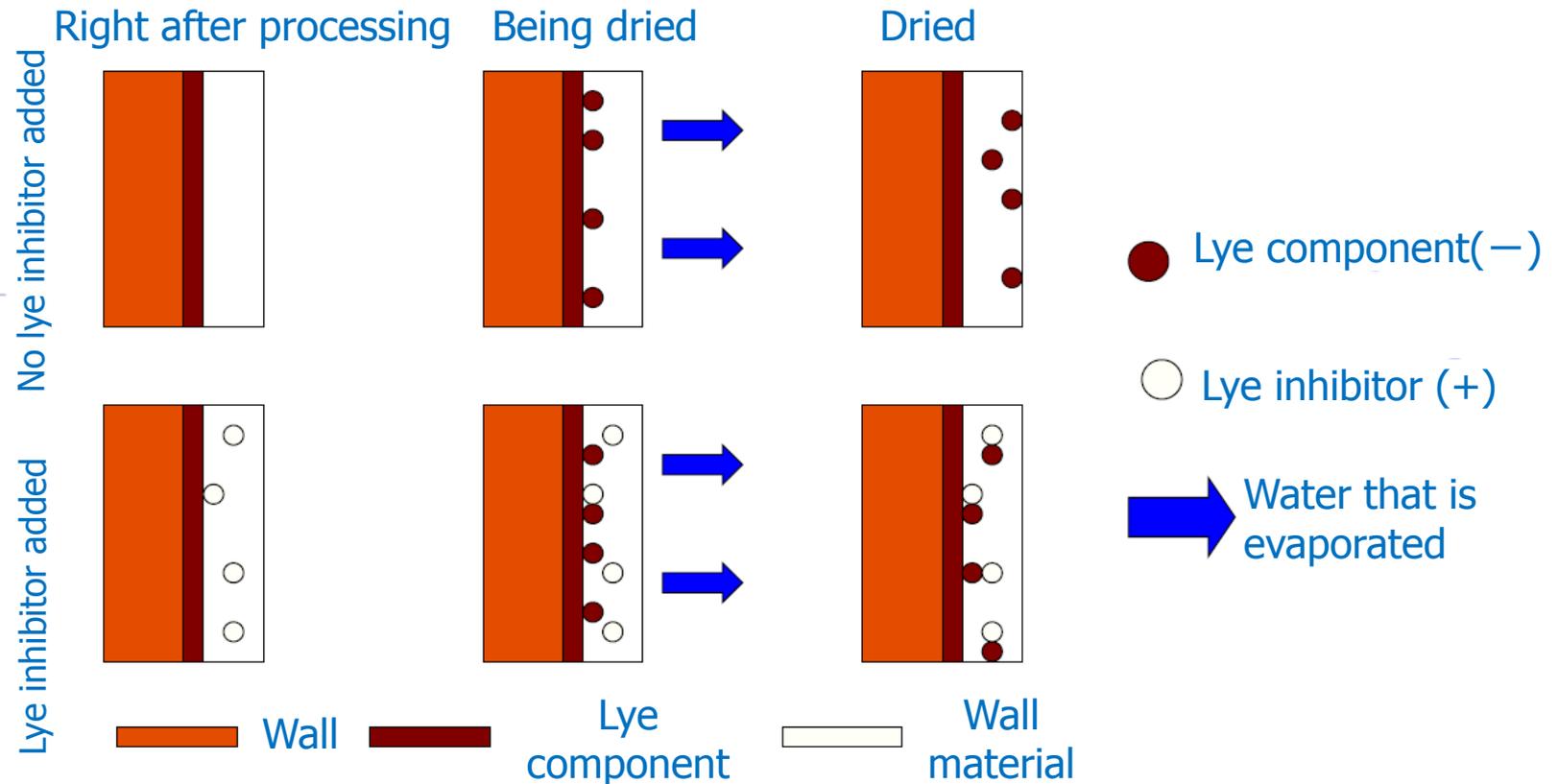
Product lineup

- Alkaline substrate treatment agents (non-formalin type)
- Flocculants for building board manufacturing processes
- Water repellents

Lye Inhibitors

PITCHNON Series

How a PITCHNON-series product inhibits lye



Lye Inhibitor

Application of fiber wall material

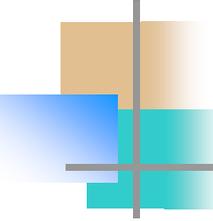
Nicotine liquid and a lignin solution are applied to a test piece. When the test piece is dried, fiber wall material (with a size of 5 x 5 cm and a thickness of 1 mm) is applied. Then, the test piece is allowed to dry at room temperature for 24 hours, and the performance is visually determined.

(1)

(2)

Nicotine
lignin





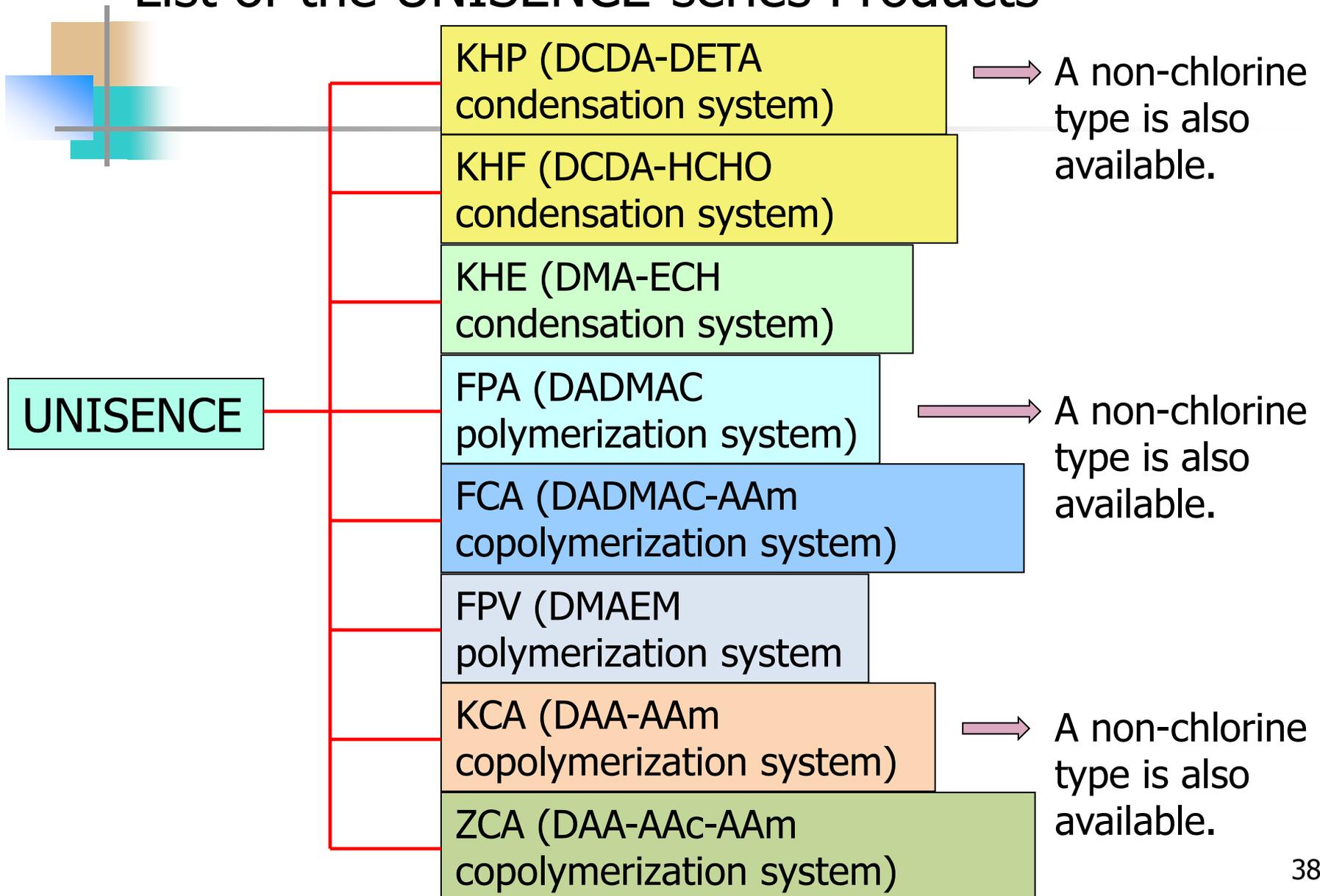
Functional Polymers

UNISENCE Series

This series of products has been developed based on the cationic polymer synthesizing technique of Senka. The series offers products in different forms with different structures and molecular weights so that you can consider using them for a wide range of applications and purposes.

- Water solution types
- Chlorine-free types
- Emulsion types

List of the UNISENCE-series Products

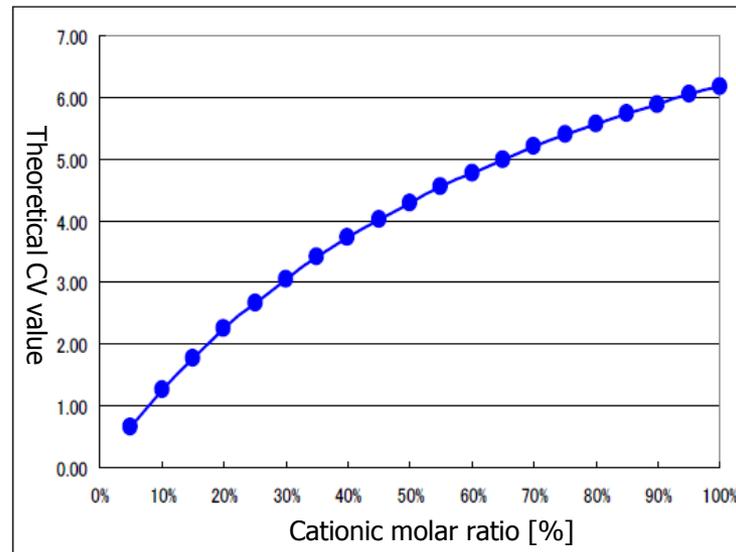
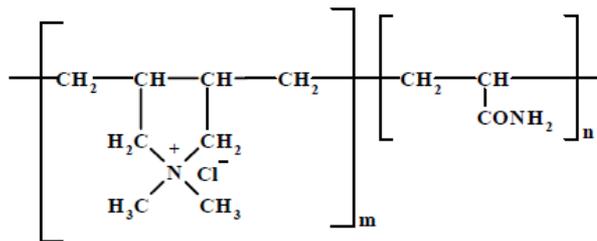


Properties and Effects of Cationic Polymers

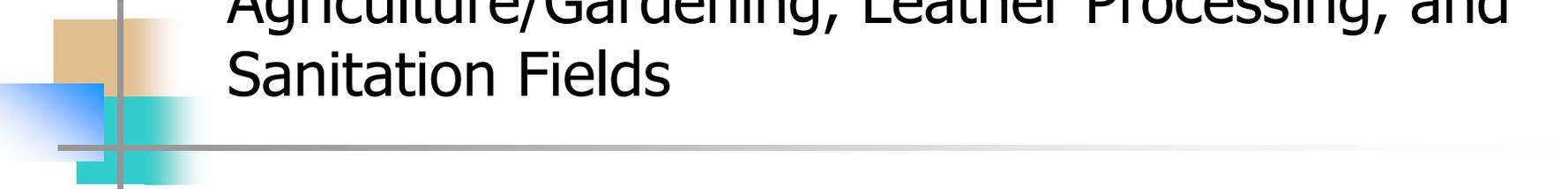
Cationization levels of the UNISENCE FCA series products

DADMAC / CV of Copolymer of DADMAC and acrylamide

You can change the cationization level of copolymers by changing the content of cationic monomers.

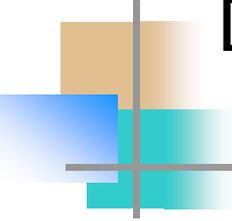


Antibacterial/Antifungal Treatment, Agriculture/Gardening, Leather Processing, and Sanitation Fields



Product lineup

- Antibacterial/ antifungal agents
- Preservatives for cut flowers
- Dye fixing agents for leather
- Sterilizers/cleaners for food processors



Development articles

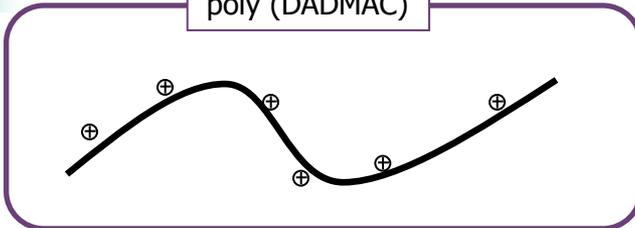
Product lineup

- Functional polys (DADMAC)
- UNISENCE NPP
- NANOATTACKER series

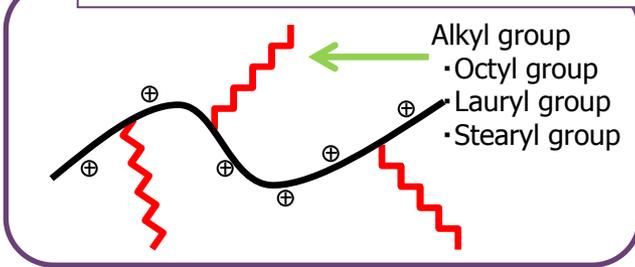
Functional Polys (DADMAC)

Schematic diagrams of a poly (DADMAC)-based high molecular surface active agent and amphiphilic polys (DADMAC)

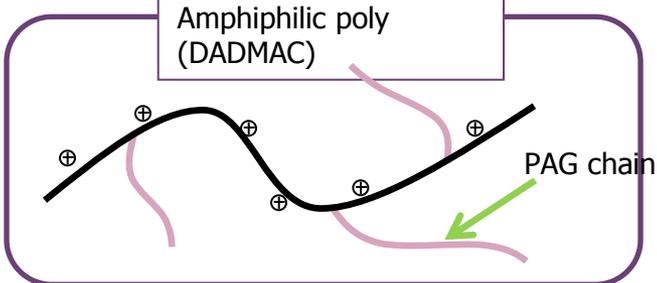
poly (DADMAC)



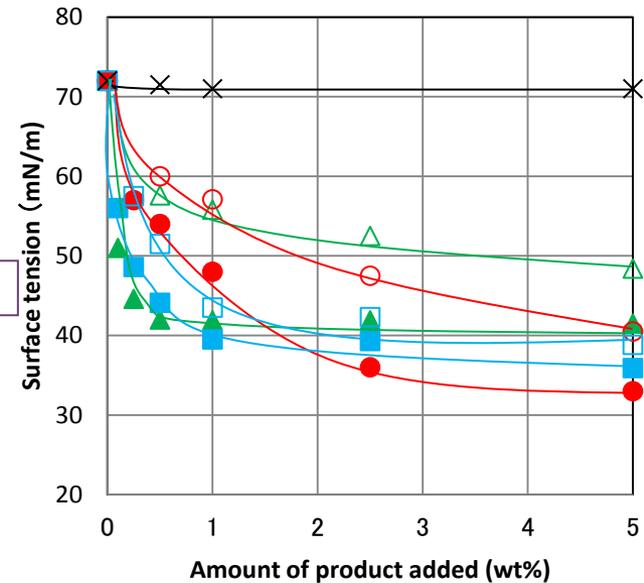
Poly (DADMAC)-based high molecular surface active agent



Amphiphilic poly (DADMAC)



Functional polys reduce water surface tension



(O) ZV-59A, (□) ZV-61A, (△) ZV-58A
 (●) ZV-60A, (■) ZV-62A, (▲) ZV-63A
 (x) Poly (DADMAC)

Measurement conditions: 20° C, purified water, Wilhelmy method (plate method)
 Measurement device: DyneMaster DY-300 from Kyowa Interface Science

UNISENCE NPP Series (Polyallyl Network Polymer Precursor (NPP))

Prototype	Ionic character	Appearance	Polymer concentration (%)	Solvent	Iodine value ¹⁾	Molecular weight ²⁾	Product pH	Product viscosity (mPa·s)	Remarks
UNISENCE NPP-301L	Cationic	Light yellow liquid	20	Water	Approx. 15	Approx. 50,000	3	10	Without MITI Available on request
UNISENCE NPP-103L	Cationic	Light yellow liquid	20	Water	Approx. 35	Approx. 100,000	3	40	Without MITI Available on request
UNISENCE NPP-004L	Cationic	Brown liquid	17	Water/DEG ³⁾	Approx. 120	Approx. 50,000	3	250	With MITI Available on request

Expected applications

- Use as a macro monomer
(Mixing a different polymer into cationic polymers)
- Use as a cross-linker
(to give a branch structure)

The UNISENCE NPP series offers allyl-based cationic polymers that have branch structures within molecules, as well as reactive groups in themselves, that can be radically polymerized.

Since they can copolymerize with other radically polymerized monomers using reactive groups within them, they can be used as a macro monomer or cross-linker.

* The values and others above are representative values, not specification values.

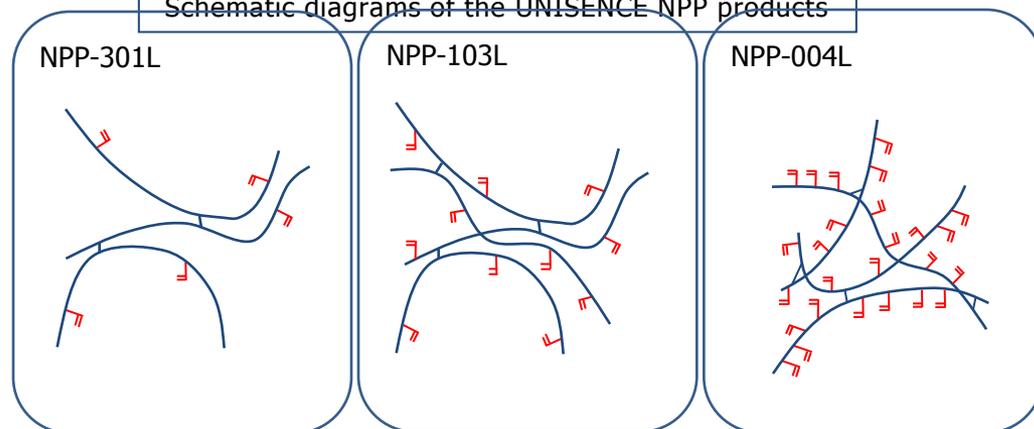
1) Number of grams of iodine (I_2) to be added to 100 g of each polymer

2) Weight average molecular weight (standard test sample: Polyethylene glycol)

Measured based on steric exclusion chromatography (SEC)

3) Diethylene glycol

Schematic diagrams of the UNISENCE NPP products



T represents reactive aryl groups.

NANOATTACKER series

Water dispersion core-corona type particle NANOATTACKER series

Product	Ionic character	Appearance	Product viscosity	Product pH	Active content	Particle size	Characteristics
NANOATTACKER C-MSE11	Cationic (Polyethylenimine)	Light yellow, milk-white liquid	5 mPa · s	Approx. 7.0	30%	Approx. 80 nm	Dispersed in water with a desired percentage
NANOATTACKER C-MST11	Cationic (Quaternary polymethacrylate)	Milk-white liquid	15 mPa · s	Approx. 5.0	30%	Approx. 100 nm	Dispersed in water with a desired percentage
NANOATTACKER A-MSA21	Anionic (Sodium polyacrylate)	Milk-white liquid	90 mPa · s	Approx. 7.0	40%	Approx. 140 nm	Dispersed in water with a desired percentage
NANOATTACKER A-MST21	Anionic (Sodium polyacrylate)	Light yellow, milk-white liquid	15 mPa · s	Approx. 7.0	30%	Approx. 100 nm	Dispersed in water with a desired percentage
NANOATTACKER N-MSG11	Nonionic (Polyethylene glycol)	Milk-white liquid	40 mPa · s	Approx. 3.5	30%	Approx. 180 nm	Dispersed in water with a desired percentage

