

PRODUCTLIST

1 PERFORMANCE CHEMICALS FOR SYNTHETIC RESIN & RUBBER INDUSTRIES AND PAINT, INK & PIGMENT INDUSTRIES

1. Curing Agents for Epoxy Resins and Epoxy Resin Enamels
2. Pigment Dispersants (Oligomer Type)
3. Emulsifiers for Emulsion Polymerization
4. Stabilizer for Emulsions and Latexes
5. Resin Modifiers
6. Internal Antistatic Agents
7. Mold Releasing Agents
8. Printing Ink Binders
9. Compounding Ingredients for Paints and Printing Inks
10. Polyurethane Coating Materials
11. Pigment Dispersants (Surfactant Type)
12. Defoaming Agents
13. Plasticizer for Polyurethane-Based Sealant

2 PERFORMANCE CHEMICALS FOR COSMETICS, PHARMACEUTICALS, DETERGENTS AND AGRICHEMICALS

Performance Chemicals for Cosmetics

1. Base Materials for Shampoos (Anionic Type)
2. Base Materials for Shampoos (Amphoteric Type)
3. Foam Stabilizers and Thickeners for Shampoos
4. Base Materials for Body Washes
5. Base Materials for Hair Conditioners
6. Compounding Ingredients for Cosmetics
7. Emulsifiers for Cosmetics

Performance Chemicals for Pharmaceuticals

1. Tablet Binders
2. Base Materials for Ointments
3. Coating Agents for Tablets
4. Germicides (Pharmaceutical Use)
5. Other Products for Pharmaceuticals

Performance Chemicals for Detergents

1. Base Materials for Detergents
2. Germicides (Industrial Use)
3. Additives for Detergents
4. Base Materials for Household Softeners
5. Industrial Defoaming Agents

Performance Chemicals for Agrichemicals

1. Emulsifiers for Emulsifiable Concentrates
2. Dispersants for Granule Preparations

3 PERFORMANCE CHEMICALS FOR POLYURETHANE AND POLYURETHANE-RELATED INDUSTRIES

1. Polyether Polyols for Flexible Slabstock Polyurethane Foams
2. Polyether Polyols for Automobile Hot Molded Seat Cushions
3. Polyether Polyols for Automobile High-Resilient Molded Seat Cushions
4. Polyether Polyols for Crushpad Foams
5. Polyether Polyols for Rigid Polyurethane Foams
6. Polyfunctional Polyols
7. Example of Polyurethane Foam System
8. Polyether Polyols for CASE
9. Prepolymers and Raw Materials for Polyurethane Elastomers
10. Base Materials for Synthetic Leathers
11. Water-Borne Polyurethanes for Textile Processing
12. Polyurethane Emulsions for Adhesives
13. Polyurethane Emulsions for Coatings

4 PERFORMANCE CHEMICALS FOR LUBRICANT INDUSTRIES AND MACHINERY & METAL PROCESSING INDUSTRIES

1. Lubricating Oil Additives
2. Base Materials for Polyalkylene Glycol-Type Lubricants
3. Base Materials for Water-Soluble Quenchants
4. Base Materials for Hydraulic Fluids
5. Materials for Brake Fluids
6. Rust Inhibitors
7. Water-Soluble Cutting Fluids
8. Emulsifiers for Metal Working Oils
9. Base Materials for Metal Cleaners

5 PERFORMANCE CHEMICALS FOR RESOURCE EXTRACTION AND MINING INDUSTRIES

1. Polymer Flocculants
2. Dewatering Accelerator
3. Cold Flow Improvers
4. Lubricity Improver
5. Dewaxing Aids

6 PERFORMANCE CHEMICALS FOR POLLUTION CONTROL

Polymer Flocculants

8 PERFORMANCE CHEMICALS FOR CONSTRUCTION AND PUBLIC WORKS

1. Pavement Materials
2. Flooring Materials
3. Caulking Materials for Clay Pipe Joints
4. Water Sealants
5. Mud Dispersants for Drilling
6. Waterproofing Agents
7. Concrete Admixtures

9 ADHESIVES AND ADHESIVE-RELATED PRODUCTS

1. Pressure-Sensitive Adhesives (Cohesive Agents)
2. Hot Melt Adhesives
3. Dry Laminate Adhesives for Food-Packaging Films
4. Potting Resins for Artificial Kidneys (Hollow-Fiber Type)
5. Resins for Anti-Corrosion Paints for Automobiles (for Improving Adhesion of Paints to Electrodeposition Steel)
6. Binders for Fiber-Finishing Agents
7. Polyurethane Emulsion for Bonding Plastics, Cloth and Wood
8. Binders for Fiberglass
9. Curing Agents for Epoxy Resins

10 PERFORMANCE CHEMICALS FOR TEXTILE INDUSTRY

Processes for Textile Manufacturing and Our Performance Chemicals

1. Polyester Textile
2. Nylon Textile
3. Acrylic Textile
4. Cotton Textile
5. Wool Textile

Performance Chemicals for Textile Industry

1. Spinning Lubricants
2. Knitting and Weaving Oils
3. Scouring and Penetrating Agents
4. Dyeing Auxiliaries
5. Softeners
6. Other Finishing Agents
7. Modifiers for Polymers

6

PERFORMANCE CHEMICALS FOR POLLUTION CONTROL

Polymer Flocculants

IMPORTANT :

Before handling these products, refer to the current Material Safety Data Sheet for recommended protective equipment, and detailed precautionary and hazards information.

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Features

Due to their high molecular weight, SANFLOC products achieve excellent results when used in small amounts.

The powder SANFLOC products contain a high amount of active groups, yet they excel in storage stability. On the other hand, the aqueous SANFLOC products have a relatively low molecular weight, and are available as an alternative to aluminum sulfate and poly (aluminum chloride).

SANFLOC products have the following features.

SANFLOC AH-400P, AH-330P

These strong anionic products are effective for the clarification, and the acceleration of flotation and sedimentation of neutral to alkaline suspensions. These products can be used on their own or in combination with inorganic flocculants.

SANFLOC AH-330P is typical of this group, and AH-400P is more anionic than AH-330P.

SANFLOC AH-200P

The medium anionic product is highly effective for suspensions with a relatively wide pH range from neutral to alkaline. It is the typical grades of anionic SANFLOC used in many industrial fields, and it can be used on its own or in combination with inorganic flocculants.

SANFLOC AS-510P, AS-110P, AH-70P

These weak anionic products are normally used for suspensions with a pH near neutral on their own or in combination with inorganic flocculants.

SANFLOC AH-70P is typical of this group. SANFLOC AS-110P and AS-510P are special weak anionic products that are highly effective for suspensions with a relatively wide pH range from alkaline to acidic.

SANFLOC N-520P, N-500P, N-0P

These nonionic products are applicable to suspensions with a wide pH range from acidic to weak alkaline, however, they are usually used for weak acidic to neutral suspensions on their own or in combination with inorganic flocculants. These products generally form tighter flocs than anionic flocculants, therefore, these nonionic products are particularly effective for the acceleration of sedimentation, and the filtration and dewatering of highly concentrated suspensions.

SANFLOC N-520P and SANFLOC N-500P do not lose their effectiveness in suspensions with a lower pH, and SANFLOC N-500P is effective even under strong acidic conditions. SANFLOC N-0P has the lowest solution viscosity in this group, and rapidly blends with suspensions to form flocs.

SANFLOC R-310P, R-320P, R-230P, R-500P

These amphoteric polymer flocculants are used for the dewatering of sludge. These products are highly effective for the dewatering of perishable sludge, which contains many organic ingredients. They are generally used in combination with inorganic flocculants.

SANFLOC C-009P, CH-019P, CE-6860P

They are strong cationic products, and are highly effective for the filtration and dewatering, and the concentration of highly organic sludge. Centrifuges and beltpress filters are most suitable for use in the dewatering process.

SANFLOC CE-694P

This moderate cationic product acts as an intermediate between strong and weak cationic products. Centrifuges are most suitable for use in the dewatering process.

SANFLOC CH-799P, CH-959P, CE-682P

These weak cationic products are highly effective for the filtration and dewatering, and the concentration of organic sludge that contains many inorganic materials. Centrifuges are suitable for use in the dewatering process.

SANFLOC C-450

An aqueous solution of moderate cationic flocculant that has a lower molecular weight than powder cationic SANFLOC products. This product is effective for the concentration and dewatering of organic suspensions such as powder products. It quickly blends with suspensions due to its low viscosity, and forms relatively tight, small flocs. Therefore, it is effective for the concentration and dewatering processes using vacuum dewaterers and beltpress filters.

SANFLOC 700

This is the strongest cationic product of all the SANFLOC products, and it insolubilizes anionic substances such as anionic dyes. Therefore, this product is particularly effective for the decolorization of wastewater from dye plants.

Preface

Polymer flocculants are water-soluble linear polymers with high molecular weight. They excel in absorption of suspended particles and flocculate the fine particles into coarse flocs, because there are many active groups in the molecules. They promote sedimentation and flotation of flocs; and they facilitate clarification of suspension, and filtration and dewatering of sludge.

Thus, polymer flocculants are indispensable agents in the rationalization of sewage treatment and various types of industrial wastewater treatment.

SANYO SANFLOC products are polymer flocculants produced using our long-standing experience in wastewater treatment. The SANFLOC products are available in many grades of anionic, nonionic, amphoteric and cationic products, so that you can choose the grade of products most suitable for the type of suspension and purpose of treatment.

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Typical Properties

Table 1. Typical Properties of SANFLOC Products

Product Name	Appearance	Ionicity	pH Range for Effective Use	Viscosity of Aqueous Solution *1		mPa · s (30°C)			Main Applications
				0.1 wt %	0.2 wt %	0.3 wt %	0.5 wt %	1.0 wt %	
SANFLOC AH-400P	White powder	Anionic (s)	7 – 12	400	1,040	2,100	3,900	8,000	1. Clarification, and acceleration of sedimentation and filtration of general industrial wastewater 2. Acceleration of solid-liquid separation in mining industry processes
SANFLOC AH-330P	White powder	Anionic (s)	7 – 12	370	820	1,700	3,300	7,000	
SANFLOC AH-200P	White powder	Anionic (m)	6 – 12	230	600	1,200	2,400	6,000	
SANFLOC AS-510P	White powder	Anionic (w)	5 – 12	140	310	680	1,400	3,500	
SANFLOC AS-110P	White powder	Anionic (w)	5 – 12	200	500	900	2,000	4,500	
SANFLOC AH-70P	White powder	Anionic (w)	5 – 12	120	300	600	1,300	3,500	
SANFLOC N-520P	White powder	Nonionic	3 – 10	70	150	330	820	2,500	1. Acceleration of filtration of organic sludge, including raw, excess and digested sludge, of sewage and industrial wastewater 2. Acceleration of solid-liquid separation in mining industry processes
SANFLOC N-500P	White powder	Nonionic	3 – 10	10	25	70	250	2,000	
SANFLOC N-0P	White powder	Nonionic	3 – 10	40	70	130	380	1,500	
SANFLOC R-310P	White powder	Amphoteric	3 – 7	100	230	400	1,100	3,200	
SANFLOC R-320P	White powder	Amphoteric	3 – 7	80	180	360	1,000	2,800	
SANFLOC R-230P	White powder	Amphoteric	3 – 6	30	70	120	300	800	
SANFLOC R-500P	White powder	Amphoteric	3 – 7	40	150	200	420	2,000	
SANFLOC C-009P	White powder	Cationic (s)	4 – 10	100	210	380	820	2,000	
SANFLOC CH-019P	White powder	Cationic (s)	4 – 10	140	300	510	1,050	2,500	
SANFLOC CH-799P	White powder	Cationic (w)	4 – 10	180	390	670	1,580	5,000	
SANFLOC CH-959P	White powder	Cationic (w)	4 – 10	60	150	310	870	3,000	
SANFLOC CE-6860P	White powder	Cationic (s)	4 – 10	130	280	550	1,080	3,000	
SANFLOC CE-694P	White powder	Cationic (m)	4 – 10	120	250	490	980	2,500	
SANFLOC CE-682P	White powder	Cationic (w)	4 – 10	140	300	600	1,200	4,000	
SANFLOC C-450	Pale straw-colored liquid	Cationic (m)	4 – 10	—	—	—	—	70	
SANFLOC 700	Colorless liquid	Cationic (s)	4 – 8	—	—	—	—	1	1. Clarification of colloidal suspensions such as dye wastewater

Note: Ionicity (s) strong
(m) medium
(w) weak

*1 Concentration-viscosity curves of several SANFLOC products are shown in Figures 1 and 2 on the next page.

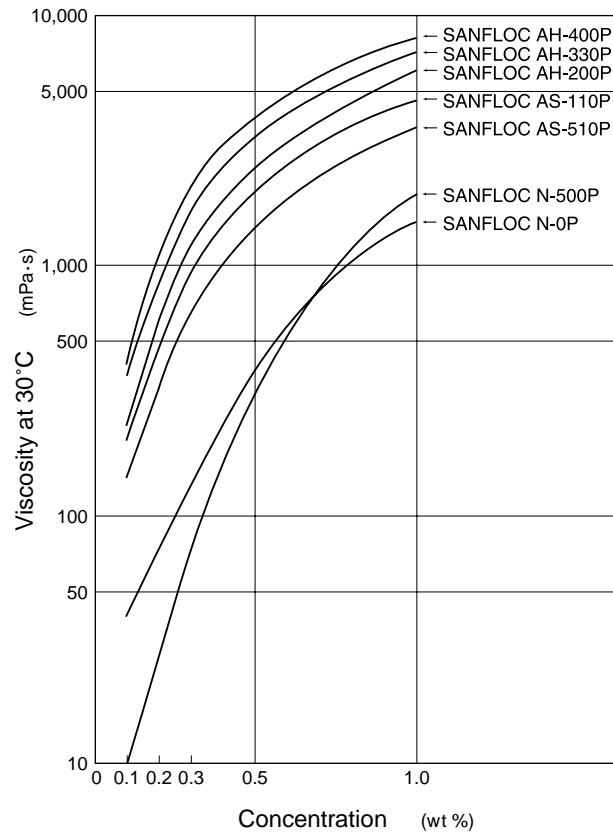


Figure 1. Concentration-Viscosity Curve of Anionic and Nonionic SANFLOC Products

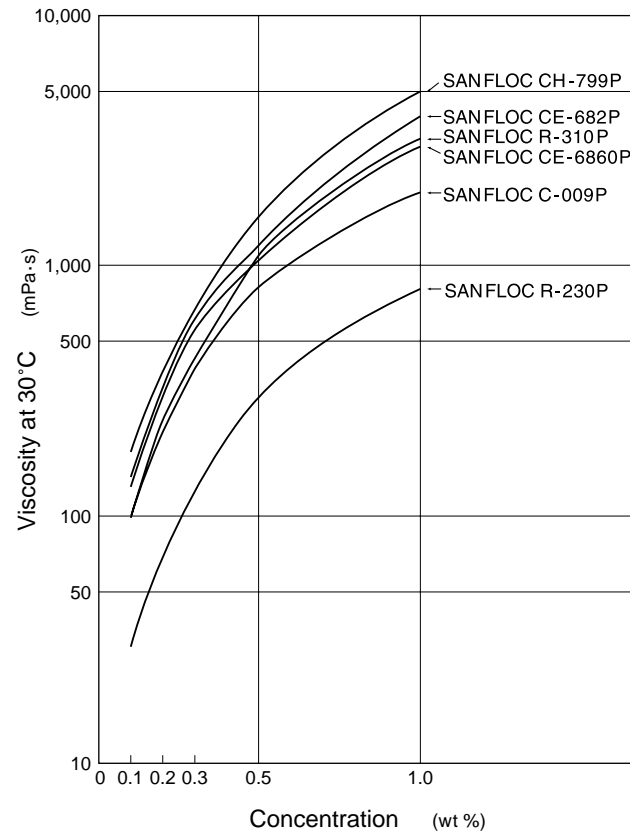


Figure 2. Concentration-Viscosity Curve of Amphoteric and Cationic SANFLOC Products

Application Methods

SANFLOC products are dissolved in water to prepare SANFLOC stock solutions, and then added to suspensions (liquids to be treated). The grade of SANFLOC products and its amount to be employed to the suspension depends on the kind of suspension and should be determined through preliminary tests.

The methods, including dissolution, addition of stock solution to suspension and preliminary tests, are shown next.

1. Dissolution

Concentration of stock solution

Table 2 shows the standard concentration of stock solutions to be prepared.

Table 2. Standard Concentration of Stock Solution

SANFLOC Products	Concentration
Powdery anionic SANFLOC Products Powdery nonionic SANFLOC Products	0.02 – 0.2 wt %
Powdery cationic SANFLOC Products Powdery amphoteric SANFLOC Products	0.02 – 0.4 wt %
SANFLOC C-450, SANFLOC 700	0.5 – 3.0 wt %

Procedure

Pour half of the water to be used into a dissolving tank, and add a predetermined amount of SANFLOC.

When using powdery products, dissolve SANFLOC by stirring in for between 30 minutes and 2 hours. SANYO SANFLOC DISPERSER (See Figure 3.) is effective for dissolving powdery products.

Precautions for dissolution

- Water
Although any water (including clean, salt and treated water) can be used, it is best to use neutral water that does not contain salt or foreign matter.
- Stirring
Propeller or handle stirrers are generally used for stirring. A rotation speed of between 100 and 300 rpm is suitable. Do not use stirrers that exert a high shear force.
- Preservation of stock solution
The performance of prepared SANFLOC stock solutions decreases over time. Use the stock solution within one day after preparation. The performance of solutions with lower concentrations decreases more significantly.

2. Addition of Stock Solution to Suspension

Thoroughly mix the SANFLOC stock solution and the suspension in order to disperse the flocculant as uniformly as possible. To do this, install a mixing bath of the stock solution with the suspension immediately before the treatment processes (sedimentation and concentration process, and filtration and dewatering processes), or add the stock solution to the suspension in transportation routes (pipes or gutters) immediately before treatment processes and mix them uniformly. (See Figures 4 to 6.)

Precautions for addition

- When transporting SANFLOC stock solutions using pumps, do not use gear pumps, use plunger or diaphragm pumps that exert very little shear force.
- Excessive stirring after mixing the stock solution with the suspension will break the flocs. Therefore, do not stir vigorously after the flocs have formed.

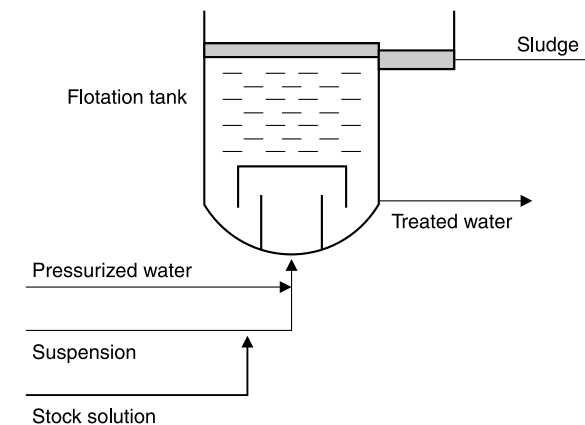


Figure 5. Addition Point of SANFLOC Stock Solution in the Flotation Process (an example)

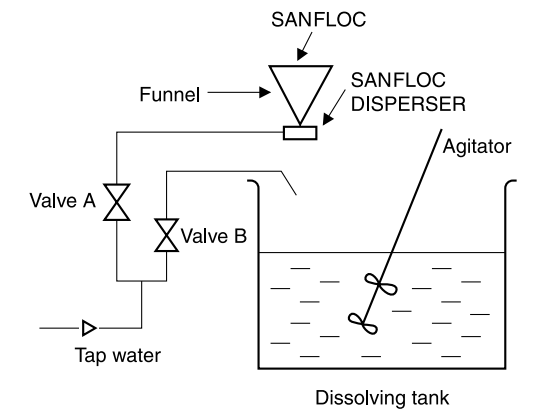


Figure 3. Typical Installation for Dissolving Powdery SANFLOC Products

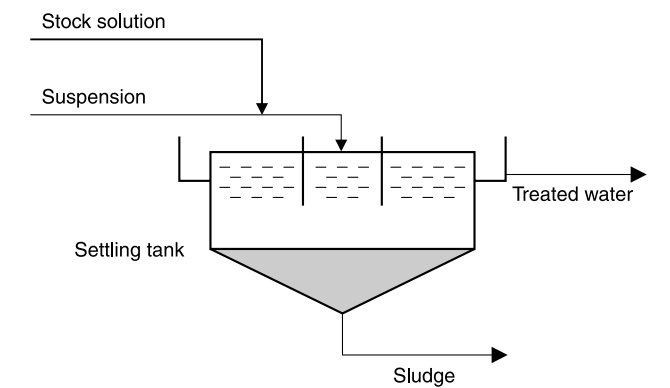


Figure 4. Addition Point of SANFLOC Stock Solution in the Settling Process (an example)

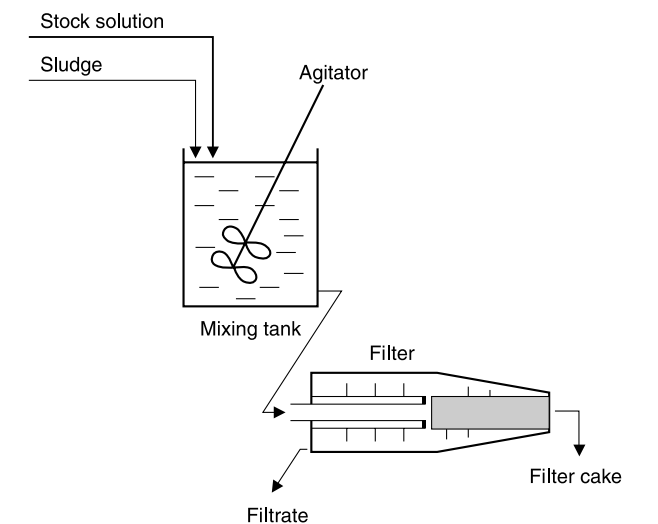


Figure 6. Addition Point of SANFLOC Stock Solution in the Filtering Process (an example)

3. Preliminary Test

Ionicity and amount of flocculants to be employed in preliminary tests

Ionicity of the flocculant to be employed can be selected by referring to Table 1, in accordance with the purpose of treatment (clarification, and acceleration of sedimentation, flotation and filtration) and the type of suspensions.

Table 3 lists the standard amount of flocculant to be employed to suspensions. As the effects may vary

significantly even within this range, determine the conditions for optimal usage by conducting preliminary tests.

Addition of 1 liter of 0.1 wt % stock solution to 1 m³ of suspension is equivalent to the addition of 1 wt ppm of flocculant to the suspension. (See Table 5 on page 10.)

Table 3. Standard Amount of SANFLOC Employed in Preliminary Tests

SANFLOC Products	Amount of SANFLOC Employed	
	Sedimentation and Clarification of Suspensions	Filtration and Dehydration of Thickened Sludge
Powdery anionic SANFLOC Products Powdery nonionic SANFLOC Products	0.1 – 50 wt ppm	10 – 100 wt ppm
Powdery cationic SANFLOC Products Powdery amphoteric SANFLOC Products	1 – 100 wt ppm	50 – 1,000 wt ppm
SANFLOC C-450, SANFLOC 700	10 – 100 wt ppm	50 – 5,000 wt ppm

Preparation of standard stock solution to be used in preliminary tests

Add SANFLOC product to water in portions while stirring with a magnetic stirrer. The amount of water and SANFLOC product is shown in Table 4.

Table 4. Amount of Water and SANFLOC Product to Prepare Standard Solution

SANFLOC Products	Amount of Water to be Added to One Weight Part of SANFLOC Product (concentration of SANFLOC product in solution)
Powdery anionic SANFLOC Products Powdery nonionic SANFLOC Products	1,000 wt parts (0.1 wt %)
Powdery cationic SANFLOC Products Powdery amphoteric SANFLOC Products	500 wt parts (0.2 wt %)
SANFLOC C-450	200 wt parts (0.5 wt %)
SANFLOC 700	50 wt parts (2 wt %)

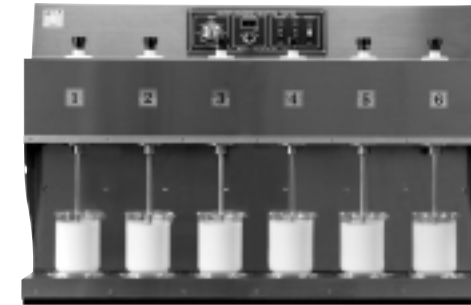
Procedure for preliminary tests

1) Clarification test (jar tester method)

- (1) Add a fixed volume of the stock solution to a 500 mL beaker holding a 500 mL test suspension to be treated, and agitate the turbid water with a jar tester at 150 rpm for 2 minutes. (See Photo 1.)
- (2) Reduce the rotation speed to 70 rpm at which the agitation is further continued for 2 minutes.
- (3) Stop the jar tester and visually inspect the state of flocs settling and the clarity of the resulting supernatant water. (See Photo 2.)

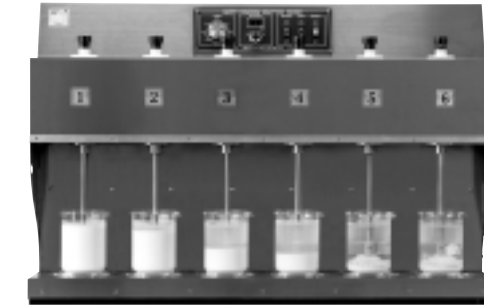
- (4) The correct grade and amount of SANFLOC to be employed, and the optimum treating conditions are determined by repeating the above-mentioned test a number of times under different sets of conditions which include the grade and amount of SANFLOC to be employed to the test suspension, the rotation speed and treatment time.

Photo 1.



a) b) c) d) e) f)
Under stirring.
Flocs are formed.

Photo 2.



a) b) c) d) e) f)
Stirrer is stopped. The suspension is separated into supernatant clear water and sediments settled at the bottom.

Notes

- Test suspension:
Clay containing water
Amount of flocculant added:
- No flocculant
 - 200 wt ppm of aluminum sulfate
 - 1 wt ppm of SANFLOC AH-200P and 100 wt ppm of aluminum sulfate
 - 2 wt ppm of SANFLOC AH-200P and 100 wt ppm of aluminum sulfate
 - 6 wt ppm of SANFLOC AH-200P and 100 wt ppm of aluminum sulfate
 - 10 wt ppm of SANFLOC AH-200P and 100 wt ppm of aluminum sulfate

2) Sedimentation test (measuring cylinder method)

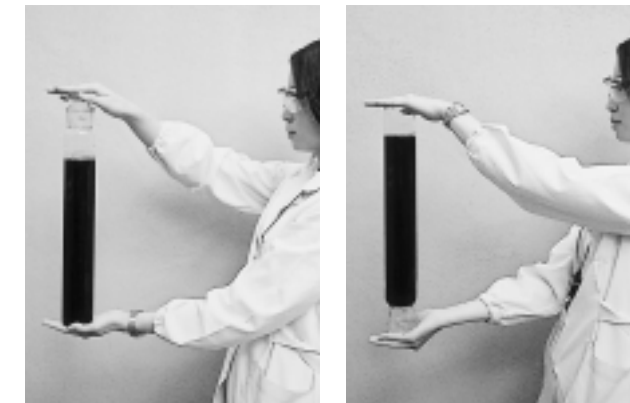
- (1) Pour a 1,000 mL test suspension into a 1,000 mL measuring cylinder equipped with a stopper.
- (2) Add a fixed volume of the stock solution to the cylinder by using a measuring pipette. (See Photo 3.)
- (3) Close the cylinder with the stopper, immediately invert it gently and restore to a vertical position. This is repeated ten times. (See Photo 4.) Then allow it to stand still and ten

- (4) The correct grade and amount of SANFLOC to be employed, and the optimum treating conditions are determined by repeating the above-mentioned test a number of times under different sets of conditions which include the grade and amount of SANFLOC to be employed to the test suspension.

Photo 3.



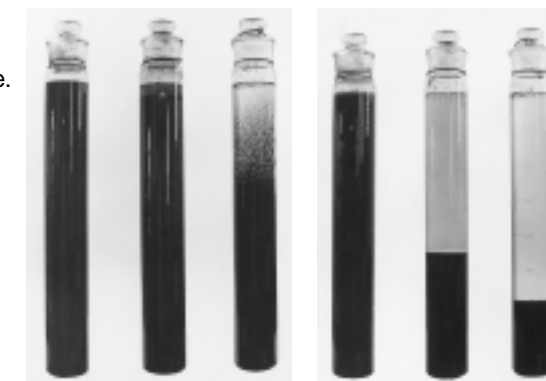
Photo 4.



This operation is repeated ten times.

Photo 5.

Flocs are formed and begin to settle.



a) b) c) a) b) c)

Flocs are deposited at the bottom.

- Notes
Test suspension: Gravel washing wastewater
Amount of flocculant added:
- No flocculant
 - 0.5 wt ppm of SANFLOC AH-200P
 - 3 wt ppm of SANFLOC AH-200P

3) Flotation test (flotation tester method) (See Figure 7.)

- (1) Turn on valve A, pour a fixed volume of tap water, usually 700 mL, through the cylinder into the tank of a flotation tester and then shut off the valve.
- (2) Turn on valve B and start the compressor to run, thereby blowing air into the tank and allowing it to dissolve in the water. When the pressure gauge indicates about 0.4 MPa (gauge), stop the compressor and shut off valve B.
- (3) Add a fixed volume of the stock solution to a 1,000 mL beaker holding a 700 mL test suspension to be treated by using a measuring pipette.
- (4) Moderately agitate the suspension to thoroughly mix with the flocculant by using a spatula and to form flocs.
- (5) Transfer the suspension from the beaker into the flotation cylinder of the tester.
- (6) Then, turn on valve A slowly to allow the water in the tank to move upward through the pipe into the flotation cylinder and to allow the air dissolved in the water to bubble out, thereby allowing the flocs to rise to the water surface.
- (7) When the volume of the liquid in the cylinder reaches a fixed volume, usually 1,000 mL, turn off valve A.
- (8) Measure the volume of the sludge floating on the water surface by reading the calibration on the cylinder, record the time during which practically all flocs have floated to the surface, and visually observe the clarity of the subnatant water.
- (9) The correct grade and amount of SANFLOC to be employed, and optimum treating conditions are determined by repeating the above-mentioned test a number of times under different sets of conditions which include the grade and amount of SANFLOC to be employed to the test suspension, the pressure level of pressurized tap water and its volume to be released into the flotation cylinder.

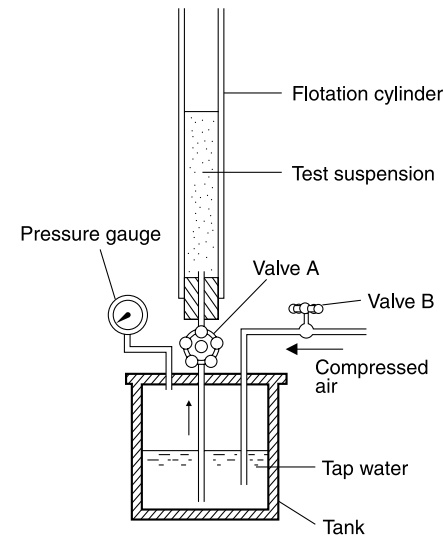


Figure 7. Flotation Tester

4) Filtration test (See Figure 8.)

- (1) Add a fixed volume of the stock solution to a 300 mL beaker holding a 200 mL test suspension to be treated, and agitate the turbid water. The standard conditions of agitation are as follows:
with a hand mixer, at 800 rpm, for 20 seconds, when centrifugal the dewatering method is applied; and
with a spatula, at 200 rpm, for 20 seconds, when another dewatering method is applied.
- (2) Stop the agitation and visually inspect the size and form of flocs, the amount of flocs settled, and the clarity of resultant supernatant water.
- (3) Put flocs on a filter cloth placed over a nutsche, apply normal pressure to filter, and inspect the filtering speed, the form and water content of the cake obtained, and the clarity of the filtered liquid.
- (4) The correct grade and amount of SANFLOC to be employed, and optimum treating conditions are determined by repeating the above-mentioned test a number of times under different sets of conditions which include the grade and amount of SANFLOC to be employed to the test suspension.

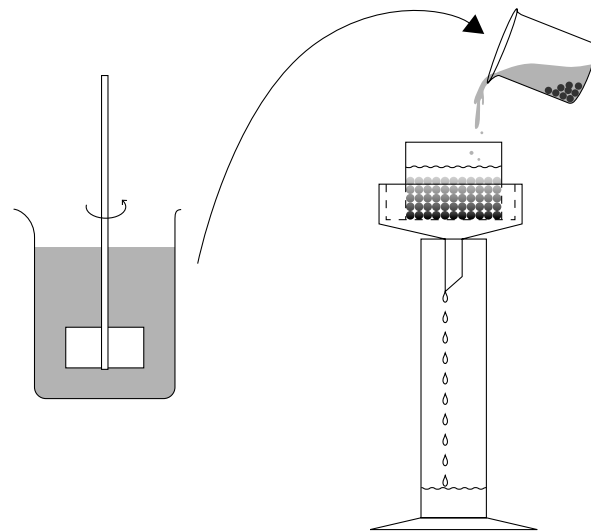


Figure 8. Filtration Test

Table 5 shows the relationship between the amount of stock solution added to the suspension and the ratio of the flocculant to the suspension.

Table 5. Relationship between Amount of Stock Solution Added to Suspension and Ratio of Flocculant to Suspension

Ratio of Flocculant to Suspension	Concentration of Stock Solution wt %	Amount of Stock Solution Added to 100 mL Suspension					Amount of Stock Solution Added to 1 m ³ Suspension		
		mL					L	g	
		0.02	0.05	0.10	1.0	5.0	0.1	1	(Powder)
0.1	0.5	0.05	0.02	0.01	—	—	—	—	—
1	2	0.50	0.20	0.10	0.01	—	1	0.1	1
3	4	1.5	0.60	0.30	0.03	—	3	0.3	3
4	5	2.0	0.80	0.40	0.04	—	4	0.4	4
5		2.5	1.0	0.50	0.05	0.01	5	0.5	5
10		5.0	2.0	1.0	0.10	0.02	10	1	10
20		10	4.0	2.0	0.20	0.04	20	2	20
30		15	6.0	3.0	0.30	0.06	30	3	30
40		20	8.0	4.0	0.40	0.08	40	4	40
50		25	10	5.0	0.50	0.10	50	5	50
100		50	20	10	1.0	0.20	100	10	100
200		100	40	20	2.0	0.40	200	20	200
300		150	60	30	3.0	0.60	300	30	300
400		200	80	40	4.0	0.80	400	40	400
500		250	100	50	5.0	1.0	500	50	500
1,000		500	200	100	10	2.0	1,000	100	1,000
2,000		1,000	400	200	20	4.0	2,000	200	2,000
3,000		1,500	600	300	30	6.0	3,000	300	3,000
4,000		2,000	800	400	40	8.0	4,000	400	4,000
5,000		2,500	1,000	500	50	10	5,000	500	5,000

Applications

When it does not cause a problem, it is best to use anionic, nonionic and amphoteric SANFLOC products in combination with inorganic flocculants, because these combinations achieve synergistic effects.

1. Application Areas

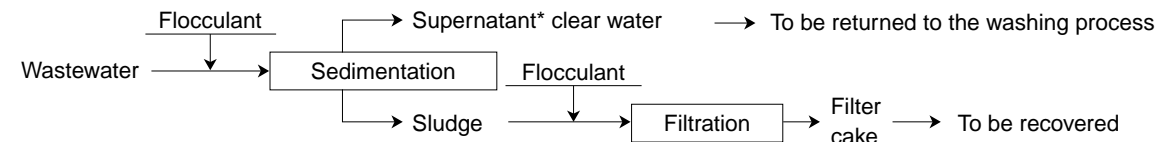
Table 6. Application Areas

Applications		Product Name	SANFLOC AH-400P AH-330P	Anionic		Nonionic	Cationic			Amphoteric
				SANFLOC AH-200P	SANFLOC AS-510P AS-110P AH-70P	SANFLOC N-520P N-500P N-0P	SANFLOC CH-799P CH-959P CE-682P	SANFLOC C-009P CH-019P CE-6860P CE-694P	SANFLOC R-310P R-320P R-230P R-500P	
Mining	Flocculation and sedimentation treatments for mineral deposits and mineral wastewater						—	—	—	
	Flocculation and sedimentation treatments for limestone cleaning wastewater						—	—	—	
Machinery and metal	Flocculation and sedimentation treatments for metal smelting and wastewater						—	—	—	
	Flocculation and sedimentation treatments for wastewater in the plating industry						—	—	—	
Pulp and paper	Flocculation and sedimentation treatments for pulp and papermaking wastewater		—					—	—	
	Dewatering of activated sludge and treated sludge		—	—	—					
	Recovery of white water		—					—	—	
Construction	Treatment for ballast quarrying wastewater						—	—	—	
	Treatment for dredging wastewater						—	—	—	
Ceramics	Treatment for cement and ready-mixed-concrete manufacturing wastewater						—	—	—	
	Treatment for clay and porcelain clay wastewater						—	—	—	
Fiber and dyeing	Flocculation and sedimentation treatments for fiber fabrication wastewater						—	—	—	
	Flocculation and sedimentation treatments for wool-dyeing wastewater						—	—	—	
	Dewatering of activated sludge and treated sludge		—	—	—					
Food	Flocculation and sedimentation treatments for fish and meat wastewater						—	—	—	
	Flocculation and sedimentation treatments for rice washing water and starch manufacturing wastewater						—	—	—	
	Dewatering of activated sludge and treated sludge		—	—	—					
Chemicals	Flocculation and sedimentation treatments for wastewater in the paint industry						—	—	—	
	Recovery of magnesium hydroxide		—				—	—	—	
	Dewatering of activated sludge and treated sludge		—	—	—					
Sewage and excrement	Dewatering of activated sludge and treated sludge		—	—	—					
	Flocculation and sedimentation of activated sludge and treated sludge		—	—	—					

Note: Most commonly effective Commonly effective

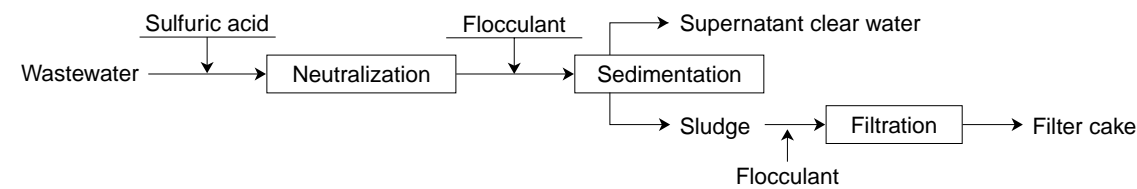
2. Application Examples

(1) Coal Washing Wastewater and Recovery of Fine Coal Powder



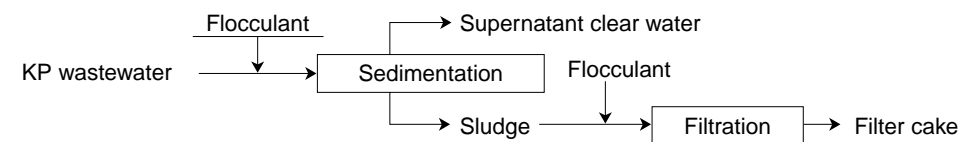
Before Treatment	Treatment and Flocculant Used	After Treatment
Black water SS content: 5,000 wt ppm	< Sedimentation > SANFLOC AL-310P 0.7 wt ppm	Colorless clear water SS content: Below 20 wt ppm
Coal content of the sludge: 31 wt %	< Filtration > SANFLOC N-0P 25 wt ppm	Coal content of the cake: 75 wt %

(2) Aluminum Processing Wastewater



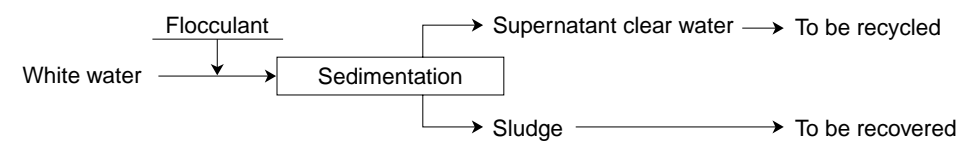
Before Treatment	Treatment and Flocculant Used	After Treatment
Suspension containing 1,000 wt ppm Al (OH) ₃	< Sedimentation > SANFLOC AH-400P 2 wt ppm	The resultant supernatant water was clear, containing no or little suspended solids.
Sludge containing 10,000 wt ppm Al (OH) ₃	< Filtration > SANFLOC N-0P 80 wt ppm	The filter cake had no fluidity.

(3) Pulp Mill Wastewater



Before Treatment	Treatment and Flocculant Used	After Treatment
Brown turbid water COD: 260 wt ppm SS content: 203 wt ppm pH: 6.3	< Sedimentation > Aluminum sulfate 200 wt ppm SANFLOC AS-510P 0.6 wt ppm	Colorless clear water COD: 70 wt ppm SS content: Below 5 wt ppm pH: 6.2
SS content: 22,000 wt ppm	< Filtration > SANFLOC AH-210P	SS content of filtrate: 18 wt ppm

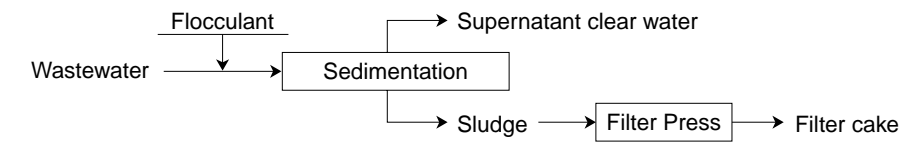
(4) Paper Mill White Water



Before Treatment	Treatment and Flocculant Used	After Treatment
White turbid water SS content: 179 wt ppm pH: 6.5	< Sedimentation > Aluminum sulfate 100 wt ppm SANFLOC AH-70P 0.8 wt ppm	Colorless clear water SS content: Below 10 wt ppm

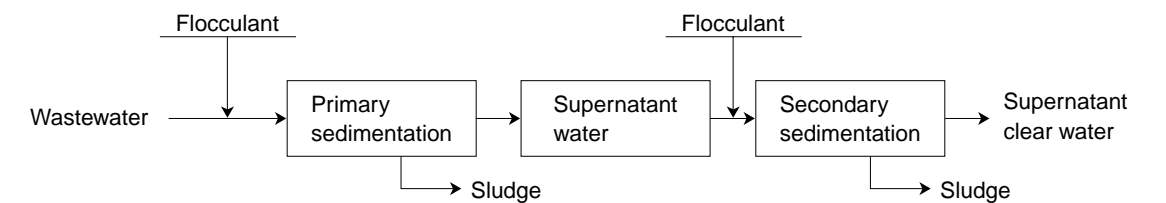
*The layer at the top of solution

(5) Gravel Washing Wastewater



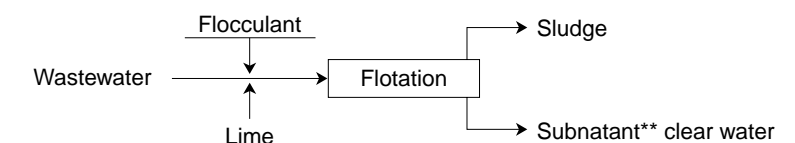
Before Treatment	Treatment and Flocculant Used	After Treatment
Yellowish brown turbid water SS content: 12 wt % pH: 6.7	< Sedimentation > Poly(aluminum chloride) 65 wt ppm SANFLOC AH-210P 15 wt ppm	Colorless clear water SS content: Below 10 wt ppm pH: 6.2

(6) Wool Scouring Wastewater (containing dyeing wastewater)



Before Treatment	Treatment and Flocculant Used	After Treatment
Light brown turbid water COD: 2,780 wt ppm Substance extracted with n-hexane: 10,800 wt ppm SS content: 19,500 wt ppm pH: 8.2	< Primary sedimentation > SANFLOC 700 240 wt ppm Poly(aluminum chloride) 3,300 wt ppm < Secondary sedimentation > SANFLOC N-520P 30 wt ppm	Slightly yellow clear water COD: 80 wt ppm Substance extracted with n-hexane: 35 wt ppm SS content: 60 wt ppm pH: 7.5

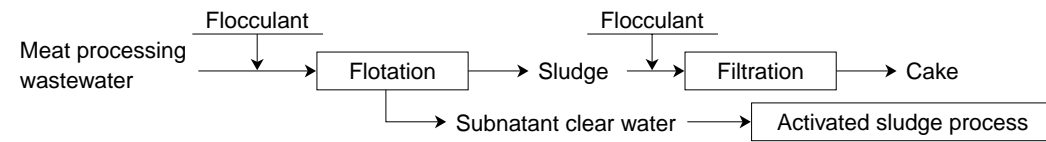
(7) Dyeing Wastewater



Before Treatment	Treatment and Flocculant Used	After Treatment
Bluish red turbid water BOD: 180 wt ppm COD: 110 wt ppm SS content: 46 wt ppm pH: 7.6	< Flotation > SANFLOC 700 15 wt ppm Aluminum sulfate 300 wt ppm Lime (to adjust pH level in a range of 6 to 7) SANFLOC AH-200P 2 wt ppm	Colorless clear water BOD: 50 wt ppm COD: 30 wt ppm SS content: Below 10 wt ppm pH: 6.5

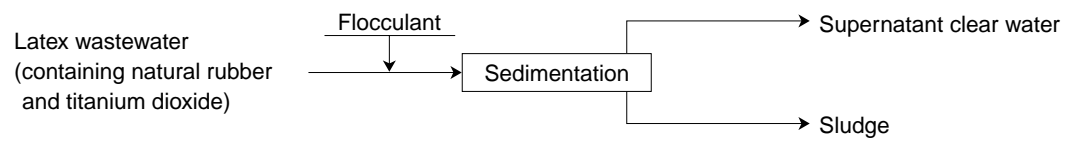
**The layer at the bottom of solution

(8) Food Processing Wastewater



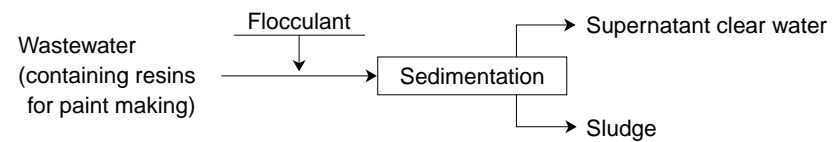
Before Treatment	Treatment and Flocculant Used	After Treatment
Pinkish white turbid water BOD: 1,500 wt ppm SS content: 1,200 wt ppm	< Flotation > Aluminum sulfate 60 wt ppm SANFLOC AH-330P 2.5 wt ppm	Slightly reddish clear water BOD: 480 wt ppm SS content: Below 20 wt ppm
SS content: 3.5 wt %	< Filtration > SANFLOC N-520P 25 wt ppm	Water content of cake: 86 wt %

(9) Rubber Processing Wastewater



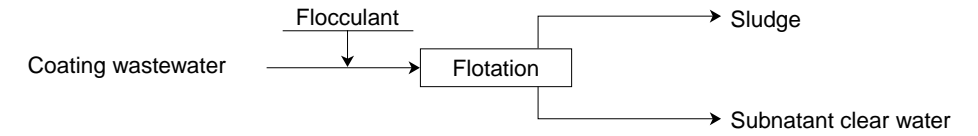
Before Treatment	Treatment and Flocculant Used	After Treatment
Milky white turbid water SS content: 400 wt ppm COD: 750 wt ppm	< Sedimentation > Aluminum sulfate 300 wt ppm SANFLOC AH-210P 1.5 wt ppm	Colorless clear water SS content: Below 10 wt ppm COD: 50 wt ppm

(10) Paint Manufacturing Plant Wastewater



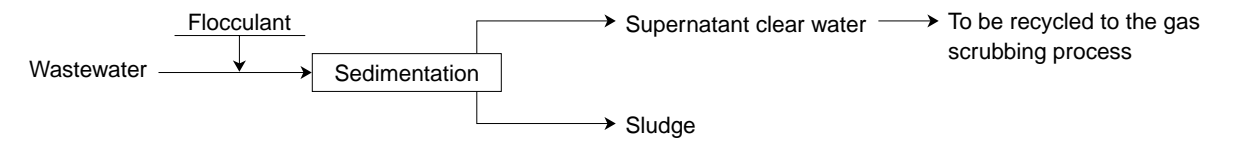
Before Treatment	Treatment and Flocculant Used	After Treatment
Grayish white turbid water COD: 100 wt ppm pH: 7.1 SS content: 55 wt ppm	< Sedimentation > Aluminum sulfate 350 wt ppm Lime 300 wt ppm SANFLOC AM-170P 1 wt ppm	Colorless clear water COD: Below 10 wt ppm pH :6.9 SS content: Below 10 wt ppm

(11) Coating Wastewater



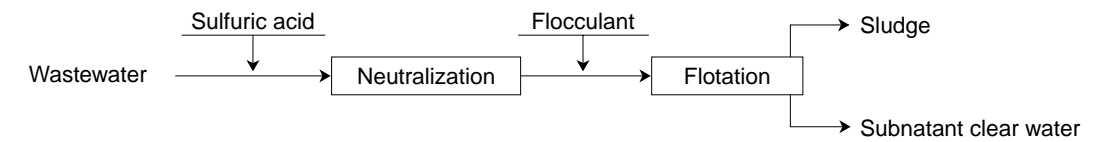
Before Treatment	Treatment and Flocculant Used	After Treatment
White turbid water COD: 200 wt ppm SS content: 260 wt ppm	< Flotation > Aluminum sulfate 150 wt ppm Lime 100 wt ppm SANFLOC N-520P 4 wt ppm	Colorless clear water COD: 18 wt ppm SS content: Below 20 wt ppm

(12) Gas Scrubbing Wastewater (from steel works)



Before Treatment	Treatment and Flocculant Used	After Treatment
Black water SS content: 3,000 wt ppm pH: 6.2	< Sedimentation > SANFLOC AH-200P 0.8 wt ppm	Colorless clear water SS content: Below 20 wt ppm pH: 6.2

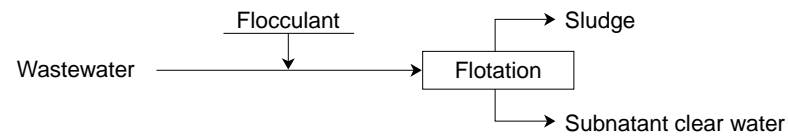
(13) Oils & Fats Manufacturing Plant Wastewater



Before Treatment	Treatment and Flocculant Used	After Treatment
Grayish white emulsion SS content: 360 wt ppm Oil content: 130 wt ppm	< Flotation > Aluminum sulfate 210 wt ppm Lime 100 wt ppm SANFLOC AH-200P 2.0 wt ppm	Colorless clear water SS content: Below 10 wt ppm Oil content: Below 5 wt ppm

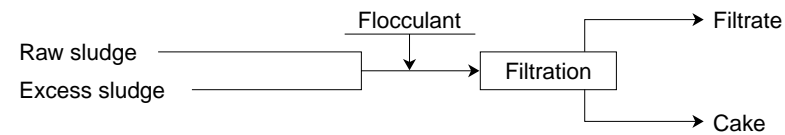
Safety Data

(14) Printing Wastewater



Before Treatment	Treatment and Flocculant Used	After Treatment
Dark green turbid water COD: 2,500 to 3,000 wt ppm SS content: 2,400 wt ppm pH: 8 – 9	< Flotation > SANFLOC 700 250 wt ppm Aluminum sulfate 100 wt ppm SANFLOC AH-330P 5 wt ppm	Pale greenish, light brownish clear water COD: 420 wt ppm SS content: Below 20 wt ppm pH: 6 – 7

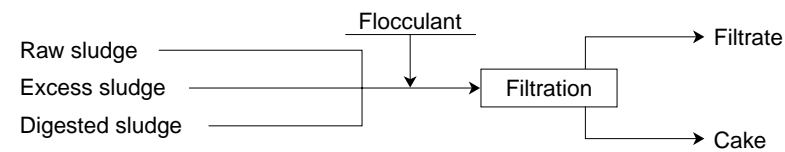
(15) Sewage Sludge



Before Treatment	Treatment and Flocculant Used	After Treatment
SS content: 2.5 wt % pH: 7.0	< Filtration > Filter: Centrifuge SANFLOC C-009P 0.7 wt %*	Water content of cake: 80 wt % SS recovery rate: 98 wt %

*Based on the weight of SS

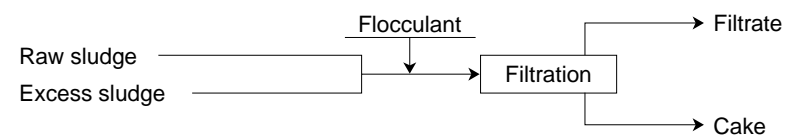
(16) Sewage Sludge



Before Treatment	Treatment and Flocculant Used	After Treatment
SS content: 2.8 wt % pH: 7.1	< Filtration > Filter: Centrifuge SANFLOC CE-6860P 0.6 wt %*	Water content of cake: 75 wt % SS recovery rate: 97 wt %

*Based on the weight of SS

(17) Sewage Sludge



Before Treatment	Treatment and Flocculant Used	After Treatment
SS content: 3.4 wt % pH: 6.8	< Filtration > Filter: Belt press SANFLOC CE-684P 0.6 wt %*	Water content of cake: 72 wt %

*Based on the weight of SS

1. Acute Oral Toxicity and Fish Toxicity

Product Name	LD ₅₀ (Oral)	LC ₅₀ (Oryzias latipes, 48 h, fresh water)	LC ₅₀ (Oryzias latipes, 48 h, sea water)
SANFLOC AH-330P	—	200 wt ppm	—
SANFLOC AH-200P	13.9 g/kg (mouse)	160 wt ppm	—
SANFLOC N-0P	—	> 1,000 wt ppm	—
SANFLOC R-310P	—	1.2 mg/L	—
SANFLOC CE-682P	> 2.0 g/kg (rat)	—	—
SANFLOC C-450	> 37 mL/kg (mouse)	0.76 wt ppm	> 1,000 wt ppm
SANFLOC 700	1.7 mL/kg (mouse)	1.9 wt ppm	—

2. Irritation to Eyes and Skin

Product Name	Acute Eye Irritation	Acute Dermal Irritation
SANFLOC R-310P	—	Non irritant
SANFLOC CH-019P	Severe irritant	Non irritant
SANFLOC CE-682P	Moderate irritant	—

Patents Registered

Product Name	Patent Registered
SANFLOC CE-6860P, SANFLOC CE-694P, SANFLOC CE-682P	Japanese Patent 1,788,399
SANFLOC R-230P	Japanese Patent 2,038,341
	Japanese Patent 2,132,040
	U.S. Patent 5,776,362
	European Patent 0,649,820