
Nonionic Surfactants Derived from Synthetic Higher Alcohol,
Exhibiting Good Low-Temperature Fluidity and Workability

SANNONIC FN Products

Preface

SANNONIC FN products are nonionic surfactants derived from synthetic higher alcohol. These products exhibit good low-temperature fluidity. Compared to conventional nonionic surfactants with nearly the same cloud point as SANNONIC FN products, these products have lower pour points. Therefore, these products facilitate operations such as transportation and compounding.

These products are available for a wide range of applications such as kitchen detergents, laundry detergents, and house-cleaning detergents as well as detergents, emulsifiers, dispersants and wetting agents for the textile, pulp and paper, synthetic resin, and metal industries.

We offer the following SANNONIC products.

Product Name	Cloud Point ^{*1} °C	pH ^{*2}	Viscosity mm ² /s (25 °C)	Pour Point ^{*3} °C	Appearance
SANNONIC FN-80	34	6.5	49	-23	Colorless to pale yellow liquid
SANNONIC FN-100	56		70	-13	
SANNONIC FN-140	79		122	5	

*1 Measured using 2 wt % aqueous solution

*2 Measured using 1 wt % aqueous solution

*3 Pour point is the highest temperature at which the sample does not flow for 5 seconds, according to JIS K 2269.

Notice: All values described in this brochure are representative.

Performance

1. Surface Activities

Table 1 shows the surface tension lowering, penetrating and foaming properties of SANNONIC FN products. Compared to secondary alcohol ethoxylate with nearly the same cloud point and an excellent penetrating property, each of these products exhibits an excellent surface tension lowering property, penetrating property and low-foaming property.

Table 1. Surface Activities

Property	Concentration wt %	SANNONIC FN-80	SANNONIC FN-100	SANNONIC FN-140	Comparison	
					SANNONIC SS-90 ^{*4}	SANNONIC SS-120 ^{*5}
Surface tension ^{*1} mN/m	0.01	29.7	30.7	34.7	29.7	33.1
	0.1	29.6	30.5	33.9	29.6	32.5
Penetrating time (power) ^{*2} s	0.01	14	13	13	13	13
	0.1	0.8	0.9	0.9	0.7	0.7
Foaming power ^{*3} mm	0.01	26 (20)	35 (28)	42 (34)	39 (31)	53 (36)
	0.1	70 (32)	97 (38)	112 (55)	120 (48)	125 (60)

*1 Measured at 30 °C using the Wilhelmy method.

*2 Measured at 30 °C using the Cotton canvas sedimentation method.

*3 Measured at 30 °C using the Ross-Miles method. Figures in parentheses indicate the foam heights after 5 min.

*4 Secondary alcohol ethoxylate, a Sanyo Chemical product with nearly the same cloud point as SANNONIC FN-100.

*5 Secondary alcohol ethoxylate, a Sanyo Chemical product with nearly the same cloud point as SANNONIC FN-140.

2. Pour Point

Table 2 shows the pour point of SANNONIC FN products.

Compared to secondary alcohol ethoxylate with nearly the same cloud point and superior low-temperature fluidity, SANNONIC FN products exhibit even lower pour points.

Table 2. Pour Point

Property	SANNONIC FN-80	SANNONIC FN-100	SANNONIC FN-140	Comparison	
				SANNONIC SS-90 ^{*1}	SANNONIC SS-120 ^{*2}
Pour Point °C	-23	-13	5	5	17

*1 Secondary alcohol ethoxylate, a Sanyo Chemical product with nearly the same cloud point as SANNONIC FN-100.

*2 Secondary alcohol ethoxylate, a Sanyo Chemical product with nearly the same cloud point as SANNONIC FN-140.

Testing Method:

Warm 45ml the sample taken into a test tube up to 45 °C and then, cool it. Take out the test tube from a cooling bath each time the temperature of the sample drops by 2.5 °C, read the temperature at which the sample stays thoroughly motionless for 5 sec, add 2.5 °C to this value and take the result as the pour point (JIS K 2269, Japanese Industrial Standard).

3. Performance of Liquid Kitchen Detergents

Table 3 shows the evaluation results of the detergency, viscosity, and low-temperature stability of model compounds for a liquid kitchen detergent containing SANNONIC FN products.

These products exhibit good performance as a material for kitchen detergents.

Table 3. Performance of Model Compounds for Liquid Kitchen Detergents

Property \ Nonionic Surfactant	SANNONIC FN-80	SANNONIC FN-100	Conventional Products	
			SANNONIC SS-70 ^{*1}	SANNONIC SS-90 ^{*2}
Detergency %	67	64	68	68
Viscosity mPa · s (30 °C)	44	13	71	27
Low-temperature stability	Good	Good	Good	Good

*1 Secondary alcohol ethoxylate, a Sanyo Chemical product with nearly the same cloud point as SANNONIC FN-80.

*2 Secondary alcohol ethoxylate, a Sanyo Chemical product with nearly the same cloud point as SANNONIC FN-100.

Materials and Methods:

Materials:

The formula of the model compound for a liquid kitchen detergent is as follows:

	wt %
Nonionic surfactant :	6.0
SANDET END ^{*1} :	11.0
PROFAN 128 Extra ^{*2} :	0.4
Water :	Balance
	100

^{*1} Sodium Alkylether Sulfate (Sanyo Chemical)

^{*2} Coconut Fatty Acid Diethanolamide (Sanyo Chemical)

Methods:

Detergency

Detergency was measured according to the Leenerts method (JIS K 3370, Japanese Industrial Standard). Each sample consisted of a set of six glass plates, which were washed with a 0.15 wt % (active ingredient) aqueous solution of the model compounds for a liquid dish detergent in a modified Leenerts tester.

Artificial sebum

20 g of fats composed of beef tallow and soybean oil (the volume ratio is 1:1), 0.25 g of monoolein and 0.1 g of oil red were dissolved in 60 mL of chloroform.

Detergency was calculated using the following equation.

$$\text{Detergency (\%)} = \frac{[\text{Dirt before washing (g)} - \text{Dirt after washing (g)}]}{\text{Dirt before washing (g)}} \times 100$$

Viscosity

Viscosity was measured using a Brookfield viscometer at 30 °C.

Low-temperature stability

The model compound was kept at -5 °C for 24 hours, and then the appearance was visually evaluated as follows:

Good: transparent liquid Poor: turbid

Applications

SANNONIC FN products are applicable for kitchen detergents, laundry detergents, house-cleaning detergents, range cleaners, removers for floor wax and detergents for cleaning bottles because these products exhibit excellent detergency, and emulsifying and dispersing properties. The following are examples of formulas for these applications.

Formula for a kitchen detergent

	wt %
SANNONIC FN-80:	5
Sodium polyoxyethylene alkyl ether sulfate:	12
Coconut fatty acid diethanolamide:	3
Ethanol:	2
Water:	Balance
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Total:	100

Formula for a liquid laundry detergent

	wt %
SANNONIC FN-80:	32
Triethanolamine polyoxyethylene alkyl ether sulfate:	22
Triethanolamine hydrochloride:	8
Perfume, colorant and other:	Proper quantity
Water:	Balance
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Total:	100

Formula for a powdered laundry detergent

	wt %
SANNONIC FN-80:	7
Sodium linear alkylbenzenesulfonate:	18
Zeolite:	13
Sodium metasilicate:	11
Sodium carbonate:	13
Soap (powder):	2
Sodium carboxymethyl cellulose:	1
Sodium sulfate:	33
Fluorescent brightener, perfume, colorant and water:	Proper quantity
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Total:	100

Formula for a house-cleaning detergent

	wt %
SANNONIC FN-100:	3
Sodium polyoxyethylene alkyl ether sulfate:	1
Butylcarbitol:	6
Perfume and colorant and other:	Proper quantity
Water:	Balance
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Total:	100

Formula for a bath detergent

	wt %
SANNONIC FN-100:	10
NEWPOL B-12 *:	8
Citric acid:	2
EDTA:	1
Perfume, colorant and other:	Proper quantity
Water:	Balance
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Total:	100

Formula for a range cleaner

	wt %
SANNONIC FN-140:	5
NEWPOL B-12 *:	10
Monoethanolamine:	3
Perfume, colorant and other:	Proper quantity
Water:	Balance
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Total:	100

Formula for a remover for floor wax

	wt %
SANNONIC FN-140:	2
NEWPOL EFP *:	15
Monoethanolamine:	14
NEWPOL B-12 *:	25
Perfume, colorant and other:	Proper quantity
Water:	Balance
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Total:	100

* Glycol-ether type solvent, a Sanyo Chemical product

Formula for Detergent for a bottle cleaner

	wt %
SANNONIC FN-140:	0.2
Sodium hydroxide:	2
Sodium gluconic acid:	1
Water:	Balance
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Total:	100

Precaution Against Mishandling

- Not only surfactants, but also suitable foam stabilizers, solubilizing agents, and builders are mixed to produce detergents. When SANNONIC FN products are mixed with them, test the procedure beforehand for optimal performance, safety and stability.
- SANNONIC FN products are oxidized when used in combination with sodium hypochlorite due to their nonionic surfactants. Therefore, do not use bleaching agents containing sodium hypochlorite with SANNONIC FN products.

Hazards Description

Important :

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

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