

Oleo & Speciality Chemicals CATALOGUE
Functional Materials Division



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Trade Name Index

T

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(Product categories)

Under development : These items are in the research and prototype stage. Please contact us for details.

Production by Order : These are manufactured on receipt of order, so it may take a long time before they are delivered.

In addition, Production by Order products must basically be picked up in full. Please contact us for details.

1. FATTY ACID

1. 1 SATURATED FATTY ACID (Typical specifications)

Chemical Name	Product Name	Appearance	Neutralization Value	Iodine Value	Color (APHA)	Melting Point (°C)
CAPRYLIC ACID	NAA®-82	Liquid	382-390	0.5 ↓	120 ↓	16.7
CAPRIC ACID	NAA®-102	Solid	323-327	0.5 ↓	120 ↓	31.5
LAURIC ACID	NAA®-122	Beads	278-282	0.5 ↓	120 ↓	Approx.43
	NAA®-312	Solid (20°C)	277-283	1.0 ↓	150 ↓	32-36
	COCONUT FATTY ACID	Solid (20°C)	260-270	10 ↓	300 ↓	23-27 (Freezing Point)
MYRISTIC ACID	NAA®-142	Beads	242-248	0.5 ↓	120 ↓	45-56
PALMITIC ACID	NAA®-160	Beads	215-220	1 ↓	120 ↓	Approx.60
(SPECIAL) STEARIC ACID	NAA®-180V	Beads	192-215	1.5 ↓	100 ↓	Approx.70
	NAA®-180V POWDER	Powder				
	NAA®-175	Beads	204-210	0.5 ↓	100 ↓	54-58
STEARIC ACID	STEARIC ACID CHERRY	Beads	197-207	0.5 ↓	100 ↓	59-61
		Powder				
		Fine Powder				
	STEARIC ACID CAMELLIA	Beads	197-207	4 ↓	6 ↓ (Gardner)	57-60
		Fine Powder				
	STEARIC ACID (BOO)	Stick	-	-	-	50-60
BEHENIC ACID	NAA®-222S BEADS	Beads	161-169	3 ↓	120 ↓	74-78

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1. 2 SATURATED FATTY ACID (Fatty acid composition)

Chemical Name	Product Name	Saturated acid (%)										Unsaturated	
		C6	C8	C10	C12	C14	C16	C18	C20	C22	C24	C18	C18
CAPRYLIC ACID	NAA®-82	0.5	99	0.5									
CAPRIC ACID	NAA®-102		0.5	99	0.5								
LAURIC ACID	NAA®-122			0.5	99	0.5							
	NAA®-312			10	75	15							
	COCONUT FATTY ACID		5	6	55	17	10	1				5	1
MYRISTIC ACID	NAA®-142				0.5	99	0.5						
PALMITIC ACID	NAA®-160					1	96	3					
(SPECIAL) STEARIC ACID	NAA®-180V						1	99					
	NAA®-180V POWDER												
	NAA®-175					4	43	52	1				
STEARIC ACID	STEARIC ACID CHERRY (Beads)												
	STEARIC ACID CHERRY (Powder)					2	31	66	1				
	STEARIC ACID CHERRY (Fine Powder)												
	STEARIC ACID CAMELLIA (Beads)					3	32	63	1	1			
	STEARIC ACID CAMELLIA (Fine Powder)												
	STEARIC ACID (BOO)	φ66mm×H208mm (25 pcs./Set)											
BEHENIC ACID	NAA®-222S BEADS						13			85	2		

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1. 3 OTHER FATTY ACID (Typical specifications)

Chemical Name	Product Name	Appearance	Neutralization Value	Iodine Value	Color (APHA)	Melting Point (°C)
TALLOW FATTY ACID	TALLOW FATTY ACID No.0	Yellow Solid	200-208	51-63	6 ↓ (Gardner)	38-44
	TALLOW FATTY ACID No.1	Yellow Solid	197-207	45-53	6 ↓ (Gardner)	40-44
HARDENED TALLOW FATTY ACID	HARDENED TALLOW FATTY ACID 45°HFA	Light Yellow Solid	202-207	38-46	120 ↓	Approx.45
	HARDENED TALLOW FATTY ACID 51°	Light Yellow Flake	197-207	28 ↓	3 ↓ (Gardner)	Approx.51
FATTY ACID for SOAP	FATTY ACID FOR SOAP	Light Yellow Solid	212-225	34-38	120 ↓	39-44
	FAK-2 (for Soap)	Light Yellow Solid	220-230	31-39	100 ↓	Approx.40
	FAK-4 (for Soap)	Light Yellow Solid	205-225	29-44	100 ↓	39-46
HYDROGENATED CASTOR OIL FATTY ACID	HYDROGENATED CASTOR OIL FATTY ACID (12-Hydroxystearic Acid)	White Flake	178-187	6 ↓	-	64-74

1. 4 OTHER FATTY ACID (Fatty acid composition)

Product Name	Saturated acid (%)					Unsaturated acid (%)		
	C12	C14	C16	C18	C20	C16	C18	C18
TALLOW FATTY ACID No.0		2	22	22		2	35	12
TALLOW FATTY ACID No.1		3	24	25		4	35	8
HARDENED TALLOW FATTY ACID 45°HFA		3	25	23		4	40	1
HARDENED TALLOW FATTY ACID 51°		3	42	40			10	2
FATTY ACID FOR SOAP	10	5	23	20		1	35	2
FAK-2 (for Soap)	20	8	32	7			27	5
FAK-4 (for Soap)	15	5	12	25			40	1
HYDROGENATED CASTOR OIL FATTY ACID			2	12 * (83)	1		0 * (2)	

* Contains a Hydroxyl Group

1. 5 UNSATURATED ACID (Typical specifications)

Chemical Name	Product Name	Unsaturated Acid (%)	Appearance	Neutralization Value	Iodine Value	Color (APHA)	Freezing Point (°C)
OLEIC ACID	NAA®-34	90	Light Yellow Viscous Liquid	198-205	87-93	260 ↓	8 ↓
	EXTRA OLEIN	92		198-204	86-91	100 ↓	7 ↓
	EXTRA OS-85	92		195-204 (Acid Value)	80-95	80 ↓	15 ↓

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2. FATTY ACID TRIGLYCERIDE

2. 1 MEDIUM CHAIN FATTY ACID TRIGLYCERIDE

Product Name	Appearance	Chemical Name	Structural Formula	Kinematic Viscosity (40°C) (mm ² /s)	Freezing Point (°C)
PANACET®800B	Light Yellow Liquid	2-Ethylhexyl triglyceride	$ \begin{array}{c} \text{O} \\ \parallel \\ \text{CH}_2-\text{O}-\text{C}-\text{R} \\ \\ \text{O} \\ \parallel \\ \text{CH}-\text{O}-\text{C}-\text{R} \\ \\ \text{O} \\ \parallel \\ \text{CH}_2-\text{O}-\text{C}-\text{R} \end{array} $ 800B R=C ₄ H ₉ CH(C ₂ H ₅) 810 R=C ₇ H ₁₅ R=C ₈ H ₁₉	-	-5 ↓
PANACET®810 PANACET®810S PANACET®810S (JPE) (Food Lubricating Agent)	Clear - Light Yellow Liquid	Medium-chain triglyceride		13	0 ↓

(JPE) Japanese Pharmaceutical Excipients

2. 2 TALLOW HARDENED OIL (Typical specifications)

Chemical Name	Product Name	Appearance	Saponification Value	Acid Value	Iodine Value	Color (APHA)	Melting Point (°C)
TALLOW HARDENED OIL	TALLOW HARDENED OIL 51° HO	Flake	190-200	2 ↓	32 ↓	150 ↓	Approx. 51
HYDROGENATED CASTOR OIL	CASTER WAX FLAKE	Flake	176-187	2 ↓	2.5 ↓	-	85 ↑

2. 3 TALLOW HARDENED OIL (Fatty acid composition)

Product Name	Saturated acid (%)						Unsaturated acid (%)	
	C10	C12	C14	C16	C18	C20	C16	C18
TALLOW HARDENED OIL 51° HO	1	1	4	27	34		3	30
CASTER WAX FLAKE				2	12 * (83)	1		0 * (2)

* Contains a Hydroxyl Group

3. GLYCERIN

3. 1 INDUSTRIAL GRADE

Product Name	Glycerin (%)	Density (20°C)	Color (Hazen No.)	Acidity or Alkalinity (meq/100g)	Chloride Test	Reducing Matter	Ash (%)
D G (DYNAMITE GLYCERIN)	98.5 ↑	1.257 ↑	30 ↓	0.3 ↓	Pass	Pass	0.05 ↓
R G (REFINED GLYCERIN)	98.5 ↑	1.257 ↑	10 ↓	0.3 ↓	Pass	Pass	0.05 ↓
GLYCERIN 85	84–87	1.221–1.230	10 ↓	—	—	—	0.03 ↓

3. 2 FOOD ADDITIVE GRADE

Product Name	Glycerin (%)	Specific Gravity (20/20°C)	Heavy Metals (μg/g)	Arsenic (μg/g)	Chloride (Cl %) (%)	Reducing Matter	Residue on Ignition (%)
FOOD ADDITIVE GLYCERIN	98.5 ↑	1.260–1.264	5.0 ↓	2.0 ↓	0.003 ↓	Pass	0.01 ↓

3. 3 FEED GRADE

Product Name	Glycerin (%)	Specific Gravity (20/20°C)	Heavy Metals (ppm)	Arsenic (ppm)	Chloride (Cl %) (%)	Reducing Matter	Residue on Ignition (%)
FEED GRADE GLYCERIN	98.5 ↑	1.260 ↑	5.0 ↓	2.0 ↓	0.001 ↓	Pass	0.01 ↓

3. 4 COSMETICS GRADE

Product Name	Glycerin (%)	Specific Gravity (20/20°C)	Heavy Metals (ppm)	Arsenic (ppm)	Chloride (Cl %) (%)	Sulfate	Residue on Ignition (%)
RG•CO•P	95.0 ↑	1.251 ↑	5.0 ↓	2 ↓	0.0013 ↓	Pass	0.01 ↓
GLYCERIN 85 for cosme	84–87	1.221–1.230	5.0 ↓	2 ↓	0.0013 ↓	Pass	0.01 ↓

3. 5 JAPANESE PHARMACOPOEIA GRADE

Product Name	Glycerin (%)	Specific Gravity (20/20°C)	Heavy Metals (ppm)	Arsenic (ppm)	Chloride as NaCl (%) (%)	Sulfate (%)	Residue on Ignition (%)
CONCENTRATED GLYCERIN	98.0–101.0	1.258 ↑	5 ↓	2 ↓	0.001 ↓	0.002 ↓	0.01 ↓
GLYCERIN PG	84.0–87.0	1.221–1.230	5 ↓	2 ↓	0.001 ↓	0.002 ↓	0.01 ↓

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4. FATTY ACID AMIDE

4. 1 MONO AMIDE

Product Name	Appearance (Average particle size)	Chemical Name	Structural Formula	Amine Value	Melting Point (°C)
ALFLOW®S-10	White Beads (300 μm)	Stearamide	$\text{C}_{17}\text{H}_{35}-\text{C}(=\text{O})\text{NH}_2$	—	100–105
ALFLOW®E-10	White Beads (300 μm)	Oleylamide	$\text{C}_{17}\text{H}_{33}-\text{C}(=\text{O})\text{NH}_2$	—	72–76
ALFLOW®P-10	White Beads (300 μm)	Erucamide	$\text{C}_{21}\text{H}_{41}-\text{C}(=\text{O})\text{NH}_2$	—	79–84

4. 2 BIS AMIDE

Product Name	Appearance	Average particle size	Chemical Name / Structural Formula	Amine Value	Melting Point (°C)
ALFLOW®H-50L	Pale Yellow Beads	0.5–1 mm	Ethylene bis stearamide $\text{C}_{17}\text{H}_{35}-\text{C}(=\text{O})\text{NH}-\text{CH}_2-\text{CH}_2-\text{NH}-\text{C}(=\text{O})-\text{C}_{17}\text{H}_{35}$	3 ↓	140–145
ALFLOW®H-50S	Pale Yellow Beads	200 μm		3 ↓	
ALFLOW®H-50F	Pale Yellow Beads	50 μm		—	
ALFLOW®H-50T	Pale Yellow Fine Powder	40 μm		3 ↓	
ALFLOW®H-50P	Pale Yellow Fine Powder	25 μm		3 ↓	
ALFLOW®H-50TF	Pale Yellow Fine Powder	18 μm		3 ↓	
ALFLOW®H-50TF-S	Pale Yellow Fine Powder	12 μm	Ethylene bis oleylamide $\text{C}_{17}\text{H}_{33}-\text{C}(=\text{O})\text{NH}-\text{CH}_2-\text{CH}_2-\text{NH}-\text{C}(=\text{O})-\text{C}_{17}\text{H}_{33}$	3 ↓	110 ↑
ALFLOW®AD-281V	Pale Yellow Beads	1 mm		8 ↓	

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5. METALLIC SOAP

5. 1 DIRECT METHOD

Product Name	Appearance	Structural Formula	Moisture (%)	Metal Content (%)	Free Fatty Acid (%)	Melting Point (°C)
CALCIUM STEARATE G	Granule	$\begin{array}{c} \text{C}_{17}\text{H}_{35}\text{COO} \\ \text{C}_{17}\text{H}_{35}\text{COO} \end{array} \text{Ca}$	3.0 ↓	6.5–7.5	1.0 ↓	145–160
CALCIUM STEARATE GP	Powder					
CALCIUM STEARATE GF-200	Fine Powder					
ZINC STEARATE G	Granule	$\begin{array}{c} \text{C}_{17}\text{H}_{35}\text{COO} \\ \text{C}_{17}\text{H}_{35}\text{COO} \end{array} \text{Zn}$	0.8 ↓	10.5–11.5	0.5 ↓	116–125
ZINC STEARATE GP	Powder					
ZINC STEARATE GF-200	Fine Powder					
MAGNESIUM STEARATE G	Granule	$\begin{array}{c} \text{C}_{17}\text{H}_{35}\text{COO} \\ \text{C}_{17}\text{H}_{35}\text{COO} \end{array} \text{Mg}$	6.0 ↓	4.0–4.8	1.0 ↓	120–140
MAGNESIUM STEARATE GR	Granule					
MAGNESIUM STEARATE GP	Powder					
MAGNESIUM STEARATE GF-200	Fine Powder					

Manufacturing method & Features



- Since the raw material itself is directly reacted, no soluble inorganic salts are produced as a byproduct during the reaction.
- It is possible to manufacture a granular product (approx. 0.3-1mm) that does not become powdery.
- It can be used for a variety of purposes, including as a slip agent, lubricant, mold release agent, anti-adhesive agent, and pigment flocculation inhibitor.
- It is used as a neutralizer (catalyst deactivator) for polyolefins and as a stabilizer for polyvinyl chloride.

5. 2 DOUBLE DECOMPOSITION METHOD

Product Name	Appearance	Structural Formula	Moisture (%)	Metal Content (%)	Free Fatty Acid (%)	Melting Point (°C)
CALCIUM STEARATE	Fine Powder	$\begin{array}{c} \text{C}_{17}\text{H}_{35}\text{COO} \\ \text{C}_{17}\text{H}_{35}\text{COO} \end{array} \text{Ca}$	3.0 ↓	6.5–7.0	0.5 ↓	150–165
CALCIUM STEARATE S			2.0 ↓	6.4–6.8	0.5 ↓	148–160
CALCIUM STEARATE FX (For Resin Coated Sand)			3.0 ↓	6.5–7.0	0.5 ↓	150–165
POWDER BASE®L (ZINC LAURATE)	Fine Powder	$\begin{array}{c} \text{C}_{11}\text{H}_{23}\text{COO} \\ \text{C}_{11}\text{H}_{23}\text{COO} \end{array} \text{Zn}$	–	13.2–14.2	0.5 ↓	123–130
POWDER BASE®M (ZINC MYRISTATE)		$\begin{array}{c} \text{C}_{13}\text{H}_{27}\text{COO} \\ \text{C}_{13}\text{H}_{27}\text{COO} \end{array} \text{Zn}$	–	12.2–13.2	0.5 ↓	123–130
ZINC STEARATE		$\begin{array}{c} \text{C}_{17}\text{H}_{35}\text{COO} \\ \text{C}_{17}\text{H}_{35}\text{COO} \end{array} \text{Zn}$	0.8 ↓	10.5–11.3	0.5 ↓	116–124
ZINC STEARATE S			0.5 ↓			
MAGNESIUM STEARATE	Fine Powder	$\begin{array}{c} \text{C}_{17}\text{H}_{35}\text{COO} \\ \text{C}_{17}\text{H}_{35}\text{COO} \end{array} \text{Mg}$	4.0 ↓	4.0–4.5	1.0 ↓	110–135
ALUMINUM STEARATE 300	Fine Powder	$\begin{array}{c} \text{C}_{17}\text{H}_{35}\text{COO} \\ \text{HO} \diagup \text{Al} \diagdown \text{HO} \end{array}$	1.5 ↓	10.0–11.5 (Ash)	8.0 ↓	150–165
ALUMINUM STEARATE 600		$\begin{array}{c} \text{C}_{17}\text{H}_{35}\text{COO} \\ \text{HO} \diagup \text{Al} \diagdown \text{C}_{17}\text{H}_{35}\text{COO} \end{array}$	1.5 ↓	8.5–10.0 (Ash)	12.0 ↓	140–155
ALUMINUM STEARATE 900		$\begin{array}{c} \text{C}_{17}\text{H}_{35}\text{COO} \\ \text{C}_{17}\text{H}_{35}\text{COO} \diagup \text{Al} \diagdown \text{C}_{17}\text{H}_{35}\text{COO} \end{array}$	1.5 ↓	6.5–8.0 (Ash)	20–30	110–125
BARIUM STEARATE (*)	Fine Powder	$\begin{array}{c} \text{C}_{17}\text{H}_{35}\text{COO} \\ \text{C}_{17}\text{H}_{35}\text{COO} \end{array} \text{Ba}$	0.5 ↓	19.5~20.5	0.5 ↓	220 ↑

(*Note*) Please handle with care as it is classified as a Deleterious Substance, Not for Medical Use.

Manufacturing method & Features



- The particle size is very small, and shape can be manufactured to be close to spherical or scale-like.
- It can be used for many purposes, such as a slip agent, lubricant, mold release agent, anti-adhesive agent, and pigment flocculation inhibitor.
- It is used as a flow improver that utilizes the particle shape, as a neutralizer (catalyst deactivator) for polyolefins, and as a stabilizer for polyvinyl chloride.

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5. 3 Neutral type

Product Name	Appearance	Structural Formula	Moisture (%)	Metal Content (%)	pH (2% dispersion)	Transparent Melting Point (°C)
AULABRITE®NC	Fine Powder	Calcium stearate (CaSO ₄)	3.0 ↓	6.0–7.0	6–7	155–165

Characteristics

- High Thermal Stability**
 AULABRITE® is superior in heat stability, it has better heat-resistant coloring properties than conventional metal soaps.
- Temporal Xanthosis Restraint of Resin**
 As the 2% dispersion is weakly acidic to neutral, it suppresses the inhibitory effect on other additives such as antioxidants and inhibits the yellowing of the resin over time.
- Decomposition Restraint of Resin**
 We can use AULABRITE® as color dispersant of the polyesters, polycarbonate which was not use so far.

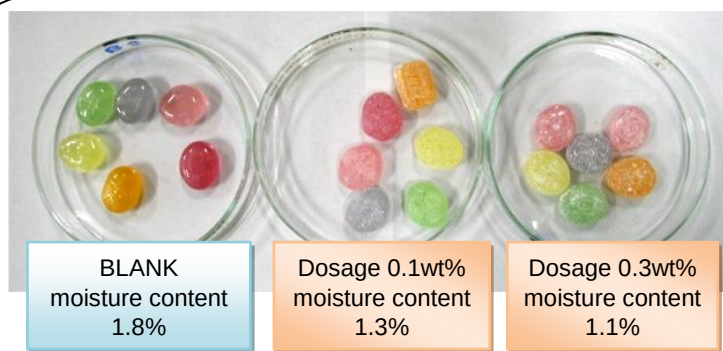
5. 4 JAPANESE PHARMACOPOEIA GRADE

Product Name	Appearance	Structural Formula	Moisture (%)	Metal Content (%)	Free Fatty Acid (%)	Melting Point (°C)
CALCIUM STEARATE (JP)	Fine Powder	$\begin{array}{c} \text{C}_{17}\text{H}_{35}\text{COO} \\ \text{C}_{17}\text{H}_{35}\text{COO} \end{array} \text{Ca}$	3.0 ↓	6.5–7.0	0.5 ↓	150–165
MAGNESIUM STEARATE (JP)	Fine Powder	$\begin{array}{c} \text{C}_{17}\text{H}_{35}\text{COO} \\ \text{C}_{17}\text{H}_{35}\text{COO} \end{array} \text{Mg}$	6.0 ↓	4.0–5.0	1.0 ↓	–

5. 5 FOOD ADDITIVE GRADE

Product Name	Appearance	Structural Formula	Moisture (%)	Metal Content (%)	Free Fatty Acid (%)	Melting Point (°C)
AULABRITE®CA-65 (Food Additive)	Fine Powder	$\begin{array}{c} \text{C}_{17}\text{H}_{35}\text{COO} \\ \text{C}_{17}\text{H}_{35}\text{COO} \end{array} \text{Ca}$	4.0 ↓	6.4–7.1	–	150–165
AULABRITE®MA-76 (Food Additive)	Fine Powder	$\begin{array}{c} \text{C}_{17}\text{H}_{35}\text{COO} \\ \text{C}_{17}\text{H}_{35}\text{COO} \end{array} \text{Mg}$	6.0 ↓	4.0–5.0	–	–

Moisture absorption test for candy



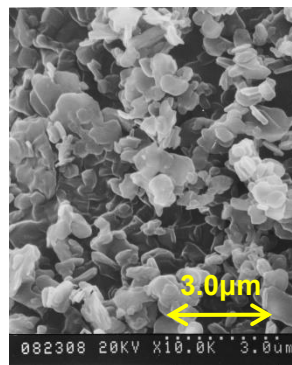
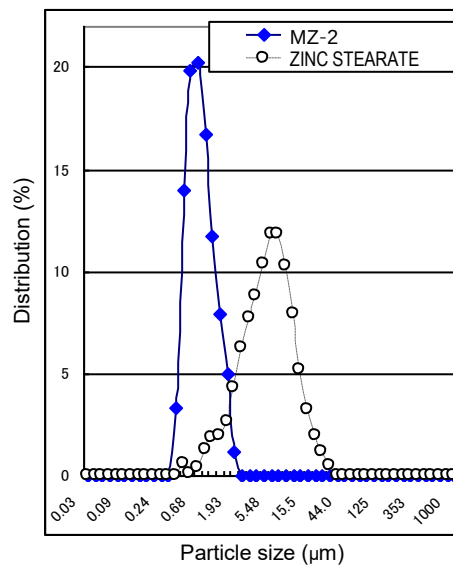
Accelerated test after 2 hours (40°C • 75%RH)
(AULABRITE®CA-65)

5. 6 HYPERFINE PARTICLES TYPE

Product Name	Appearance (Average Particle Size)	Structural Formula	Moisture (%)	Metal Content (%)	Free Fatty Acid (%)	Melting Point (°C)
NISSAN ELECTOL® MZ-2	Fine Powder (1.5μm↓)	$\begin{array}{c} \text{C}_{17}\text{H}_{35}\text{COO} \\ \text{C}_{17}\text{H}_{35}\text{COO} \end{array} \text{Zn}$	0.5 ↓	10.0–11.0	0.5 ↓	125–135

Characteristics

- Average particle size **3.0μm↓**, white powder.
- Particle **size distribution is narrow** and does not contain large particles.
- The particle is **disc-shaped or strip-shaped** with no broken surfaces (disk thickness of 0.1μm or less).



MZ-2

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6. ESTER

6. 1 METHYL ESTER

Product Name	Appearance	Chemical Name	Structural Formula	Freezing Point (°C)
METHYL LAURATE 95	Clear Liquid	Methyl laurate	$C_{11}H_{23}-C(=O)-O-CH_3$	Approx. 7
METHYL STEARATE 95	Light Yellow Solid	Methyl stearate	$C_{17}H_{35}-C(=O)-O-CH_3$	39 (Melting Point)
UNISTER®M-182A	Light Yellow Liquid	Methyl oleate	$C_{17}H_{33}-C(=O)-O-CH_3$	0 ↓

6. 2 BUTYL ESTER

Product Name	Appearance	Chemical Name	Structural Formula	Freezing Point (°C)
BUTYL LAURATE	Yellow Liquid	Butyl laurate	$C_{11}H_{23}-C(=O)-O-C_4H_9$	-13--16
BUTYL STEARATE	Light Yellow Solid	Butyl stearate	$C_{17}H_{35}-C(=O)-O-C_4H_9$	23 (Melting Point)

6. 3 ISOPROPYL ESTER

Product Name	Appearance	Chemical Name	Structural Formula	Freezing Point (°C)
IPM-R	Clear Liquid	Isopropyl myristate	$C_{13}H_{27}-C(=O)-O-CH(CH_3)_2$	3-9
IPP-R	Clear Liquid	Isopropyl palmitate	$C_{15}H_{31}-C(=O)-O-CH(CH_3)_2$	11

6. 4 2-ETHYLHEXYL ESTER

Product Name	Appearance	Chemical Name	Structural Formula	Freezing Point (°C)
UNISTER®MB-816	Light Yellow Liquid	2-Ethylhexyl palmitate	$C_{15}H_{31}-C(=O)-O-CH_2-CH(C_2H_5)-C_4H_9$	0 (Pour Point)
UNISTER®MB-871	Light Yellow Liquid	2-Ethylhexyl fatty acid ester	$R-C(=O)-O-CH_2-CH(C_2H_5)-C_4H_9$	Approx. 1
UNISTER®MB-876	Light Yellow Liquid	2-Ethylhexyl stearate	$C_{17}H_{35}-C(=O)-O-CH_2-CH(C_2H_5)-C_4H_9$	Approx. 10
UNISTER®MB-881	Light Yellow Viscous Liquid	2-Ethylhexyl oleate	$C_{17}H_{33}-C(=O)-O-CH_2-CH(C_2H_5)-C_4H_9$	-40 (Pour Point)

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6. 7 POLYOL ESTER for LUBRICATING OIL (Typical specifications) (1)

Product Name	Acid Value (mgKOH/g)	Flash Point (°C)	Kinematic Viscosity (mm ² /s)		Viscosity Index	Pour Point (°C)
			40°C	100°C		
UNISTER®HR-208BRS	0.1 ↓	168	7.4	2.0	50	-50
UNISTER®HP-210R	0.1	216	10.6	3.0	146	-7.5
UNISTER®HP-281R	0.1	278	24.1	5.9	206	-30
UNISTER®H-334R	0.1	261	19.6	4.4	140	-40
UNISTER®H-327R	0.1	265	20.4	4.5	138	-45
UNISTER®H-310D	2.8	216	33.1	5.6	104	-37.5
UNISTER®H-385R	0.4	282	49.9	9.9	189	-5
UNISTER®H-381	2.3	314	49.5	9.6	183	-32.5
UNISTER®H-381R	0.3	324	48.7	9.8	192	-32.5

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6. 7 POLYOL ESTER for LUBRICATING OIL (Typical specifications) (2)

Product Name	Acid Value (mgKOH/g)	Flash Point (°C)	Kinematic Viscosity (mm ² /s)		Viscosity Index	Pour Point (°C)
			40°C	100°C		
UNISTER®H-345	3.5	238	83.2	12.4	146	-5
UNISTER®H-481R	0.5	330	64.6	12.3	191	-20
UNISTER®H-445R	2.3	240	120	17.2	157	-2.5
UNISTER®H-481T	1.6	310	76.2	12.4	162	-27.5
UNISTER®H-481D	1.5	286	130	14.9	116	-27.5
UNISTER®HR-20B	0.1	266	19.4	4.9	190	-17.5
UNISTER®HR-22 ※Production by Order	0.1	244	22.1	4.7	135	-35
UNISTER®HR-32	0.1 ↓	273	33.5	5.8	114	-50
UNISTER®HR-46 ※Production by Order	0.1	272	45.5	7.4	130	-42.5
UNISTER®HR-64	0.1	283	64.8	9.0	113	-37.5
UNISTER®HR-170R	0.1	303	167	17.6	115	-35
UNISTER®HR-200	0.1 ↓	298	235	17.9	81	-30
UNISTER®H-609BR	0.3	302	462	28.1	85	-17.5

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6. 8 MONO ESTER for LUBRICATING OIL (Typical specifications)

Product Name	Acid Value (mgKOH/g)	Flash Point (°C)	Kinematic Viscosity (mm ² /s)		Viscosity Index	Pour Point (°C)
			40°C	100°C		
UNISTER®MB-408B ※Production by Order	0.1 ↓	104	1.5	0.7	–	–50
UNISTER®MB-808B	0.1 ↓	138	2.7	1.1	–	–50
UNISTER®M-114	0.2	158	3.3	1.3	–	17.5
UNISTER®M-182A	0.2	183	4.4	1.8	–	0 ↓ (Freezing Point)
UNISTER®M-183	0.4	182	4.9	1.9	–	5
UNISTER®M-480R ※Production by Order	0.1	210	5.9	2.2	221	–40
UNISTER®M-476	0.1	193	6.7	2.4	203	22–23 (Melting Point)
UNISTER®MB-816	0.1	215	8.4	2.6	165	0
UNISTER®MB-881	0.3	224	8.4	2.7	174	–40
UNISTER®MB-876	0.1	205	9.7	2.9	167	0
UNISTER®MB-1381	0.1	254	14.2	3.9	182	–30
UNISTER®D-13BA	0.1	260	22.7	4.9	149	–50 ↓

6. 9 COMPLEX™ ESTER (Typical specifications)

Product Name	Acid Value (mgKOH/g)	Flash Point (°C)	Kinematic Viscosity (mm ² /s)		Viscosity Index	Pour Point (°C)
			40°C	100°C		
UNISTER®C-3371A	1.7	270	77.4	11.4	141	–47.5
UNISTER®C-3373A	2.8	271	245	29.5	159	–32.5
UNISTER®C-400B	0.5	308	390	38.9	153	–40
UNISTER®C-6910BE ※Production by Order	4.0	315	557	42.0	122	–25
UNISTER®TOE-500	3.6	284	557	58.9	175	–32.5
UNISTER®TOE-2500	3.6	290	2,622	199	198	–12.5

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6. 10 ADDITIVES for KEROSENE POWER GENERATION (For diesel engine)

Product Name	Appearance	Flash Point (°C)	Kinematic Viscosity (40°C) (mm ² /s)	Density (15°C) (g/cm ³)	pH	Pour Point (°C)
LE191A	Colorless-Light Milk-White Liquid	63	617	0.898	–	–21

(Main Application) Fuel leak prevention, Prevention of seizure and wear of fuel injection pump

6. 11 ADITIVES for LUBRICATING OIL (Anti-wear agents)

Product Name	Appearance	Flash Point (°C)	Kinematic Viscosity (mm ² /s)		Acid value (mg KOH/g)	Pour Point (°C)
			40°C	100°C		
ESLUBE®AW-01P	Liquid (Paste-like at low temperatures)	260	3,000	220	10	15

6. 12 BIODEGRADABLE HYDRAULIC FLUIDS (Typical specifications)

Product Name	Acid Value (mgKOH/g)	Flash Point (°C)	Kinematic Viscosity (mm ² /s)		Viscosity Index	Pour Point (°C)
			40°C	100°C		
MILLUBE®E-22A ※Production by Order	0.6	284	24.2	6.0	211	–30
MILLUBE®E-32A	0.6	286	32.0	7.0	189	–30
MILLUBE®E-46A	0.6	296	45.7	9.0	184	–35
MILLUBE®E-56A	0.5	324	56.8	10.6	180	–40

(Main Application) Hydraulic oil for dam sluice gates and discharge equipment, pile-driving machines, vibro-hammers, underwater backhoes, down-the-hole hammers, and other hydraulic equipment

“**MILLUBE®E** series” are biodegradable hydraulic fluids which have many features other than good biodegradability, including good lubricity, low toxicity, and fire retardancy with higher flash point.

6. 13 ENVIRONMENTALLY FRIENDLY LUBRICANTS for MARINE USE (2013 VGP Certified)

Product Name	Acid Value (mgKOH/g)	Flash Point (°C)	Kinematic Viscosity (mm ² /s)		Viscosity Index	Pour Point (°C)
			40°C	100°C		
MILLUBE®ST-100U	1	342	123	18.5	168	–35
MILLUBE®ST-150U	1	340	158	24.1	185	–25
MILLUBE®EM-32 ※Under development	1	280	33.1	7.2	191	–30
MILLUBE®EM-46 ※Under development	1	308	46.3	9.2	186	–40

(Main Application) **MILLUBE®ST-100U, 150U**: Stern tube bearing oil, Thruster oil; **MILLUBE®EM-32, EM-46**: Hydraulic fluid

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6. 14 BIODEGLADABLE HIGH VISIOSITY MULTI-PURPOSE LUBRICANTS

Product Name	Acid Value (mgKOH/g)	Flash Point (°C)	Kinematic Viscosity (mm ² /s)		Viscosity Index	Pour Point (°C)
			40°C	100°C		
MILLUBE®G-150A ※Production by Order	3	308	150	20.7	161	-35
MILLUBE®G-320A ※Production by Order	3	278	347	36.1	150	-35

(Main Application) Gearboxes for wind power generators, gear oils for other industrial equipment, etc.

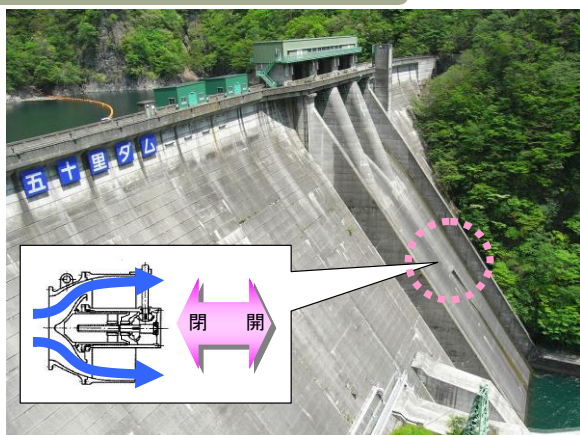
BIODEGLADABLE LUBRICANTS

Biodegradable lubricants are decomposed by bacteria in nature.

Since they are broken down by microorganisms into water and carbon dioxide and returned to nature, they can be said to be lubricants that reduces environmental impact.

APPLICATION of MILLUBE®

MILLUBE® is registered with the Eco Mark (Certification No. 08110006).



(FLOODGATE of DAM)



(WATERWEED CUTTER)



(UNDERWATER BACKHOE)



(PIERLESS FLOODGATE)

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7. AMINE

7. 1 PRIMARY AMINE

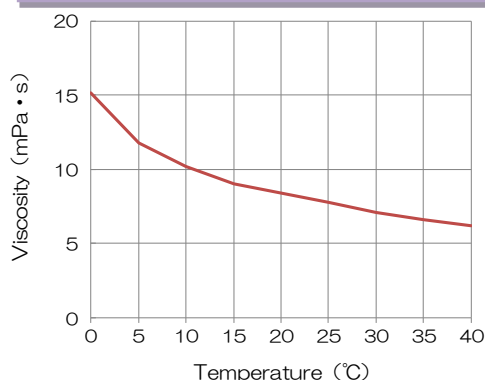
Product Name	Appearance	Chemical Name	Structural Formula	Total Amine Value	Freezing Point (°C)
NISSANAMINE®BB	White Waxy Solid	Dodecylamine	$C_{12}H_{25}-NH_2$	292-306	Approx.28 (Melting Point)
NISSANAMINE®FB	Dark Brown Liquid in Summer Light Yellow Solid in Winter	Coco-alkylamine	$R-NH_2$	270-290	17
NISSANAMINE®M-14	Light Yellow Liquid	1-amino-3-undecanoxo -propane	$C_{11}H_{23}O(CH_2)_3-NH_2$	214-244	Approx.-5
NISSANAMINE®PB	White Waxy Solid	Hexadecylamine	$C_{16}H_{33}-NH_2$	223-233	47
NISSANAMINE®PB FLAKE	White-Light Yellow Brown Flake				
NISSANAMINE®ABT-2	White Waxy Solid (20°C)	Tallow alkylamine	$R-NH_2$	208-220	30-40
NISSANAMINE®ABT	White-Light Yellow Solid	Hardened tallow -alkylamine	$R-NH_2$	204-219	40-46
NISSANAMINE®ABT FLAKE	White-Light Yellow Flake				
NISSANAMINE®AB	White-Light Yellow Solid	Octadecylamine	$C_{18}H_{37}-NH_2$	203-213	Approx.53 (Melting Point)
NISSANAMINE®AB FLAKE	White Flake				
NISSANAMINE®OB	Dark Brown Liquid in Summer Light Yellow Solid in Winter	Oleylamine	$C_{18}H_{35}-NH_2$	200-216	Approx.15
NISSANAMINE®SB	Light Yellow Solid	Soybean alkylamine	$R-NH_2$	197-217	20-30
NISSANAMINE®VB-S	White Waxy Solid	Behenylamine	$C_{22}H_{45}-NH_2$	165-185	55-65
NISSANAMINE®VB-S FLAKE	White-Light Yellow Flake				

Low viscosity and Low freezing point



NISSANAMINE®M-14
(Freezing Point: Approx.-5)

Temperature - Viscosity curve (M-14)



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7. 2 TERTIARY AMINE

Product Name	Appearance	Chemical Name	Structural Formula	Total Amine Value	Freezing Point (°C)
TERTIARY NISSANAMINE®BB	Clear - Light Yellow Liquid	Dodecyl -dimethyl amine	$C_{12}H_{25}-N\begin{matrix} \nearrow CH_3 \\ \searrow CH_3 \end{matrix}$	243-266	-15
TERTIARY NISSANAMINE®ABT	Dark Brown Liquid in Summer Light Yellow Solid in Winter	Hardened tallow alkyl -dimethyl amine	$R-N\begin{matrix} \nearrow CH_3 \\ \searrow CH_3 \end{matrix}$	180-200	18-21
TERTIARY NISSANAMINE®AB	White-Light Yellow Waxy Solid	Octadecyl -dimethyl amine	$C_{18}H_{37}-N\begin{matrix} \nearrow CH_3 \\ \searrow CH_3 \end{matrix}$	170-192	20-23

7. 3 DIAMINE

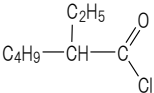
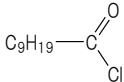
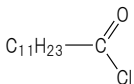
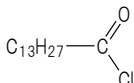
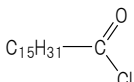
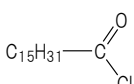
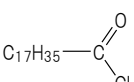
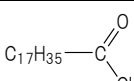
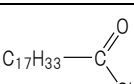
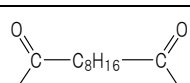
Product Name	Appearance	Chemical Name	Structural Formula	Total Amine Value	Freezing Point (°C)
NISSANAMINE®DT	Yellow Waxy Solid	Tallow alkyl -propylene diamine	$R-NH-C_3H_6-NH_2$	290 ↑	25-34
NISSANAMINE®DT-H	Dark Brown Flake	Hardened tallow alkyl -propylene diamine		320 ↑	40-42
NISSANAMINE®DOB-R	Dark Brown Liquid in Summer Light Yellow Solid in Winter	Oleyl -propylene diamine	$C_{18}H_{35}-NH-C_3H_6-NH_2$	320-350	Approx.20
NISSANAMINE®DV FLAKE	Dark Brown Flake	Behenyl -propylene diamine	$C_{22}H_{45}-NH-C_3H_6-NH_2$	240-295	61-68

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8. FATTY ACID CHLORIDE

Product Name	Appearance	Structural Formula	Chloride (%)	Phosphorus (%)	Free Fatty Acid (%)	Freezing Point (°C)
DISTILLED 2-ETHYLHEXYL CHLORIDE	Light Yellow Liquid		20.8–22.8	0.1 ↓	2.5 ↓	–50 ↓
CAPRYL CHLORIDE	Light Yellow Liquid		19.3–22.3	1.5 ↓	3.5 ↓	–31
LAUROYL CHLORIDE	Light Yellow Liquid		17.5–20.5	1.5 ↓	4.0 ↓	–17
MYRISTOYL CHLORIDE	Light Yellow Liquid		15.0–18.0	1.5 ↓	3.0 ↓	3
DISTILLED MYRISTOYL CHLORIDE			12.0–18.0	0.1 ↓	0.8 ↓	3
DISTILLED PALMITOYL CHLORIDE	Light Yellow Liquid (Solid in winter)		12.0–13.5	0.1 ↓	0.8 ↓	11–12
DISTILLED ISOPALMITOYL CHLORIDE	Light Yellow Liquid		12.0–14.0	0.2 ↓	1.5 ↓	–50 ↓
REFINED STEAROYL CHLORIDE	Light Yellow Liquid (Solid in winter)		11.5–13.0	0.1 ↓	1.5 ↓	Approx.10
REFINED ISOSTEAROYL CHLORIDE	Light Yellow Liquid		10.1–12.1	0.1 ↓	2.5 ↓	–50 ↓
OLEYL CHLORIDE	Light Yellow Liquid		12.5–15.5	1.5 ↓	6.5 ↓	Approx.–44
DISTILLED SEBACOYL DICHLORIDE	Light Yellow Liquid		28.7–30.7	0.2 ↓	2.5 ↓	–5

Attention

- Fatty acid chloride constantly generates hydrogen chloride gas, so please be careful when handling it.
- When melting these, do not raise the temperature above what is necessary, gradually heat them, slowly release the gas, and then open them.
- Samples are taken at the time of manufacture, so please allow some time for preparation. Thank you for your understanding.

We can also produce products to order, depending on the purpose and use. Please contact us for more information.

9. SURFACTANTS

Anionic Surfactant 	A surfactant with a negative-charged lipophilic part when dissolved in water. The representative counter ion is Na⁺ and K⁺.
Cationic Surfactant 	A surfactant with a positive-charged lipophilic part when dissolved in water. The representative counter ion is Cl⁻ and SO₄⁻.
Amphoteric Surfactant 	A surfactant with both cationic and anionic centers in the molecule, showing cationic or anionic behavior
Nonionic Surfactant 	A surfactant with a non-charged molecule when dissolved in water including ether bond or hydroxyl group in it.

(1) Krafft point

The solubility of the ionic surfactants has increases gently as the temperature increases, and remarkably increases around krafft point.

(2) Cloud point

Regarding ethylene oxide-based non-ionic surfactants, the hydration force (hydrogen bond) decreases as the temperature increases. Above their cloud points, they become insoluble releasing water molecules.

(3) Hydroxyl value (OHV , mgKOH/g)

Amount of KOH required for neutralizing acetic acid necessary to acetylate hydroxyl groups.

(4) Calculation formula for average molecular weight from OHV

$$\text{Average Molecular Weight} = \frac{56.1 \times \text{Functional group number}}{\text{OHV}} \times 1000$$

(5) HLB (Hydrophilic-lipophilic balance)

HLB is the ratio of oil-soluble and water-soluble parts of molecule. It is originally developed for ethoxylated surfactant (ranging from 0 to 20).

9. 1 ANIONIC SURFACTANT

9. 1. 1 Alkyl sulfate type

Product Name	Appearance	Chemical Name	Structural Formula	Active Component (%)
SINTREX®EH-R	Light Yellow Liquid	2-Ethylehexyl sulfate ester -sodium salt (Aqueous solution)	$\begin{array}{c} \text{C}_2\text{H}_5 \\ \\ \text{C}_4\text{H}_9-\text{CH}-\text{CH}_2-\text{O}-\text{SO}_3\text{Na} \end{array}$	40
PERSOFT®SK	Light Yellow Liquid (Solid in Winter)	Alkyl sulfate ester sodium salt (Aqueous solution)	$\begin{array}{c} \text{R}-\text{O}-\text{SO}_3\text{Na} \\ \text{R}=\text{C}_8-\text{C}_{18} \end{array}$	Approx.30
PERSOFT®SF-T	Light Yellow Liquid	Lauryl sulfate ester -triethanolamine salt (Aqueous solution)	$\begin{array}{c} \text{R}-\text{O}-\text{SO}_3\text{H} \cdot \text{N}(\text{C}_2\text{H}_4\text{OH})_3 \\ \text{R}=\text{C}_{12}-\text{C}_{14} \end{array}$	Approx.40

9. 1. 2 Alkyl ether sulfate type

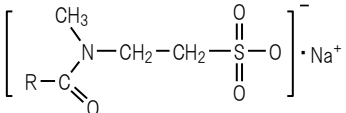
Product Name	Appearance	Chemical Name	Structural Formula	Active Component (%)
NISSANTRAX®K-40	Light Yellow Liquid	Polyoxyethylene lauryl ether sulfate -sodium salt (Aqueous solution)	$\begin{array}{c} \text{C}_{12}\text{H}_{25}-\text{O}-(\text{C}_2\text{H}_4\text{O})_n-\text{SO}_3\text{Na} \\ \text{K-40 } n \approx 4 \\ \text{K-300 } n \approx 30 \end{array}$	Approx.28
NISSANTRAX®K-300	Light Yellow Liquid			Approx.30
PERSOFT®EF	Light Yellow Liquid	Polyoxyethylene alkyl ether sulfate -sodium salt (Aqueous solution)	$\begin{array}{c} \text{R}-\text{O}-(\text{C}_2\text{H}_4\text{O})_n-\text{SO}_3\text{Na} \\ \text{EF } \text{R}=\text{C}_{12}, \text{C}_{14} \\ \text{EDO } \text{R}=\text{C}_{12}, \text{C}_{13} \\ \text{EK } \text{R}=\text{C}_{10}-\text{C}_{18} \end{array}$	25
PERSOFT®EDO	Light Yellow Liquid			Approx.26
PERSOFT®EK	Light Yellow Liquid (Turbid in Winter)			Approx.30
PERSOFT®EF-T	Light Yellow Liquid	Polyoxyethylene lauryl ether sulfate -triethanolamine salt (Aqueous solution)	$\begin{array}{c} \text{R}-\text{O}-(\text{C}_2\text{H}_4\text{O})_n-\text{SO}_3\text{H} \cdot \text{N}(\text{C}_2\text{H}_4\text{OH})_3 \\ \text{EF-T } \text{R}=\text{C}_8-\text{C}_{18} \end{array}$	36

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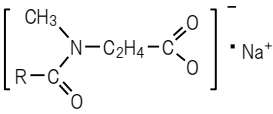
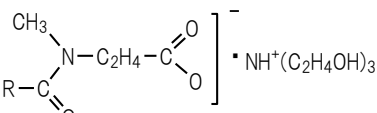
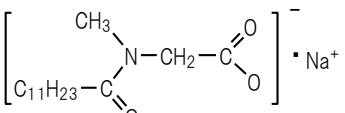
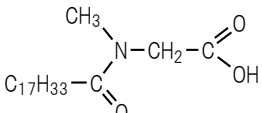
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9. 1. 3 Methyltaurine type

Product Name	Appearance	Chemical Name	Structural Formula	Active Component (%)
DIAPON®S	White Liquid	N- (Fatty acid acyl) -N-methyltaurine sodium salt (Mixed with anionic surfactant)		13
DIAPON®LM	White - Light Yellow Paste	N- (Coconut oil acyl) -N-methyltaurine sodium salt (Aqueous solution)		26-29
DIAPON®K	White - Light Yellow Paste (Room temperature)			26
DIAPON®K-SF	Clear - Light Yellow Liquid			30
DIAPON®K-SF POWDER	White - Light Yellow Powder			95
DIAPON®HF-SF	Clear - Light Yellow Liquid	N-Decanoyl -N-methyltaurine sodium salt (Aqueous solution)		24-30

9. 1. 4 Amino acid type

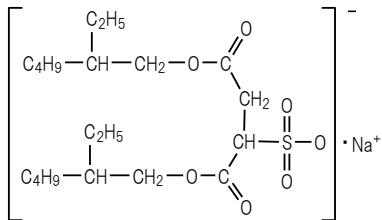
Product Name	Appearance	Chemical Name	Structural Formula	Active Component (%)
SOFTILT®AS-L	Clear - Light Yellow Liquid	N-Dodecanoyl-N-methyl -β-alanine sodium salt (Aqueous solution)		30
SOFTILT®AT-L	Clear - Light Yellow Liquid	N-Dodecanoyl-N-methyl -β-alanine triethanolamine salt (Aqueous solution)		30
FIRET®L	Light Yellow Liquid	N-Lauroyl-N-methylglycine -sodium salt (Aqueous solution) «Sodium lauroyl sarcosine»		30
OLEOYLSARCOSINE 221P	Light Yellow-Dark Brown Liquid	N-Oleoyl-N-methylglycine «Oleoyl sarcosine»		100

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9. 1. 5 Sodium dialkyl sulfosuccinate

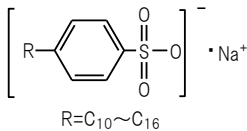
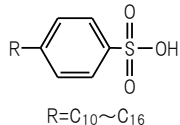
Product Name	Appearance	Chemical Name	Structural Formula	Active Component (%)
RAPISOL®A-30	Clear Viscous Liquid	1,4-Bis(2-ethylhexyl)-sodium sulfosuccinate		30
RAPISOL®A-80	Clear - Light Yellow Viscous Liquid			80

Wettability

Surface tension of aqueous solution (20°C)	Concentration of RAPISOL® (ppm)						
	5,000	2,000	1,000	500	100	50	0
Surface tension (mN/m)	27.3	27.6	30.6	34.8	47.7	51.5	72.5

Penetrating power of aqueous solution		Concentration of RAPISOL® (ppm)			
		5,000	1,000	500	100
Time for Felt to sink (20×10×6) mm	25°C	0.4 sec.	4.1 sec.	12.3 sec.	300 sec.
	50°C	0.4 sec.	2.0 sec.	5.6 sec.	64 sec.
	70°C	0.3 sec.	1.4 sec.	1.7 sec.	23 sec.

9. 1. 6 Alkylbenzene sulfonate

Product Name	Appearance	Chemical Name	Structural Formula	Active Component (%)
NEWREX®R-25L	Yellowish White Liquid	Linear alkylbenzene-sulfonic acid sodium salt (Aqueous solution)		Approx.25
NEWREX®R	Yellowish White Paste			Approx.50
NEWREX®SOFT 5S	Dark Brown Viscous Liquid	Linear alkylbenzene-sulfonic acid		96 ↑

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9. 1. 7 Fatty acid soap (Potassium)

Product Name	Appearance	Chemical Name	Water (%)	Pure Soap (%)
NONSOUL®LK-2	White Flake	Potassium laurate	5 ↓	98 ↑
NONSOUL®LK-5	Light Yellow Flake	Potassium salt of fatty acid (C12-20)	–	98 ↑
NONSOUL®LK-30	Light Yellow Liquid	Potassium cocoate (Aqueous solution)	Approx.70	–
NONSOUL® MK-1	White Flake	Potassium myristate	10 ↓	98 ↑
NONSOUL®PK-1	White Flake	Potassium palmitate	10 ↓	97 ↑
NONSOUL®TK-1	Light Yellow Flake	Potassium salt of tallow fatty acid	10 ↓	–
NONSOUL®SK-1	White Needle-Shaped	Potassium salt of hardened tallow fatty acid 《Potassium stearate》	8 ↓	96 ↑
NONSOUL®OK-1	Yellow Liquid	Potassium oleate (Aqueous solution)	Approx.80	–
NONSOUL®OK-2	Yellow Liquid	Potassium oleate (Aqueous & diethanolamine solution)	Approx.60 * solvent	–

9. 1. 8 Fatty acid soap (Sodium)

Product Name	Appearance	Chemical Name	Water (%)	Pure Soap (%)
NONSOUL®LN-1	White Flake	Sodium laurate	20 ↓	97 ↑
NONSOUL®PN-1	Yellow Needle-Shaped	Sodium salt of fatty acid	13 ↓	97 ↑
NONSOUL®PN-1 POWDER	Light Yellow Powder		7 ↓	97 ↑
MARSEILLE SOAP	Yellow Needle-Shaped	Sodium salt of tallow fatty acid	10 ↓	96 ↑
MARSEILLE SOAP T POWDER	Yellow Powder		7 ↓	92 ↑
NONSOUL®TN-1	White Needle-Shaped	Sodium salt of hydrogenated tallow fatty acid	10 ↓	–
NONSOUL®SN-1A	White Needle-Shaped	Sodium salt of hardened tallow fatty acid 《Sodium stearate》	15 ↓	96 ↑
NONSOUL®SN-1 POWDER	White Powder		15 ↓	96 ↑
NONSOUL®ON-A	Yellow Needle-Shaped	Sodium oleate	6 ↓	95 ↑
NONSOUL®ON-A POWDER	Light Yellow Powder			
NONSOUL®ON-1N	Yellow Flake			

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9. 2 CATIONIC SURFACTANT

9. 2. 1 Amine salt type

Product Name	Appearance	Chemical Name	Structural Formula	Freezing Point (°C)	Active Component (%)
NISSANCATION®MA	Light Yellow Flake	Tetradecylamine acetate	$C_{14}H_{29}-NH_2 \cdot CH_3-C \begin{array}{l} \nearrow OH \\ \searrow O \end{array}$	60-70	100
NISSANCATION®SA	Light Yellow Flake	Octadecyl amine acetate	$C_{18}H_{37}-NH_2 \cdot CH_3-C \begin{array}{l} \nearrow OH \\ \searrow O \end{array}$	Approx.80	100

9. 2. 2 Trimethyl type

Product Name	Appearance	Chemical Name	Structural Formula	Active Component (%)
NISSANCATION®BB	Light Yellow Liquid	Dodecyl trimethyl -ammonium chloride (Aqueous solution)	$\left[\begin{array}{c} CH_3 \\ \\ C_{12}H_{25}-N^+-CH_3 \\ \\ CH_3 \end{array} \right] \cdot Cl^-$	30
NISSANCATION®FB	Light Yellow Liquid	Coco-alkyl trimethyl -ammonium chloride (Aqueous solution)	$\left[\begin{array}{c} CH_3 \\ \\ R-N^+-CH_3 \\ \\ CH_3 \end{array} \right] \cdot Cl^-$	30
NISSANCATION®PB-300	Light Yellow Liquid	Hexadecyl trimethyl -ammonium chloride (Aqueous solution)	$\left[\begin{array}{c} CH_3 \\ \\ C_{16}H_{33}-N^+-CH_3 \\ \\ CH_3 \end{array} \right] \cdot Cl^-$	28
NISSANCATION®AB	Light Yellow Viscous Liquid	Octadecyl trimethyl -ammonium chloride (Aqueous & IPA solution)	$\left[\begin{array}{c} CH_3 \\ \\ C_{18}H_{37}-N^+-CH_3 \\ \\ CH_3 \end{array} \right] \cdot Cl^-$	20-25
NISSANCATION®AB-600	Light Yellow Viscous Liquid			60-66
NISSANCATION®VB-M FLAKE	Light Yellow Flake	Behenyl trimethyl -ammonium chloride (Contains 20% IPA)	$\left[\begin{array}{c} CH_3 \\ \\ C_{22}H_{45}-N^+-CH_3 \\ \\ CH_3 \end{array} \right] \cdot Cl^-$	80
NISSANCATION®VB-F	Light Yellow Flake	Behenyl trimethyl -ammonium chloride (Contains 20% ethanol)		

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9. 2. 3 Dialkyl type

Product Name	Appearance	Chemical Name	Structural Formula	Active Component (%)
NISSANCATION®2ABT	Light Yellow Viscous Liquid	Bis (hydrogenated tallow-alkyl) dimethyl-ammonium chloride (Aqueous & IPA solution)	$\left[\begin{array}{c} \text{CH}_3 \\ \\ \text{R}-\text{N}^+-\text{R} \\ \\ \text{CH}_3 \end{array} \right] \cdot \text{Cl}^-$	75
NISSANCATION®2-OLR	Light Yellow Liquid	Dioleyl dimethyl-ammonium chloride (Aqueous & IPA solution)	$\left[\begin{array}{c} \text{CH}_3 \\ \\ \text{C}_{18}\text{H}_{35}-\text{N}^+-\text{C}_{18}\text{H}_{35} \\ \\ \text{CH}_3 \end{array} \right] \cdot \text{Cl}^-$	75

9. 2. 4 Benzyl & special type

Product Name	Appearance	Chemical Name	Structural Formula	Active Component (%)
NISSANCATION®F2-50R	Clear - Light Yellow Liquid	Coco-alkyl dimethyl benzyl-ammonium chloride <Benzalkonium chloride solution>	$\left[\begin{array}{c} \text{CH}_3 \\ \\ \text{R}-\text{N}^+-\text{CH}_2-\text{C}_6\text{H}_5 \\ \\ \text{CH}_3 \end{array} \right] \cdot \text{Cl}^-$	50
NISSANCATION®M2-100R	White - Light Yellow Powder	Tetradecyl dimethyl benzyl-ammonium chloride <Benzalkonium chloride>	$\left[\begin{array}{c} \text{CH}_3 \\ \\ \text{C}_{14}\text{H}_{29}-\text{N}^+-\text{CH}_2-\text{C}_6\text{H}_5 \\ \\ \text{CH}_3 \end{array} \right] \cdot \text{Cl}^-$	90 ↑
NISSANCATION®EQ-01D	White Solid	N, N-Diacyloxyethyl-N-hydroxyethyl-N-methyl-ammonium methylsulfate (Contains diethyleneglycol)	$\left[\begin{array}{c} \text{CH}_3 \\ \\ \text{RCOOC}_2\text{H}_4-\text{N}^+-\text{C}_2\text{H}_4\text{OCOR} \\ \\ \text{C}_2\text{H}_4\text{OH} \end{array} \right] \cdot \text{CH}_3\text{SO}_4^-$	83-87
NISSANCATION®AR-4	Light Yellow Liquid	1-Methyl-1-hydroxyethyl-2-alkyl tallow Imidazolium-chloride (Aqueous & IBA solution)	$\left[\begin{array}{c} \text{HO}-\text{CH}_2-\text{CH}_2 \\ \\ \text{N}^+ \\ \quad \backslash \\ \text{CH}_3 \quad \text{C}=\text{N} \\ \quad \quad \quad \quad / \\ \quad \quad \text{CH}_2-\text{CH}_2 \end{array} \right] \cdot \text{Cl}^-$	35

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9. 3 NONIONIC SURFACTANT

9. 3. 1 Ether type (1)

Product Name	Appearance	Chemical Name	Structural Formula	Cloud Point (°C)	HLB	Freezing Point (°C)
NONION K-204	Clear - Light Yellow Liquid	Polyoxyethylene lauryl ether	$C_{12}H_{25}O-(C_2H_4O)_n-H$	0 ↓	9.7	Approx.15
NONION K-220	White - Light Yellow Solid			100 ↑	16.5	Approx.40
NONION K-230	White - Light Yellow Solid			100 ↑	17.5	Approx.45
NONION K-2100W (Antioxidant added)	Clear - Light Yellow Liquid	Polyoxyethylene lauryl ether (Contains 50% water)		100 ↑	19.2	0 ↓
PERSOFT®NK-60	Light Yellow Liquid	Polyoxyethylene alkyl ether (Contains 10% water)	$R-O-(C_2H_4O)_n-H$	55-63	12.0	5 ↓
PERSOFT®NH-90C	Light Yellow - Brown Solid	Polyoxyethylene alkyl ether		Approx.78	13.5	Approx.30
PERSOFT®NK-100	Light Yellow Liquid	Polyoxyethylene alkyl ether (Contains 20% water)		90 ↑	14.0	10 ↓ (Pour Point)
PERSOFT®NK-100C	White - Light Yellow Solid (Milky-White Liquid in Summer)	Polyoxyethylene alkyl ether				Approx.25
NONION P-208	White - Light Yellow Solid	Polyoxyethylene cetyl ether	$C_{16}H_{33}O-(C_2H_4O)_n-H$	40-55	11.9	Approx.25
NONION P-210	White - Light Yellow Solid			60-75	12.9	Approx.28
NONION P-213	White - Light Yellow Solid			85-95	14.1	28-38
NONION E-202 NONION E-202S	Clear - Light Yellow Liquid	Polyoxyethylene oleyl ether	$C_{18}H_{35}O-(C_2H_4O)_n-H$	0 ↓	4.9	Approx.2
NONION E-205 NONION E-205S	Clear - Light Yellow Liquid			0 ↓	9.0	Approx.4
NONION E-212	White - Light Yellow Solid			80 ↑	13.3	Approx.31
NONION E-215	White - Light Yellow Solid			95 ↑	14.2	Approx.35
NONION E-230	White - Light Yellow Solid			100 ↑	16.6	Approx.40
NONION S-202	White - Light Yellow Solid	Polyoxyethylene stearyl ether	$C_{18}H_{37}O-(C_2H_4O)_n-H$	0 ↓	4.9	Approx.40
NONION S-207	White - Light Yellow Solid			0 ↓	10.7	30-36
NONION S-215	White - Light Yellow Solid			90 ↑	14.2	Approx.40
NONION S-220	White - Light Yellow Solid			100 ↑	15.3	Approx.45
NONION B-250	White - Light Yellow Solid	Polyoxyethylene behenyl ether	$C_{22}H_{45}O-(C_2H_4O)_n-H$	100 ↑	17.4	Approx.53

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9. 3. 1 Ether type (2)

Product Name	Appearance	Chemical Name	Structural Formula	Cloud Point (°C)	HLB	Freezing Point (°C)
NONION EH-204	Clear - Light Yellow Liquid	Polyoxyethylene-2-ethylhexyl ether	$C_8H_{17}O-(C_2H_4O)_n-H$	-	11.5	-30 ↓
NONION EH-208	Clear - Light Yellow Liquid			73-79	14.6	Approx.-10
NONION ID-203	Clear - Light Yellow Liquid	Polyoxyethylene-isodecyl ether	$C_{10}H_{21}O-(C_2H_4O)_n-H$	0 ↓	9.1	Approx.-1
NONION ID-206	Clear - Light Yellow Liquid			44-54	12.5	Approx.4
NONION ID-209	Clear - Light Yellow Liquid			70 ↑	14.3	Approx.15
DISPANOL®TOC	Clear - Light Yellow Liquid	Polyoxyethylene-alkyl(branch)ether	$R-O-(C_2H_4O)_n-H$	45-55	13.0	5-25
NONION HT-505	Clear - Light Yellow Liquid	Polyoxyethylene-polyoxypropylene-alkyl ether	-	5 ↓	5	Approx.-17
NONION HT-510	Clear - Light Yellow Liquid			60-75	10	Approx.19

9. 3. 2 Special ether type

Product Name	Appearance	Chemical Name	Structural Formula	Cloud Point (°C)	HLB	Freezing Point (°C)
UNILUBE®MS-70K	Clear - Light Yellow Liquid	Polyoxypropylene-stearyl ether	$C_{18}H_{35}O-(C_3H_6O)_n-H$	-	-	-10 ↓
DISPANOL®16	White - Light Yellow Solid	Mixture	-	-	-	Approx.40
DISPANOL®16A		Special type		0 ↓	-	30-36
NONION MN-811	Clear - Light Yellow Liquid	Special type	-	Approx.45	8.3	Approx.20

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9. 3. 3 Ester type

Product Name	Appearance	Chemical Name	Structural Formula	Cloud Point (°C)	HLB	Freezing Point (°C)
NONION L-2	Light Yellow Liquid	Polyoxyethylene -mono laurate	$C_{11}H_{23}-C(=O)-O-(C_2H_4O)_nH$	-	10.0	-3-10
NONION L-4	Clear-Light Yellow Liquid			40-50	13.3	Approx.10
NONION S-2	White - Light Yellow Solid	Polyoxyethylene -mono stearate	$C_{17}H_{35}-C(=O)-O-(C_2H_4O)_nH$	-	8.0	33-41
NONION S-4	White - Light Yellow Solid			-	11.6	30-40
NONION S-6	Yellow - Brown Solid			45-55	13.6	Approx.35
NONION S-15	Light Yellow - Brown Solid			-	13.6	Approx.40
NONION S-15K	Light Yellow - Brown Solid			-	13.6	Approx.40
NONION S-15.4	White - Light Yellow Solid			100 ↑	16.8	40-45
NONION S-15.4V	White - Light Yellow Solid			100 ↑	18.3	Approx.50
NONION S-40	White Flake			100 ↑	18.3	Approx.50
NONION O-2	Yellow - Yellowish Dark Brown Liquid	Polyoxyethylene -mono oleate	$C_{17}H_{33}-C(=O)-O-(C_2H_4O)_nH$	-	8.3	-20 ↓
NONION O-3	Yellow - Yellowish Dark Brown Liquid			-	10.2	Approx.-8
NONION O-4	Yellow - Dark Brown Viscous Liquid			-	11.6	Approx.-5
NONION O-6	Yellow - Dark Brown Viscous Liquid			40-50	13.5	Approx.13

9. 3. 4 Diester type

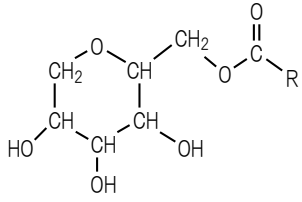
Product Name	Appearance	Chemical Name	Structural Formula	HLB	Freezing Point (°C)
UNISTER®E-275	Light Yellow Flake	Ethylene glycol -distearate	$C_{17}H_{35}-C(=O)-O-CH_2CH_2O-C(=O)-C_{17}H_{35}$	-	Approx.63 (Melting Point)
NONION DS-60HN	Light Yellow Flake	Polyethyleneglycol -distearate	$C_{17}H_{35}-C(=O)-O-(C_2H_4O)_n-C(=O)-C_{17}H_{35}$	19.0	Approx.60 (Melting Point)
NONION DO-4	Yellow - Dark Brown Liquid	Polyethyleneglycol -dioleate	$C_{17}H_{33}-C(=O)-O-(C_2H_4O)_n-C(=O)-C_{17}H_{33}$	8.6	25 ↓
NONION DO-6				10.6	25 ↓
UNISAFE®NKL-9520	Clear - Light Yellow Liquid	Polypropyleneglycol -distearate	$C_{17}H_{35}-C(=O)-O-(C_3H_6O)_n-C(=O)-C_{17}H_{35}$	-	-10

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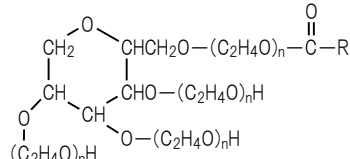
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9. 3. 5 Sorbitan derivatives

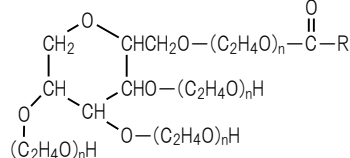
Product Name	Appearance	Chemical Name	Structural Formula	HLB	Freezing Point (°C)
NONION CP-08R (*)	Yellow-Brown Viscous Liquid	Sorbitan mono caprylate	 (Structural formula is monoester)	9.6	0 ↓
NONION LP-20R (*)	Light Yellow Viscous Liquid	Sorbitan mono laurate		8.6	Approx.16
NONION PP-40R (Food Additive)	Light Yellow Pellet	Sorbitan mono palmitate		6.7	45-51
NONION SP-60R (Food Additive)	Light Yellow Pellet	Sorbitan mono stearate		4.7	49-55
NONION OP-80R (*)	Yellow Viscous Liquid	Sorbitan mono oleate		4.3	5 ↓
NONION OP-83RAT	Brown Viscous Liquid	Sorbitan sesqui oleate		3.7	-10 ↓
NONION OP-85R	Brown-Dark Brown Viscous Liquid	Sorbitan tri oleate		1.8	0 ↓

(*) There are also food additive-compliant products available.

9. 3. 6 Polyoxyethylene sorbitan derivatives

Product Name	Appearance	Chemical Name	Structural Formula	HLB	Freezing Point (°C)
NONION LT-221	Yellow-Dark Brown Viscous Liquid	Polyoxyethylene-sorbitan mono laurate	 (Structural formula is monoester)	16.7	Approx.-5
NONION LT-280	Light Yellow-Yellow Solid			19.0	Approx.40
NONION LT-280W (Antioxidant added)	Light Yellow-Yellow Liquid				0 ↓
NONION ST-221	Light Yellow-Yellow Paste -Solid	Polyoxyethylene-sorbitan mono stearate	(Structural formula is monoester)	15.7	Approx.25
NONION OT-221	Light Yellow-Yellow Liquid	Polyoxyethylene-sorbitan mono oleate		15.7	Approx.-10
NONION OT-521	Light Yellow-Yellow Liquid	Polyoxyethylene-sorbitan tri oleate		10.8	-

9. 3. 7 Polyoxyethylene sorbitan derivatives (Food additive)

Product Name	Appearance	Chemical Name	Structural Formula	HLB	Freezing Point (°C)
WILSURF®TF-20 (Food Additive)	Yellow-Dark Brown Viscous Liquid	Polyoxyethylene-sorbitan mono laurate		16.7	Approx.-5
WILSURF®TF-60 (Food Additive)	Light Yellow-Yellow Paste -Solid	Polyoxyethylene-sorbitan mono stearate		15.7	Approx.24
WILSURF®TF-80 (Food Additive)	Light Yellow-Yellow Liquid	Polyoxyethylene-sorbitan mono oleate		15.7	Approx.-10

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9. 3. 8 Monoglyceride type

Product Name	Appearance	Chemical Name	Structural Formula	HLB	Freezing Point (°C)
MONOGLY D	White Powder	Glycerol mono stearate (Distilled grade)	$ \begin{array}{c} \text{O} \\ \parallel \\ \text{CH}_2-\text{O}-\text{C}-\text{R} \\ \\ \text{CH}-\text{OH} \\ \\ \text{CH}_2-\text{OH} \end{array} $	3.8	Approx.66
MONOGLY MB (Food Additive)	Light Yellow Beads	Glycerol mono stearate		5.5	Approx.60
MONOGLY M-14	White Powder	Glycerol mono myristate		3.5	Approx.50 (Pour Point)

9. 3. 9 Polyoxyethylene monoglyceride type

Product Name	Appearance	Chemical Name	Structural Formula	HLB	Freezing Point (°C)
UNIGLY®MK-207	Clear - Light Yellow Liquid	Polyoxyethylene -glyceryl mono cocoate	$ \begin{array}{c} \text{O} \\ \parallel \\ \text{CH}_2-\text{O}-\text{C}-\text{R} \\ \\ \text{CH}-\text{O}-(\text{C}_2\text{H}_4\text{O})_n-\text{H} \\ \\ \text{CH}_2-\text{O}-(\text{C}_2\text{H}_4\text{O})_n-\text{H} \end{array} $	13.0	Approx.-1.5
UNIGLY®MK-230	Light Yellow Liquid			17.4	Approx.12

9. 3. 10 Polyoxyethylene glyceride type

Product Name	Appearance	Chemical Name	Structural Formula	HLB	Freezing Point (°C)
UNIOX®HC-40	Waxy Solid	Polyoxyethylene -hydrogenated castor oil	$ \begin{array}{c} \text{O} \qquad \text{O}-(\text{C}_2\text{H}_4\text{O})_n\text{H} \\ \parallel \qquad \qquad \qquad \parallel \\ \text{CH}_2-\text{O}-(\text{C}_2\text{H}_4\text{O})_n-\text{C}-(\text{CH}_2)_{10}\text{CH}(\text{CH}_2)_5\text{CH}_3 \end{array} $	13.3	Approx.25
UNIOX®HC-60	Waxy Solid		$ \begin{array}{c} \text{O} \qquad \text{O}-(\text{C}_2\text{H}_4\text{O})_n\text{H} \\ \parallel \qquad \qquad \qquad \parallel \\ \text{CH}-\text{O}-(\text{C}_2\text{H}_4\text{O})_n-\text{C}-(\text{CH}_2)_{10}\text{CH}(\text{CH}_2)_5\text{CH}_3 \\ \\ \text{O} \qquad \text{O}-(\text{C}_2\text{H}_4\text{O})_n\text{H} \\ \parallel \qquad \qquad \qquad \parallel \\ \text{CH}_2-\text{O}-(\text{C}_2\text{H}_4\text{O})_n-\text{C}-(\text{CH}_2)_{10}\text{CH}(\text{CH}_2)_5\text{CH}_3 \end{array} $	15.0	30-35
UNIOX®GT-20IS	Light Yellow Liquid	Polyoxyethylene -glyceryl tri-isostearic acid	$ \begin{array}{c} \text{O} \\ \parallel \\ \text{CH}_2-\text{O}-(\text{C}_2\text{H}_4\text{O})_n-\text{C}-\text{R} \\ \\ \text{CH}-\text{O}-(\text{C}_2\text{H}_4\text{O})_n-\text{C}-\text{R} \\ \\ \text{CH}_2-\text{O}-(\text{C}_2\text{H}_4\text{O})_n-\text{C}-\text{R} \end{array} $	10.4	0 ↓

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9. 3. 11 Sorbitol derivatives

Product Name	Appearance	Chemical Name	Structural Formula	HLB	Freezing Point (°C)
UNIOX®ST-30E	Light Yellow - Yellow Liquid	Polyoxyethylene-sorbitol tetra oleate	$\begin{array}{c} \text{CH}_2\text{---O---(C}_2\text{H}_4\text{O)}_n\text{---C---R} \\ \parallel \\ \text{O} \\ \text{CH---O---(C}_2\text{H}_4\text{O)}_n\text{---C---R} \\ \parallel \\ \text{O} \\ \text{CH---O---(C}_2\text{H}_4\text{O)}_n\text{---C---R} \\ \parallel \\ \text{O} \\ \text{CH---O---(C}_2\text{H}_4\text{O)}_n\text{---C---R} \\ \parallel \\ \text{O} \\ \text{CH}_2\text{---O---(C}_2\text{H}_4\text{O)}_n\text{---H} \end{array}$	11.2	0 ↓
UNIOX®ST-40E	Light Yellow - Yellow Liquid			12.5	0 ↓
UNIOX®ST-60E	Light Yellow - Yellow Viscous Liquid			14.2	Approx.12

9. 3. 12 Polyglycerin alkyl ester type

Product Name	Appearance	Chemical Name	Structural Formula	HLB	Freezing Point (°C)
UNIGLY®GL-106	Light Yellow Liquid	Polyglycerin laurate ester	$\text{C}_{11}\text{H}_{23}\text{---C---O---(CH}_2\text{---CH---CH}_2\text{O)}_n\text{---H}$ $\parallel \quad \quad \quad \mid$ $\text{O} \quad \quad \quad \text{OH}$	14.5	Approx.-9
UNIGLY®GO-102R	Light Yellow Liquid	Polyglycerin oleate ester	$\text{C}_{17}\text{H}_{33}\text{---C---O---(CH}_2\text{---CH---CH}_2\text{O)}_n\text{---H}$ $\parallel \quad \quad \quad \mid$ $\text{O} \quad \quad \quad \text{OH}$	8.8	-

9. 3. 13 Polyoxyethylene polypropylene glycol

Product Name	Appearance	Chemical Name / Structural Formula	Cloud Point (°C)	EO (wt%)	Molecular Weight	Freezing Point (°C)
PLONON®#102	Clear - Light Yellow Liquid	Polyethyleneglycol-polypropyleneglycol-polyethyleneglycol (Block copolymer) HO-(C ₂ H ₄ O) _m -(C ₃ H ₆ O) _n -(C ₂ H ₄ O) _m -H	28	20	1,250	-20 ↓
PLONON®#104	Clear - Light Yellow Liquid		62	40	1,670	5 (Pour Point)
PLONON®#201	Clear - Light Yellow Liquid		20	10	2,220	-10 ↓
PLONON®#202B	Clear - Light Yellow Liquid		30	20	2,400	-5 ↓ (Pour Point)
PLONON®#204	White Turbid Liquid - Paste		62	40	3,330	Approx.20
PLONON®#208	White Flake		100 ↑	80	10,000	Approx.52
PLONON®70DP-600B	White - Light Yellow Flake		100 ↑	70	10,000	Approx.56
PLONON®70DP-950B	White - Light Yellow Flake		100 ↑	70	13,000	Approx.55

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9. 3. 14 Polyoxyethylene alkyl amine type

Product Name	Appearance	Chemical Name	Structural Formula	Cloud Point (°C)	HLB	Freezing Point (°C)
NYMEEN®L-201	Yellow-Dark Brown Liquid	Polyoxyethylene-lauryl amine	$\text{C}_{12}\text{H}_{25}-\text{N} \begin{cases} \text{CH}_2\text{CH}_2\text{OH} \\ \text{H} \end{cases}$	0 ↓	3.8	Approx.10
NYMEEN®L-202	Yellow-Dark Brown Liquid		$\text{C}_{12}\text{H}_{25}-\text{N} \begin{cases} \text{CH}_2\text{CH}_2\text{OH} \\ \text{CH}_2\text{CH}_2\text{OH} \end{cases}$	0 ↓	6.4	Approx.15 (Pour Point)
NYMEEN®L-207	Yellow-Dark Brown Liquid		$\text{C}_{12}\text{H}_{25}-\text{N} \begin{cases} (\text{C}_2\text{H}_4\text{O})_n\text{H} \\ (\text{C}_2\text{H}_4\text{O})_n\text{H} \end{cases}$	80 ↑	12.5	Approx.-5
NYMEEN®F-202	Yellow-Dark Brown Liquid	Polyoxyethylene-coco alkyl amine	$\text{R}-\text{N} \begin{cases} (\text{C}_2\text{H}_4\text{O})_n\text{H} \\ (\text{C}_2\text{H}_4\text{O})_n\text{H} \end{cases}$	0 ↓	6.1	Approx.0
NYMEEN®F-215	Yellow-Dark Brown Liquid			100 ↑	15.4	5 ↓
NYMEEN®T2-202	Yellow-Dark Brown Solid	Polyoxyethylene-tallow alkyl amine	$\text{R}-\text{N} \begin{cases} (\text{C}_2\text{H}_4\text{O})_n\text{H} \\ (\text{C}_2\text{H}_4\text{O})_n\text{H} \end{cases}$	0 ↓	5.0	Approx.25
NYMEEN®T2-210	Light Yellow-Dark Brown Liquid			95 ↑	12.5	0 ↓
NYMEEN®T2-230	Light Yellow-Dark Brown Liquid			100 ↑	16.7	Approx.20
NYMEEN®S-202	Yellow-Dark Brown Solid	Polyoxyethylene-stearyl amine	$\text{C}_{18}\text{H}_{37}-\text{N} \begin{cases} (\text{C}_2\text{H}_4\text{O})_n\text{H} \\ (\text{C}_2\text{H}_4\text{O})_n\text{H} \end{cases}$	0 ↓	5.0	Approx.45
NYMEEN®S-204	Yellow-Dark Brown Solid			0 ↓	8.0	Approx.25
NYMEEN®S-210	Yellow-Dark Brown Liquid			90 ↑	12.5	Approx.10
NYMEEN®S-215	Yellow-Dark Brown Liquid			90 ↑	14.5	Approx.2
NYMEEN®S-220	Yellow-Dark Brown Liquid			100 ↑	15.4	Approx.5
NYMEEN®O-205	Yellow-Dark Brown Liquid	Polyoxyethylene-oleyl amine	$\text{C}_{18}\text{H}_{35}-\text{N} \begin{cases} (\text{C}_2\text{H}_4\text{O})_n\text{H} \\ (\text{C}_2\text{H}_4\text{O})_n\text{H} \end{cases}$	100 ↑	9.0	0 ↓
NYMEEN®DT-203	Dark Brown Liquid	Polyoxyethylene-alkyl propylene-diamine	$\text{R}-\text{N} \begin{cases} \text{C}_3\text{H}_6-\text{N} \begin{cases} (\text{C}_2\text{H}_4\text{O})_n\text{H} \\ (\text{C}_2\text{H}_4\text{O})_n\text{H} \end{cases} \\ (\text{C}_2\text{H}_4\text{O})_n-\text{H} \end{cases}$	0 ↓	6.0	Approx.15
NYMEEN®DT-208	Dark Brown Liquid			100 ↑	10.7	Approx.5

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9. 3. 15 Alkanol amide type

Product Name	Appearance	Chemical Name	Structural Formula	Freezing Point (°C)
STAFOAM®FK	Yellow Viscous Liquid	Mixture of anionic and nonionic surfactant	$\text{R}-\text{C}(=\text{O})\text{N}\begin{matrix} \nearrow \text{CH}_2\text{CH}_2\text{OH} \\ \searrow \text{CH}_2\text{CH}_2\text{OH} \end{matrix}$	-
STAFOAM®F	Yellow Viscous Liquid	Coconut fatty acid diethanolamide (1:2 type)	$\text{R}-\text{C}(=\text{O})\text{N}\begin{matrix} \nearrow \text{CH}_2\text{CH}_2\text{OH} \\ \searrow \text{CH}_2\text{CH}_2\text{OH} \end{matrix}$ ▪ $\text{N}\begin{matrix} \nearrow \text{CH}_2\text{CH}_2\text{OH} \\ \searrow \text{CH}_2\text{CH}_2\text{OH} \end{matrix}$	-10
STAFOAM®T	Dark Brown Viscous Liquid	Tallow fatty acid diethanolamide (1:2 type)		25
STAFOAM®DL	Light Yellow Solid	Lauric acid diethanolamide (1:1 type)	$\text{C}_{11}\text{H}_{23}-\text{C}(=\text{O})\text{N}\begin{matrix} \nearrow \text{CH}_2\text{CH}_2\text{OH} \\ \searrow \text{CH}_2\text{CH}_2\text{OH} \end{matrix}$	40-47 (Melting Point)
STAFOAM®DF-4	Light Yellow - Yellowish Dark Brown Liquid (Solid in winter)	Coconut fatty acid diethanolamide (1:1 type)	$\text{R}-\text{C}(=\text{O})\text{N}\begin{matrix} \nearrow \text{CH}_2\text{CH}_2\text{OH} \\ \searrow \text{CH}_2\text{CH}_2\text{OH} \end{matrix}$ DF-4: C ₁₂ (Approx.70%) DFC : C ₁₂ (Approx.50%) +Containing glycerin	12.9
STAFOAM®DFC	Light Yellow Viscous Liquid			Approx.-7
STAFOAM®DO	Yellow Viscous Liquid	Oleic acid diethanolamide (1:1 type)	$\text{C}_{17}\text{H}_{33}-\text{C}(=\text{O})\text{N}\begin{matrix} \nearrow \text{CH}_2\text{CH}_2\text{OH} \\ \searrow \text{CH}_2\text{CH}_2\text{OH} \end{matrix}$	Approx.6
STAFOAM®DOS	Light Yellow Viscous Liquid			6

9. 3. 16 Polyoxyethylene alkanol amide type

Product Name	Appearance	Chemical Name	Structural Formula	Freezing Point (°C)
NYMID®MT-215	White-Light Yellow Solid	Polyoxyethylene fatty acid -monoethanolamide	$\text{R}-\text{C}(=\text{O})\text{N}\begin{matrix} \nearrow \text{CH}_2\text{CH}_2\text{O}(\text{C}_2\text{H}_4\text{O})_n\text{H} \\ \searrow \text{H} \end{matrix}$	40

9. 3. 17 Amine oxide type

Product Name	Appearance	Chemical Name	Structural Formula	Active Component (%)	Freezing Point (°C)
UNISAFE®A-LM	Clear - Light Yellow Liquid	Lauryl dimethylamine -oxide solution	$\text{C}_{12}\text{H}_{25}-\text{N}\begin{matrix} \nearrow \text{CH}_3 \\ \searrow \text{CH}_3 \end{matrix} \rightarrow \text{O}$	35	-1
UNISAFE®A-SM	White - Light Yellow Paste	Stearyl dimethylamine -oxide solution	$\text{C}_{18}\text{H}_{37}-\text{N}\begin{matrix} \nearrow \text{CH}_3 \\ \searrow \text{CH}_3 \end{matrix} \rightarrow \text{O}$	35	Approx.25
UNISAFE®A-LE	Light Yellow Turbid Liquid	Dihydroxyethyl -laurylamine oxide solution	$\text{C}_{12}\text{H}_{25}-\text{N}\begin{matrix} \nearrow \text{CH}_2\text{CH}_2\text{OH} \\ \searrow \text{CH}_2\text{CH}_2\text{OH} \end{matrix} \rightarrow \text{O}$	40	Approx.-4
UNISAFE®WHS-10	Light Yellow Liquid	Dihydroxyethyl -laurylamine oxide solution (Mixed with surfactant)	-	10	-

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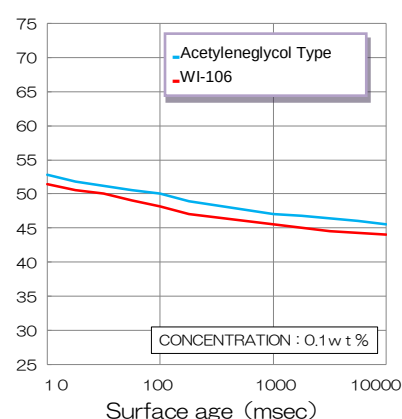
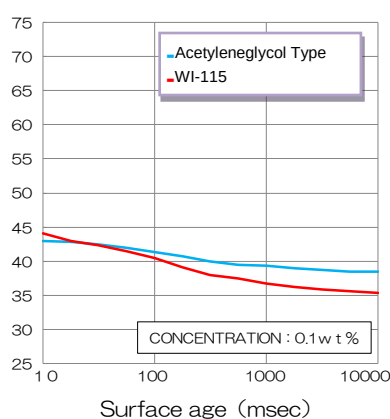
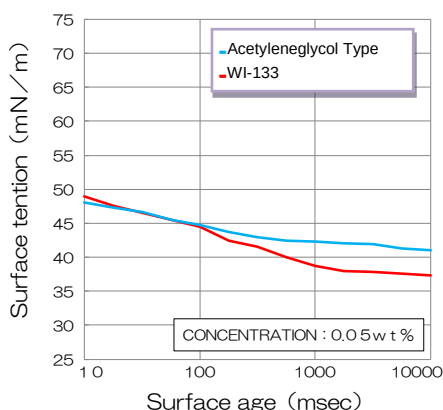
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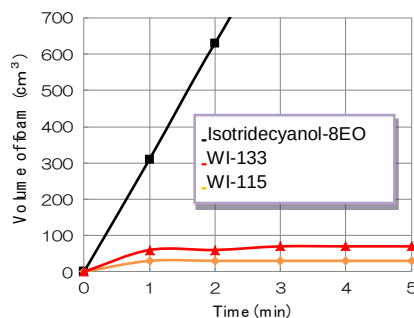
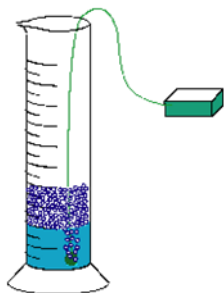
9. 3. 18 Low foaming wetting type

Product Name	Appearance	Viscosity(25°C) (mm ² /s)	Solubility in water(%)	HLB	Freezing Point (°C)	Dynamic surface tension at each surface age (mN/m)		
						10msec	100msec	1000msec
DISPANOL®WI-106	Clear Liquid	28	0.1 ↓	5	-20 ↓	49.2	44.6	38.8
DISPANOL®WI-115		38	Approx.0.1	5	-20 ↓	44.3	40.6	36.7
DISPANOL®WI-133		65	Soluble	11	-6	52.9	50.0	47.1

Dynamic surface tension



Low foaming



《Formulation ①》

Wetting agent	2wt%
Ethylene glycol mono-tert-butylether	20wt%
Water	Remainder

- Dilute ① in to 50 times with water. ⇒ ②
- Put 200g of ② in a 1000mL graduated cylinder.
- Place at rest for 10 minutes in a water bath hold at 25°C.
- Blow air into the solution at 300mL/min.

9. 4 AMPHOTERIC SURFACTANT

Product Name	Appearance	Chemical Name	Structural Formula	Ash (%)	Active Component (%)
NISSANANON®BF	Light Yellow Liquid	Betaines, coco alkyldimethyl (Aqueous solution)		9 ↓	Approx.25
NISSANANON®BL	Light Yellow Liquid	1-Dodecanaminium, -N-(carboxymethyl)-N, N-dimethyl-, inner salt (Aqueous solution)		6 ↓	33.5-38.5
NISSANANON®BL-SF	Light Yellow Liquid			2 ↓	33.5-37.5
NISSANANON®BDF-R	Light Yellow Liquid	1-Propanaminium,3-amino -N-(carboxymethyl)-N,N -dimethyl-, N-coco acyl -derivatives., inner salts (Aqueous solution)		8 ↓	Approx.30
NISSANANON®BDF-SF				2 ↓	Approx.30
NISSANANON®BDL-SF	Light Yellow Liquid	1-Propanaminium, -N-(carboxymethyl)-N, N-dimethyl-3-[(1-oxododecyl)-amino]-, inner salt (Aqueous solution)	BDF : R= Coconut fatty acid BDL : R= C ₁₁ H ₂₃	1.5 ↓	Approx.30
NISSANANON®GLM-R-LV	Yellow Liquid	Imidazolium compounds, -1-(carboxymethyl)-4,5-dihydro -1-(hydroxyethyl)-2-norcoco -alkyl, hydroxides, inner salts (Aqueous solution)		5.5-6.5	Approx.30
NISSANANON®LA	Light Yellow Liquid (Turbid under 20°C)	Sodium laurylamino diacetate (Aqueous solution)		1.5 ↓	25-31

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9. 5 POLYMER SURFACTANT

9. 5. 1 POLYMER SURFACTANT (1)

Product Name	Appearance	Chemical Name	Solubility in water	Viscosity(25℃) (mm ² /s)	Active Component (%)
POLYSTER®OM	Light Yellow Clear or Cloudy Liquid	Sodium salts of high molecular weigh polycarbonates (Aqueous solution)	⊙	50 (20℃)	Approx.25
POLYSTER®OMR	Light Yellow Clear Liquid		⊙	50 (20℃)	Approx.25
POLYSTER®A-1060	Light Yellow Liquid		⊙	—	Approx.43
POLYSTER®OMA	Light Yellow Clear or Cloudy Liquid	Ammonium salts of high molecular weight polycarbonates (Aqueous solution)	⊙	90	Approx.21
MALIALIM®HKM-50A	Yellow-Dark Brown Viscous Liquid		⊙	350	Approx.50
MALIALIM®HKM-150A			⊙	200	Approx.50
ESLEAM®AD-3172M	Light Yellow-Yellow Liquid	Amine functional polymer	○	Approx.600	100
ESLEAM®AD-374M	Light Yellow-Yellow Liquid		△	Approx.500	100
ESLEAM®AD-508E	Light Yellow-Yellow Liquid		×	Approx.1,700	100

9. 5. 2 POLYMER SURFACTANT (2)

Product Name	Appearance	Chemical Name	Solubility in water	Viscosity(25℃) (mm ² /s)	Active Component (%)
MALIALIM®AKM-1511-60	Yellow-Dark Brown Liquid	Copolymer of polycarboxylic acid -derivatives (Aqueous solution)	⊙	350 (25℃)	Approx.60
MALIALIM®AKM-0531	Yellow-Dark Brown Viscous Liquid	Copolymer of polycarboxylic acid -derivatives	⊙	200	100
MALIALIM®AFB-1521	Yellow-Dark Brown Viscous Liquid		△	300	100
MALIALIM®AAB-0851	Yellow-Dark Brown Viscous Liquid		×	300	100
MALIALIM®AWS-0851	Yellow-Yellowish Dark Brown Viscous Liquid			500	100
MALIALIM®SC-0505K	Reddish Liquid		⊙	60	100
MALIALIM®SC-1015F	Yellow-Dark Brown Viscous Liquid		△	120	100
MALIALIM®SC-0708A	Yellow-Dark Brown Viscous Liquid		×	120	100

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9. 5. 3 Applications of dispersant (for Ceramics & Metals)

Solubility	Molecular weight	Adsorption part	Powders	Ceramics (Oxide・Nitride)				Ceramics (Carbide・Carbon material)				Metals (Ni:○ Ag:◇ Al:□)			
			Systems	Aqueous		Solvent		Aqueous		Solvent		Aqueous		Solvent	
			Particle size	1 μm		1 μm		1 μm		1 μm		1 μm		1 μm	
				↓	↑	↓	↑	↓	↑	↓	↑	↓	↑	↓	↑
Water-soluble	Middle	Acid	MALIALIM®SC-0505K	●	○	●	○					○◇□	○◇□	○◇□	○◇□
		Base	ESLEAM®AD-3172M	○	○	○	○					○◇□	○◇□	○◇□	○◇□
	High	Acid	MALIALIM®AKM-0531	○	●	○	●					○◇□	○◇□	○◇□	○◇□
		Base	MALIALIM®HKM-50A	○	●			○	○			○◇□	○◇□		
			MALIALIM®HKM-150A	○	●			○	○			○◇□	○◇□		
			POLYSTER®OMA	○	●			○	○			○◇□	○◇□		
Non-water-soluble	Low	Acid	ESLEAM®221P											●◇□	●◇□
			ESLEAM®213P											●◇□	●◇□
			ESLEAM®C-2093I ※Under development			●								○◇□	
		Base	NYMEEN®L-201											○◇□	○◇□
			NYMEEN®L-202											○◇□	○◇□
	Middle	Acid	MALIALIM®SC-1015F			●	○							○◇■	○◇□
			MALIALIM®SC-0708A			○	○							●◇□	○◇□
		Base	ESLEAM®AD-374M			○	●							○◇□	○◇□
			ESLEAM®AD-508E			○	●							○◇□	○◇□
	High	Acid	MALIALIM®AFB-1521			○	●							○◇□	○◇□
			MALIALIM®AAB-0851			○	●							○◇□	○◇□
			MALIALIM®AWS-0851			○	○							○◇□	●◇□

●◆■: Excellent

More detailed data is available on our website.

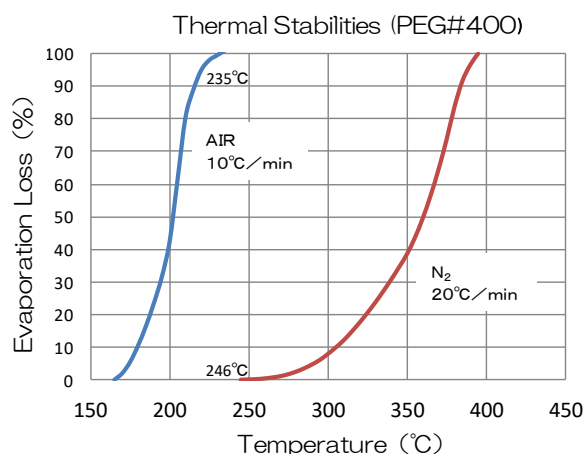
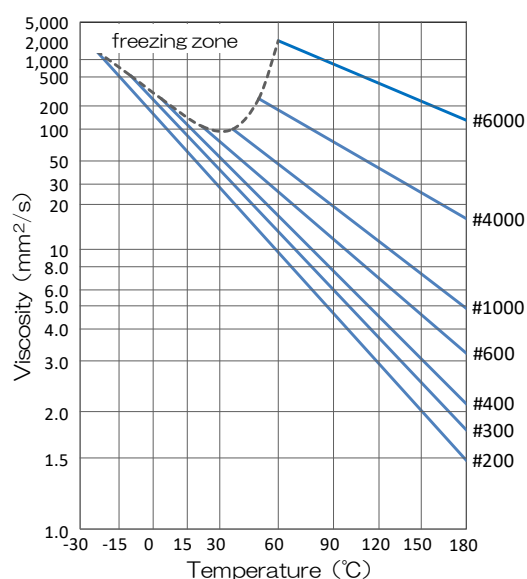
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<https://www.nof.co.jp/contents/additives/english/index.html>

10. POLYETHER

10.1 POLYETHYLENE GLYCOL

Product Name	Appearance	Chemical Name/ Structural Formula	Molecular Weight (Average)	Viscosity (100℃) (mm ² /s)	Freezing Point (℃)
PEG#200T	Clear - Light Yellow Liquid	Polyethyleneglycol (DEG : 0.3%↓)	200	3.8-4.8	-45 ↓
PEG#200	Clear - Light Yellow Liquid	Polyethyleneglycol $\text{HO}-(\text{C}_2\text{H}_4\text{O})_n\text{-H}$	200	3.6-4.6	-45 ↓
PEG#300	Clear - Light Yellow Liquid		300	5.0-6.2	-8 ↓
PEG#400	Clear - Light Yellow Liquid		400	6.0-8.0	6
PEG#600	Clear - Light Yellow Liquid		600	10.0-12.0	20
PEG#1000	White - Light Yellow Solid		1,000	17.0-20.0	40
PEG#1500	White - Light Yellow Solid		PEG#300、1540 (Mixture)	13.0-18.0	38
PEG#1540	White - Light Yellow Solid		1,540	25.0-32.0	45
PEG#2000	White - Light Yellow Solid		2,000	37.0-47.0	50
PEG#4000	White - Light Yellow Flake		3,100	75.0-85.0	55
PEG#4000P	White - Light Yellow Powder				
PEG#6000	White - Light Yellow Flake		8,800	700-900	60
PEG#6000P	White - Light Yellow Powder				
PEG#11000	White - Light Yellow Flake		11,000	1,000-1,750	58
PEG#20000	White - Light Yellow Flake		20,000	10,000-15,000	65



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10.2 POLYETHYLENE GLYCOL (METHYL-BLOCKING TYPE)

Product Name	Appearance	Chemical Name	Structural Formula	Molecular Weight (Average)	Freezing Point (°C)
UNIOX [®] M-400	Clear - Light Yellow Liquid	Polyethyleneglycol - monomethyl ether	$\text{CH}_3\text{O}-(\text{C}_2\text{H}_4\text{O})_n\text{H}$	400	0 ↓
UNIOX [®] M-550	Clear - Light Yellow Liquid			550	15-20
UNIOX [®] M-1000	White - Light Yellow Solid			1,000	Approx.40
UNIOX [®] M-2000	White - Light Yellow Flake			2,000	Approx.50
UNIOX [®] M-4000	White - Light Yellow Solid			4,000	Approx.55
UNIOX [®] MM-400	Clear - Light Yellow Liquid	Polyethyleneglycol dimethyl ether	$\text{CH}_3\text{O}-(\text{C}_2\text{H}_4\text{O})_n\text{CH}_3$	400	Approx.5

10.3 GLYCERYL POLYETHYLENE GLYCOL

Product Name	Appearance	Chemical Name	Structural Formula	Molecular Weight (Average)	Freezing Point (°C)
UNIOX [®] G-450	Light Yellow Liquid	Polyethyleneglycol - glyceryl ether	$\begin{array}{c} \text{CH}_2\text{O}-(\text{C}_2\text{H}_4\text{O})_l\text{H} \\ \\ \text{CHO}-(\text{C}_2\text{H}_4\text{O})_m\text{H} \\ \\ \text{CH}_2\text{O}-(\text{C}_2\text{H}_4\text{O})_n\text{H} \end{array}$	450	-20 ↓
UNIOX [®] G-750	Light Yellow Liquid			750	-20 ↓

10.4 POLYPROPYLENE GLYCOL

Product Name	Appearance	Chemical Name	Structural Formula	Solubility in water	Molecular Weight (Average)	Pour Point (°C)
UNIOI [®] D-250	Clear - Light Yellow Liquid	Polypropyleneglycol «Diol type»	$\text{HO}-(\text{C}_3\text{H}_6\text{O})_n\text{H}$	∞	250	-30 ↓
UNIOI [®] D-400				∞	400	-30 ↓
UNIOI [®] D-700				∞	700	-40
UNIOI [®] D-1000				0.2	1,000	-30 ↓
UNIOI [®] D-1200				0.2	1,200	-30 ↓
UNIOI [®] D-2000				0.2	2,000	-30 ↓
UNIOI [®] D-4000				0.2	4,000	-20 ↓

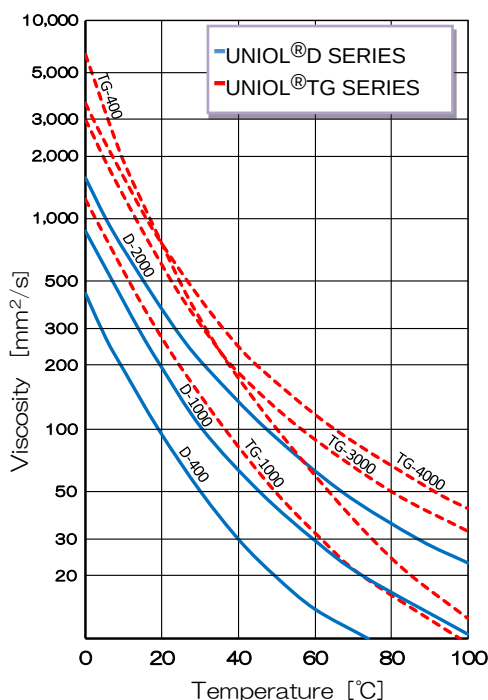
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10.5 GLYCERYL POLYPROPYLENE GLYCOL

Product Name	Appearance	Chemical Name	Structural Formula	Solubility in water	Molecular Weight (Average)	Pour Point (°C)
UNIOR®TG-330	Clear – Light Yellow Liquid	Polypropyleneglycol-glyceryl ether «Triol type»	$\begin{array}{c} \text{CH}_2-\text{O}-(\text{C}_3\text{H}_6\text{O})_l-\text{H} \\ \\ \text{CH}-\text{O}-(\text{C}_3\text{H}_6\text{O})_m-\text{H} \\ \\ \text{CH}_2-\text{O}-(\text{C}_3\text{H}_6\text{O})_n-\text{H} \end{array}$	∞	330	-25 ↓
UNIOR®TG-1000R				0.16	1,000	-25 ↓
UNIOR®TG-3000				0.02	3,000	-30 ↓
UNIOR®TG-4000				0.02	4,000	-25 ↓



10.6 DIGLYCERYL POLYPROPYLENE GLYCOL

Product Name	Appearance	Chemical Name	Structural Formula	Molecular Weight (Average)	Freezing Point (°C)
UNILUBE®DGP-700 (Antioxidant added)	Light Yellow Viscous Liquid	Polypropyleneglycol-diglyceryl ether	$\begin{array}{c} \text{CH}_2-\text{O}-(\text{C}_3\text{H}_6\text{O})_n-\text{H} \\ \\ \text{CH}-\text{O}-(\text{C}_3\text{H}_6\text{O})_n-\text{H} \\ \\ \text{CH}_2 \\ \\ \text{O} \\ \\ \text{CH}_2 \\ \\ \text{CH}-\text{O}-(\text{C}_3\text{H}_6\text{O})_n-\text{H} \\ \\ \text{CH}_2-\text{O}-(\text{C}_3\text{H}_6\text{O})_n-\text{H} \end{array}$	700	0 ↓
UNILUBE®DGP-700F					

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10. 7 SORBITOL POLYPROPYLENE GLYCOL

Product Name	Appearance	Chemical Name	Structural Formula	Molecular Weight (Average)	Freezing Point (°C)
UNIOL®HS-1600D	Clear Viscous Liquid	Polypropyleneglycol-sorbitol ether	$ \begin{array}{c} \text{CH}_2-\text{O}-(\text{C}_3\text{H}_6\text{O})_n-\text{H} \\ \\ \text{CH}-\text{O}-(\text{C}_3\text{H}_6\text{O})_n-\text{H} \\ \\ \text{CH}-\text{O}-(\text{C}_3\text{H}_6\text{O})_n-\text{H} \\ \\ \text{CH}-\text{O}-(\text{C}_3\text{H}_6\text{O})_n-\text{H} \\ \\ \text{CH}-\text{O}-(\text{C}_3\text{H}_6\text{O})_n-\text{H} \\ \\ \text{CH}_2-\text{O}-(\text{C}_3\text{H}_6\text{O})_n-\text{H} \end{array} $	1,600	0 ↓

10. 8 POLYBUTYLENE GLYCOL

Product Name	Appearance	Chemical Name	Structural Formula	Molecular Weight (Average)	Pour Point (°C)
UNIOL®PB-500	Clear - Light Yellow Liquid	Polybutyleneglycol	$\text{HO}-(\text{C}_4\text{H}_8\text{O})_n-\text{C}_3\text{H}_6\text{O}-(\text{C}_4\text{H}_8\text{O})_n-\text{H}$	500	0 ↓ (Freezing Point)
UNIOL®PB-700				700	-40 ↓

10. 9 POLYETHYLENE-POLYPROPYLENE GLYCOL

Product Name	Appearance	Chemical Name / Structural Formula	Molecular Weight (Average)	Freezing Point (°C)
UNILUBE®5TP-300KB	Clear - Light Yellow Liquid	Polyethyleneglycol-polypropyleneglycol pentaerythritol ether $ \begin{array}{c} \text{HO}-(\text{C}_2\text{H}_4\text{O})_m-(\text{C}_3\text{H}_6\text{O})_n-\text{CH}_2 \\ \\ \text{HO}-(\text{C}_2\text{H}_4\text{O})_m-(\text{C}_3\text{H}_6\text{O})_n-\text{CH}_2 \\ \text{C} \\ \\ \text{CH}_2\text{O}-(\text{C}_3\text{H}_6\text{O})_n-(\text{C}_2\text{H}_4\text{O})_m\text{H} \\ \\ \text{CH}_2\text{O}-(\text{C}_3\text{H}_6\text{O})_n-(\text{C}_2\text{H}_4\text{O})_m\text{H} \end{array} $ $m \doteq 1.5 \quad n \doteq 16 \quad \text{※Block type}$	4,000	-10 ↓

10. 10 POLYETHYLENE-POLYBUTYLENE GLYCOL

Product Name	Appearance	Chemical Name / Structural Formula	Molecular Weight (Average)	Freezing Point (°C)
WILBRIDE®RC-9050 (Antioxidant added)	White - Light Yellow Solid	Polyethyleneglycol- polybutyleneglycol pentaerythritol ether $ \begin{array}{c} \text{HO}-(\text{AO})_n-\text{CH}_2 \\ \\ \text{HO}-(\text{AO})_n-\text{CH}_2 \\ \text{C} \\ \\ \text{CH}_2\text{O}-(\text{AO})_n-\text{H} \\ \\ \text{CH}_2\text{O}-(\text{AO})_n-\text{H} \end{array} $ ※Block type	-	35

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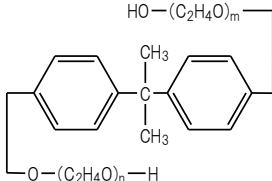
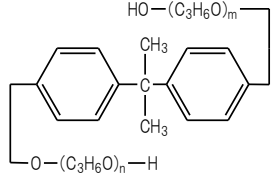
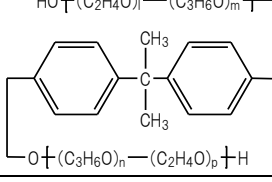
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10. 11 TETRAMETHYLENE GLYCOL DERIVATIVES

Product Name	Appearance	Chemical Name / Structural Formula	THF (wt%)	Molecular Weight (Average)	Freezing Point (°C)
POLYCERIN®DC-1100	Clear - Light Yellow Liquid	Polyoxytetramethylen-polyoxyethyleneglycol $\text{HO} \left[(\text{C}_4\text{H}_8\text{O})_m - (\text{C}_2\text{H}_4\text{O})_n \right] \text{H}$ * [] : Random addition	45	1,000	0 ↓
POLYCERIN®DC-1800E			60	1,800	-10 ↓
POLYCERIN®DC-3000E			65	3,000	-10 ↓
POLYCERIN®DCB-1000	Clear - Light Yellow Liquid	Polyoxytetramethylen-polyoxypropyleneglycol $\text{HO} \left[(\text{C}_4\text{H}_8\text{O})_m - (\text{C}_3\text{H}_6\text{O})_n \right] \text{H}$ * [] : Random addition	50	1,000	0 ↓
POLYCERIN®DCB-2000			65	2,000	0 ↓

10. 12 BISPHENOL A DERIVATIVES

Product Name	Appearance	Chemical Name	Structural Formula	Molecular Weight (Average)	Freezing Point (°C)
UNIOL®DA-400	Liquid	Polyoxyethylene -bisphenol A ether		400	-10 ↓
UNIOL®DA-700	Liquid			660	0 ↓
UNIOL®DB-400	Viscous Liquid	Polyoxypropylene -bisphenol A ether		400	20 (Pour Point)
UNILUBE®50DB-22	Liquid	Polyoxyethylene -polyoxypropylene -bisphenol A ether <Random addition type>		750	-10 ↓

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10. 13 POLYALKYLENE GLYCOL DERIVATIVES (1) (water-soluble type)

Product Name	Appearance	Viscosity (mm ² /s)			Viscosity index	Molecular Weight (Average)	Pour Point (°C)
		20°C	40°C	100°C			
UNILUBE®50MB-2	Clear - Light Yellow Liquid	15	7.6	2.1	49	200	-65
UNILUBE®50MB-5		40	19.7	4.7	171	500	-52.5
UNILUBE®50MB-11		115	50.7	10.8	211	1,000	-45
UNILUBE®50MB-26		310	134	25.7	228	2,000	-35
UNILUBE®50MB-72		960	397	71.6	258	3,000	-32.5
UNILUBE®50MB-168		2,700	945	160	-	4,000	-30
UNILUBE®25DE-60	Clear-Light Yellow Liquid	910	332	55.3	235	3,500	-40 ↓
UNILUBE®50DE-25	Clear-Light Yellow Liquid	340	129	24.5	224	1,750	-45
UNILUBE®75DE-15	Clear - Light Yellow Liquid	242	90.5	15.7	186	1,100	-5.5
UNILUBE®75DE-25		332	126	22.0	203	1,400	-15
UNILUBE®75DE-60		945	340	59.7	238	3,000	-2.5
UNILUBE®75DE-170		2,850	1,050	160	-	5,000	0
UNILUBE®75DE-2620	Light Yellow Viscous Liquid	-	17,300	2,540	-	13,000	5
UNILUBE®75DE-3800		-	24,940	3,730	-	15,000	5
UNILUBE®75DE-5000		-	34,000	5,000	-	18,500	Approx.12
UNILUBE®80DE-40U	Clear Liquid	-	213	40.0	241	2,000	20 (Melting Point)

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10. 14 POLYALKYLENE GLYCOL DERIVATIVES(2) (water-soluble type)

Product Name	Appearance	Viscosity (mm ² /s)			Viscosity index	Molecular Weight (Average)	Pour Point (°C)
		20°C	40°C	100°C			
UNILUBE®15TY-260KB	Clear - Light Yellow Liquid	735	236	33.7	190	3,000	-30
UNILUBE®25TG-55	Clear - Light Yellow Liquid	1,300	350	54.1	218	4,550	-17.5
UNILUBE®50TG-32	Clear - Light Yellow Liquid	545	178	29.7	209	2,800	-40
UNISAFE® 75EL-138H	Clear - Light Yellow Liquid	-	27,790	3,880	-	15,000	Approx.5
UNISAFE® AX-22 (Antioxidant added)	Dark Brown - Reddish Dark Brown Liquid	1,640	340	21.7	74	-	-10 ↓

10. 15 POLYALKYLENE GLYCOL DERIVATIVES (non-water-soluble type)

Product Name	Appearance	Viscosity (mm ² /s)			Viscosity index	Molecular Weight (Average)	Pour Point (°C)
		20°C	40°C	100°C			
UNILUBE®MB-7	Clear - Light Yellow Liquid	72.0	32.8	6.8	168	700	-47.5
UNILUBE®MB-11		135	56.1	10.8	187	1,000	-42.5
UNILUBE®MB-14		173	73.4	13.8	195	1,200	-40
UNILUBE®MB-19		236	105	18.9	202	1,300	-35
UNILUBE®MB-22		297	125	21.8	203	1,400	-32.5
UNILUBE®MB-370		894	330	53.6	229	2,300	-25
UNILUBE®MB-700	Reddish Liquid	1,788	616	96.7	250	3,000	-22.5
UNILUBE®MB-7X (Antioxidant added)		85.0	34.8	6.7	155	700	-35 ↓
UNILUBE®MB-11X (Antioxidant added)		160	60.1	11.0	178	1,000	-40 ↓
UNILUBE®10MS-250KB	Clear - Light Yellow Liquid	604	222	37.8	222	2,000	-40 ↓

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10. 16 ALLYL POLYETHER

Product Name	Appearance	Chemical Name	Structural Formula	Molecular Weight (Average)	EO / PO Mol Ratio
UNIOX®PKA-5001	Clear - Light Yellow Liquid	Polyethyleneglycol -allylether	$\text{CH}_2=\text{CH}-\text{CH}_2-\text{O}-(\text{C}_2\text{H}_4\text{O})_n-\text{H}$	200	100/0
UNIOX®PKA-5002	Clear - Light Yellow Liquid			400	100/0
UNIOX®PKA-5003	Clear - Light Yellow Liquid			450	100/0
UNIOX®PKA-5004	White - Light Yellow Solid			750	100/0
UNIOX®PKA-5005	White - Light Yellow Solid			1,500	100/0
UNIOX®PKA-5006	Clear - Light Yellow Liquid	Methoxy -polyethyleneglycol -allylether	$\text{CH}_2=\text{CH}-\text{CH}_2-\text{O}-(\text{C}_2\text{H}_4\text{O})_n-\text{CH}_3$	350	100/0
UNIOX®PKA-5007	Clear - Light Yellow Liquid			400	100/0
UNIOX®PKA-5008	Clear - Light Yellow Liquid			450	100/0
UNIOX®PKA-5009	Clear - Light Yellow Liquid			550	100/0
UNIOX®PKA-5010	White - Light Yellow Solid			1,500	100/0
UNILUBE®PKA-5011	Clear - Light Yellow Liquid	Polyethyleneglycol -polypropyleneglycol -allylether	$\text{CH}_2=\text{CH}-\text{CH}_2-\text{O}-[(\text{C}_2\text{H}_4\text{O})_m-(\text{C}_3\text{H}_6\text{O})_n]-\text{H}$ * [] : Random addition	750	75/25
UNILUBE®PKA-5013	Clear - Light Yellow Liquid			2,000	50/50
UNISAFE® PKA-5014TF	Clear - Light Yellow Liquid	Polypropyleneglycol -allylether	$\text{CH}_2=\text{CH}-\text{CH}_2-\text{O}-(\text{C}_3\text{H}_6\text{O})_n-\text{H}$	1,500	0/100
UNISAFE® PKA-5015	Clear - Light Yellow Liquid	Butoxy -polyethyleneglycol -polypropyleneglycol -allylether	$\text{CH}_2=\text{CH}-\text{CH}_2-\text{O}-[(\text{C}_2\text{H}_4\text{O})_m-(\text{C}_3\text{H}_6\text{O})_n]-\text{C}_4\text{H}_9$ * [] : Random addition	1,600	75/25
UNISAFE® PKA-5016	Clear - Light Yellow Liquid			1,600	50/50
UNISAFE® PKA-5017	Clear-Light Yellow Liquid			2,500	50/50
UNIOX®PKA-7201	Clear - Light Yellow Liquid	Polyethyleneglycol -diallylether	$\text{CH}_2=\text{CH}-\text{CH}_2-\text{O}-(\text{C}_2\text{H}_4\text{O})_n-\text{CH}_2-\text{CH}=\text{CH}_2$	500	100/0
UNIOX®PKA-6206	Clear - Light Yellow Liquid			800	100/0

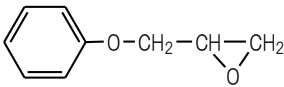
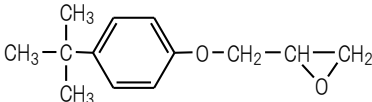
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11. MONOMER

11. 1 GLYCIDYL ETHER & ESTER

Product Name	Appearance	Chemical Name	Structural Formula	Viscosity(25°C) (mPa·s)	Epoxy Equivalent (g/eq.)
EPIOL®B ※	Clear-Light Yellow Liquid	1-Butyl glycidyl ether	$C_4H_9-O-CH_2-CH-CH_2$ O	1.4	145 ↓
EPIOL®EH-N	Light Yellow Liquid	2-Ethylhexyl -glycidyl ether	$C_4H_9-CH-CH_2-O-CH_2-CH-CH_2$ C ₂ H ₅ O	2.0	168-262
EPIOL®A ※, *	Clear-Light Yellow Liquid	Allyl glycidyl ether	$CH_2=CH-CH_2-O-CH_2-CH-CH_2$ O	1.1	—
EPIOL®P ※	Clear-Light Yellow Liquid	Phenyl glycidyl ether		6	150-163
EPIOL®TB	Light Yellow Liquid	<i>p</i> - <i>tert</i> -Butylphenyl -glycidyl ether		30	4.2 ↑ (Epoxy Contents) (eq./kg)
EPIOL®OH ※	Colorless Liquid	Glycidol	$HO-CH_2-CH-CH_2$ O	4 (20°C)	—
EPIOL®G-100	Light Yellow Liquid	1,2,3-Propanetriol -polymer with -(chloromethyl)oxirane	$CH_2-O-CH_2-CH-CH_2$ CH-O-R CH ₂ -O-(CH ₂ -CH-O) _n -CH ₂ -CH-CH ₂ CH ₂ Cl n = 0, 1 R = H, -O-CH ₂ -CH-CH ₂ O	120-175	160 ↓
EPIOL®E-100LC	Light Yellow Liquid	2,2'-[Ethylenebis -(oxymethylene)] -bisoxirane	$CH_2-O-(C_2H_4O)_n-CH_2-CH-CH_2$ CH ₂ -O-(C ₂ H ₄ O) _n -CH ₂ -CH-CH ₂ n = 0~2	15	145 ↓
EPIOL®E-400 ※Production by Order	Light Yellow Liquid	Polyethyleneglycol -diglycidyl ether	$R-O-(CH_2-CH-O)_n-R$ R = $-O-CH_2-CH-CH_2$ O	60	263-303
EPIOL®E-1000 ※Production by Order	Light Yellow Liquid		E-400 n ≐ 9 E-1000 n ≐ 23	—	1.35-1.90 (Epoxy Contents) (eq./kg)

Epoxy Equivalent (g/eq.) = 1000 ÷ Epoxy Contents (eq./kg)

Epoxy Equivalent (g/eq.) = 16 × 100 ÷ Oxirane Oxygen (%)

※ WARNING

On February 4, 1991, Labour Standards Bureau in its official notice (#80-2) announced 48 types of existing chemical compounds found to have shown significant mutagenicity. Of our products, EPIOL B, A, P, and OH are included in the group. **HANDLE THESE PRODUCTS WITH EXTRA CARE.**

* NOTICE

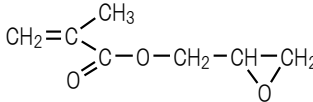
As of September 1, 2010, a Cabinet Order to Amend Part of the Cabinet Order on the Regulations of Dangerous Goods (Cabinet Order No. 16 of 2010) and a Ministerial Ordinance to Amend Part of the Regulations on the Regulations of Dangerous Goods (Ministry of Internal Affairs and Communications Ordinance No. 10 of 2010) came into effect, **changing the designated quantity for Class 5 dangerous goods (self-reactive substances) to 100 kg.**

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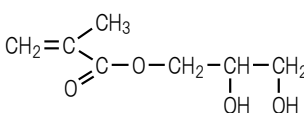
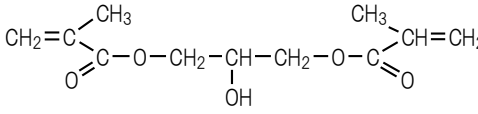
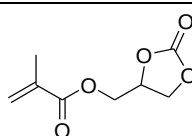
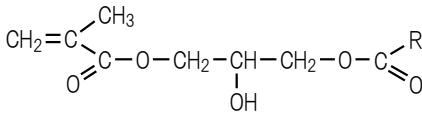
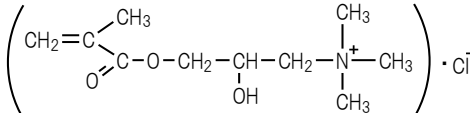
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11. 2 GLYCIDYL METHACRYLATE (GMA)

Product Name	Chemical Name	Structural Formula	CAS No. (Tg: Polymer)
BLEMMER®G ※	Glycidyl methacrylate		106-91-2 (46°C)
BLEMMER®GH ※	Glycidyl methacrylate (Low epichlorohydrin grade)		
BLEMMER®GS ※	Glycidyl methacrylate (Chlorine-free)		

※ Please handle with care as it falls under the category of "Non-medicinal hazardous substances".

11. 3 GLYCIDYL METHACRYLATE DERIVATIVES

Product Name	Chemical Name	Structural Formula	CAS No. (Tg: Polymer)
BLEMMER®GLM	Glyceryl monomethacrylate		5919-74-4 (55°C)
BLEMMER®GLM-R ※Under development	Glyceryl monomethacrylate (Chlorine-free)		
BLEMMER®GMR-M ※Under development	Glyceryl dimethacrylate		1830-78-0 (-)
BLEMMER®GMR-R ※Under development	Glyceryl dimethacrylate (Chlorine-free)		
BLEMMER®DO-MA ※Production by Order	(2-Oxo-1,3-dioxolane-4 yl)methyl methacrylate		13818-44-5 (134°C)
BLEMMER®G-FA80	Fatty acid modified -glycidyl methacrylate (20% Solvent dilution)		Registered (-)
BLEMMER®QA	N,N,N-Trimethyl-N-(2-hydroxy-3-metacryloyloxopropyl)-ammonium chloride (50% Aqueous solution)		13052-11-4 (-)

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11. 4 ALKYL MONO METHACRYLATE

Product Name	Chemical Name	Structural Formula	Melting Point (°C)	CAS No. (Tg : Polymer)
BLEMMER®EHMA-25	2-Ethylhexyl methacrylate		—	688-84-6 (-10°C)
BLEMMER®LMA	Lauryl methacrylate		-20	142-90-5 (-65°C)
BLEMMER®SLMA-S BLEMMER®SLMA-SH	Alkyl (C _{12,13}) methacrylate		—	142-90-5 2495-25-2 (-64°C)
BLEMMER®CMA ※Production by Order	Alkyl methacrylate (C ₁₆ :70%)		Approx. 12 (Freezing Point)	2495-27-4 (-9°C)
BLEMMER®SMA	Stearyl methacrylate		18-20	32360-05-7 (38°C)
BLEMMER®VMA ※Production by Order	Behenyl methacrylate (C ₂₂ :98%)		Approx. 44	16669-27-5 (-)
BLEMMER®VMA-70	Behenyl methacrylate (C ₂₂ :70%)		Approx. 38 (Freezing Point)	16669-27-5 (47°C)

11. 5 ALKYL MONO ACRYLATE

Product Name	Chemical Name	Structural Formula	Melting Point (°C)	CAS No. (Tg : Polymer)
BLEMMER®CHA	Cyclohexyl acrylate		-60 ↓	3066-71-5 (16°C)
BLEMMER®LA	Lauryl acrylate		0	2156-97-0 (-5°C)
BLEMMER®SA	Stearyl acrylate		Approx. 30	4813-57-4 (30°C)
BLEMMER®VA	Behenyl acrylate (C ₂₂ :98%)		Approx. 46	18299-85-9 (50°C)

WARNING

When melting solid monomer, avoid local heating. Heating temperature should not exceed 60°C. Also, use only after complete melting. The composition and polymerization inhibitor may become non-uniform in a partially melted state.

11. 6 POLYALKYLENE GLYCOL MONO METHACRYLATE

Product Name	Chemical Name	Structural Formula	Melting Point (°C)	CAS No. (T _g : Polymer)
BLEMMER®PME-100 ※Production by Order	Methoxy -polyethyleneglycol -methacrylate	$\text{CH}_2=\text{C}(\text{CH}_3)-\text{C}(=\text{O})-\text{O}-(\text{C}_2\text{H}_4\text{O})_n-\text{CH}_3$ PME-100 $n \approx 2$ PME-200 $n \approx 4$ PME-400 $n \approx 9$ PME-1000 $n \approx 23$	-	45103-58-0 (-26°C)
BLEMMER®PME-200			Approx. -15	26915-72-0 (-59°C)
BLEMMER®PME-400			-1-2	26915-72-0 (-60°C)
BLEMMER®PME-1000			Approx. 35	26915-72-0 (-52°C)
BLEMMER®50POEP-800B	Octoxy -polyethyleneglycol -polypropyleneglycol -methacrylate	$\text{CH}_2=\text{C}(\text{CH}_3)-\text{C}(=\text{O})-\text{O}-(\text{C}_2\text{H}_4\text{O})_m-(\text{C}_3\text{H}_6\text{O})_n-\text{CH}_2-\text{CH}(\text{C}_2\text{H}_5)-\text{C}_4\text{H}_9$ $m \approx 8, n \approx 7$	-	146181-50-2 (-)
BLEMMER®PLE-1300 ※Production by Order	Lauroxy -polyethyleneglycol -methacrylate	$\text{CH}_2=\text{C}(\text{CH}_3)-\text{C}(=\text{O})-\text{O}-(\text{C}_2\text{H}_4\text{O})_n-\text{C}_{12}\text{H}_{25}$ PLE-1300 $n \approx 30$	38.5	Registered (-)
BLEMMER®PSE-1300	Stearoxy -polyethyleneglycol -methacrylate	$\text{CH}_2=\text{C}(\text{CH}_3)-\text{C}(=\text{O})-\text{O}-(\text{C}_2\text{H}_4\text{O})_n-\text{C}_{18}\text{H}_{37}$ $n \approx 30$	Approx. 45	52352-43-9 (-51°C)

11. 7 POLYALKYLENE GLYCOL MONO ACRYLATE

Product Name	Chemical Name	Structural Formula	CAS No. (T _g : Polymer)
BLEMMER®AME-400	Methoxy -polyethyleneglycol -acrylate	$\text{CH}_2=\text{CH}-\text{C}(=\text{O})-\text{O}-(\text{C}_2\text{H}_4\text{O})_n-\text{CH}_3$ $n \approx 9$	32171-39-4 (-65°C)
BLEMMER®ANP-300	Nonilphenoxy -polypropyleneglycol -acrylate	$\text{CH}_2=\text{CH}-\text{C}(=\text{O})-\text{O}-(\text{C}_3\text{H}_6\text{O})_n-\text{C}_6\text{H}_4-\text{C}_9\text{H}_{19}$ $n \approx 5$	71926-19-7 (-39°C)
BLEMMER®75ANEP-600	Nonilphenoxy -poly (ethyleneglycol -propyleneglycol) -acrylate	$\text{CH}_2=\text{CH}-\text{C}(=\text{O})-\text{O}-[(\text{C}_2\text{H}_4\text{O})_m-(\text{C}_3\text{H}_6\text{O})_n]_{\text{Random Addition}}-\text{C}_6\text{H}_4-\text{C}_9\text{H}_{19}$ ※Random Addition	115166-38-6 (-48°C)

WARNING

When melting solid monomer, avoid local heating. Heating temperature should not exceed 60°C.
Wait until monomer is completely melted before using.
In locally melted states, composition and distribution of polymerization inhibitor may not stay uniform.

11. 8 POLYALKYLENE GLYCOL MONO METHACRYLATE (-OH TERMINATED)

Product Name	Chemical Name	Structural Formula	CAS No. (Tg : Polymer)
BLEMMER®PE-90	Polyethyleneglycol methacrylate	$\text{CH}_2=\text{C}(\text{CH}_3)\text{C}(=\text{O})\text{O}-(\text{C}_2\text{H}_4\text{O})_n-\text{H}$ PE-90 $n \approx 2$ PE-200 $n \approx 4.5$ PE-350 $n \approx 8$	25736-86-1 (-)
BLEMMER®PE-200			25736-86-1 (-53°C)
BLEMMER®PE-350			25736-86-1 (-58°C)
BLEMMER®PE-350G	Polyethyleneglycol methacrylate (60% Aqueous solution)		
BLEMMER®PP-1000	Polypropyleneglycol methacrylate	$\text{CH}_2=\text{C}(\text{CH}_3)\text{C}(=\text{O})\text{O}-(\text{C}_3\text{H}_6\text{O})_n-\text{H}$ PP-1000 $n \approx 4-6$ PP-500 $n \approx 9$ PP-800 $n \approx 13$	39420-45-6 (-49°C)
BLEMMER®PP-500			39420-45-6 (-57°C)
BLEMMER®PP-800			39420-45-6 (-62°C)
BLEMMER®50PEP-300	Poly (ethyleneglycol-propyleneglycol) -methacrylate	$\text{CH}_2=\text{C}(\text{CH}_3)\text{C}(=\text{O})\text{O}-\left[(\text{C}_2\text{H}_4\text{O})_m-(\text{C}_3\text{H}_6\text{O})_n \right]_x-\text{H}$ $m \approx 3.5$ $n \approx 2.5$ ※Random Addition	58916-75-9 (-60°C)
BLEMMER®55PET-800	Poly (ethyleneglycol -tetramethyleneglycol) -methacrylate	$\text{CH}_2=\text{C}(\text{CH}_3)\text{C}(=\text{O})\text{O}-\left[(\text{C}_2\text{H}_4\text{O})_m-(\text{C}_4\text{H}_8\text{O})_n \right]_x-\text{H}$ $m \approx 10$ $n \approx 5$ ※Random Addition	72514-28-4 (-66°C)
BLEMMER®10PPB-500B	Propyleneglycol-polybutyleneglycol -methacrylate	$\text{CH}_2=\text{C}(\text{CH}_3)\text{C}(=\text{O})\text{O}-\text{C}_3\text{H}_6\text{O}-(\text{C}_4\text{H}_8\text{O})_n-\text{H}$ $n \approx 6$	800379-55-9 (-)

11. 9 POLYALKYLENE GLYCOL MONO ACRYLATE (-OH TERMINATED)

Product Name	Chemical Name	Structural Formula	CAS No. (Tg : Polymer)
BLEMMER®AE-90U ※Under development	Polyethyleneglycol acrylate	$\text{CH}_2=\text{CH}-\text{C}(=\text{O})\text{O}-(\text{C}_2\text{H}_4\text{O})_n-\text{H}$ AE-90U $n \approx 2$ AE-200 $n \approx 4.5$ AE-400 $n \approx 10$	26403-58-7 818-61-1 (-49°C)
BLEMMER®AE-200			26403-58-7 (-54°C)
BLEMMER®AE-400			26403-58-7 (-64°C)
BLEMMER®AP-400	Polypropyleneglycol acrylate	$\text{CH}_2=\text{CH}-\text{C}(=\text{O})\text{O}-(\text{C}_3\text{H}_6\text{O})_n-\text{H}$ AP-400 $n \approx 6$ AP-800 $n \approx 13$	50858-51-0 (-59°C)
BLEMMER®AP-800 ※Under development			50858-51-0 (-62°C)

Characteristics

A special monomer with a hydroxyl group (-OH group) at the end by utilizing the addition.

11. 10 ALKYL DIMETHACRYLATE

Product Name	Chemical Name	Structural Formula	CAS No. (Tg: Polymer)
BLEMMER®NDMA	1,9-Nonanediol dimethacrylate		65833-30-9 (-)

11. 11 POLYALKYLENEGLYCOL DIMETHACRYLATE

Product Name	Chemical Name	Structural Formula	CAS No. (Tg: Polymer)
BLEMMER®PDE-150	Polyethyleneglycol -dimethacrylate	 PDE-150 n≐3 PDE-200 n≐4 PDE-400 n≐9 PDE-600 n≐14	25852-47-5 (-)
BLEMMER®PDE-200			25852-47-5 (-)
BLEMMER®PDE-400			25852-47-5 (-9°C)
BLEMMER®PDE-600			25852-47-5 (-34°C)
BLEMMER®PDP-400N	Polypropyleneglycol -dimethacrylate	 n≐7	25852-49-7 (-11°C)
BLEMMER®PDT-650 ※Production by Order	Polytetramethyleneglycol -dimethacrylate	 n≐9	28883-57-0 (-53°C)
BLEMMER®PDBE-200A	Ethoxylated bisphenol A -dimethacrylate	 PDBE-200A m+n≐4 PDBE-250 m+n≐6 PDBE-450A m+n≐10 PDBE-1300 m+n≐30	41637-38-1 (105°C)
BLEMMER®PDBE-250 ※Production by Order			41637-38-1 (88°C)
BLEMMER®PDBE-450A			41637-38-1 (17°C)
BLEMMER®PDBE-1300 ※Production by Order			41637-38-1 (-38°C)

11. 12 POLYALKYLENEGLYCOL DIACRYLATE

Product Name	Chemical Name	Structural Formula	CAS No. (Tg: Polymer)
BLEMMER®ADE-200	Polyethyleneglycol diacrylate	 ADE-200 n≐4 ADE-300 n≐7 ADE-400A n≐9	26570-48-9 (50°C)
BLEMMER®ADE-300			26570-48-9 (-)
BLEMMER®ADE-400A			26570-48-9 (-23°C)
BLEMMER®ADP-400	Polypropyleneglycol diacrylate	 n≐7	52496-08-9 (-18°C)
BLEMMER®ADT-250	Polytetramethyleneglycol -diacrylate	 n≐3	52277-33-5 (-)

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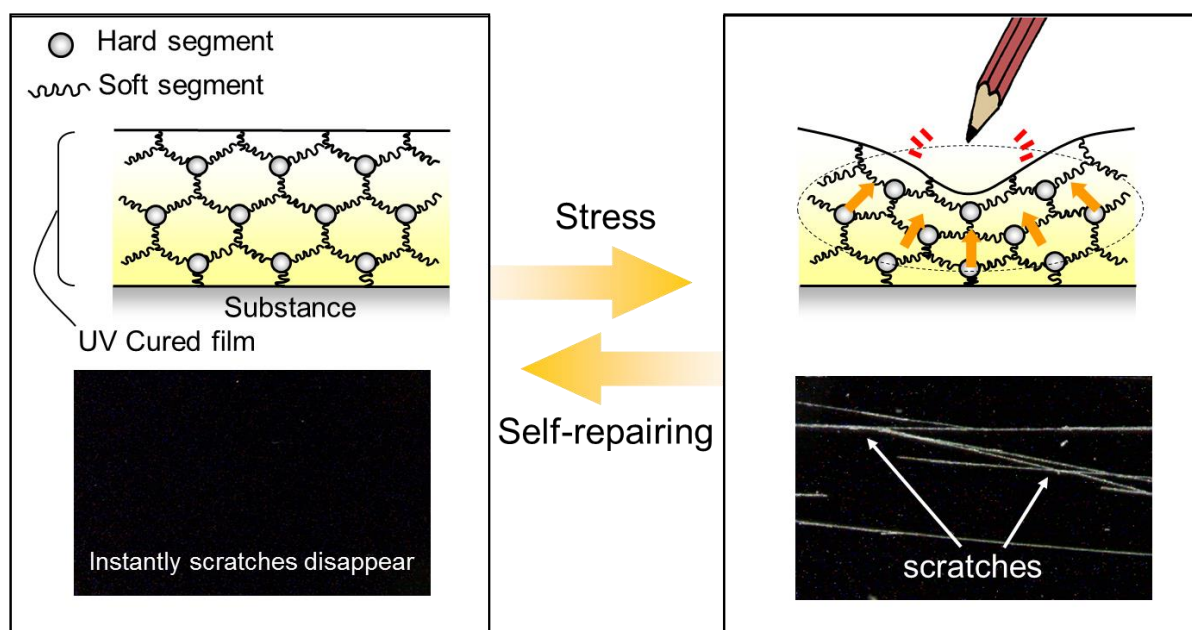
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12. URETHANE ACRYLATE

Product Name	Properties				Cured film properties		
	Molecular Weight (Average)	Functional group	Viscosity (25°C)(mPa·s)	Refractive index (20°C)	Pencil hardness (Base:PET)	Tg: Polymer (°C)	Tensile elongation (%)
BLEMME [®] DA-800AU	1,100	2	1,500	1.477	6B	-30	50
BLEMME [®] DA-400AU ※Under development	800	2	1,100	1.480	3B	-20	40
BLEMME [®] TA-604AU	2,000	3 ↑	20,000	1.491	HB	5	50

Characteristics

- Ultraviolet (UV)-curable resin with a fast curing speed.
- Various customizations are possible by combining various monomers and additives.
- Adds flexibility and elasticity to resins.
- Cured films of **TA-604AU** show “**Self-repairing**” that means slight scratches are instantly repaired.



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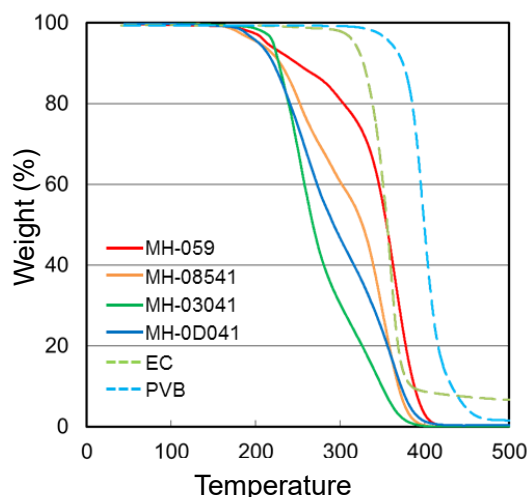
13. ACRYLIC POLYMER for BINDER

Product Name	Appearance	Features	Weight average Molecular Weight	Tg (°C)	Tensile strength (MPa)	Tensile elongation (%)
MARPROOF® MH-0D041	Beads	Low solution viscosity High solubility	Approx.60, 000	50	–	–
MARPROOF® MH-03041	Beads	High solubility Good degradability	Approx.300, 000	50	26	5.5
MARPROOF® MH-08541	Beads	High solubility Good degradability	Approx.800, 000	70	31	5.5
MARPROOF®AM-515 ※Solvent dilution	Liquid	Addition to ethyl cellulose improves adhesiveness	–	–	–	–

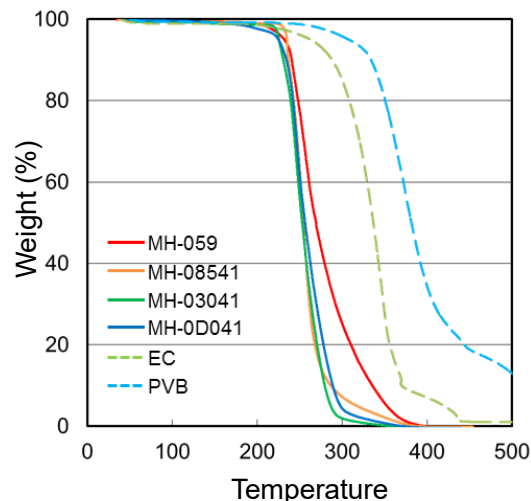
Characteristics

- Good thermal degradability, decomposable at 300°C.
- Equivalent or superior strength to polyvinyl butyral.

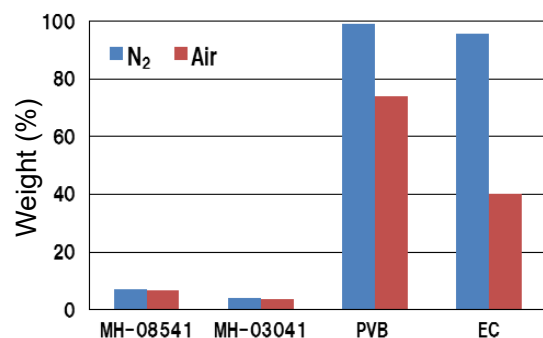
○Under nitrogen atmosphere



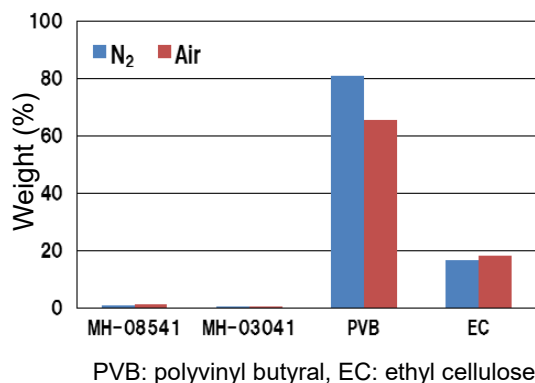
○Under air atmosphere



○Residual after holding at 250°C for 2 hours



○Residual after holding at 300°C for 2 hours



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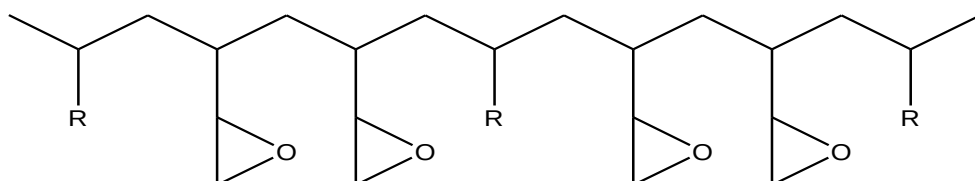
14. POLYMER with GLYCIDYL METHACRYLATE

Product Name	Appearance	Category	Weight average Molecular Weight	Tg (°C)	Epoxy Equivalent (g/eq.)
MARPROOF®G-0105SA	Flake	Copolymer with styrene	10,000	90	3,000
MARPROOF®G-0130SP	Powder	Copolymer with styrene	9,000	69	530
MARPROOF®G-0150M	Powder	(Meth)Acrylic polymer	10,000	71	310
MARPROOF®G-0250SF	Flake	Copolymer with styrene	20,000	74	310
MARPROOF®G-1005S	Powder	Copolymer with styrene	100,000	96	3,300
MARPROOF®G-1010S ※Production by Order	Powder	Copolymer with styrene	100,000	93	1,700
MARPROOF®G-2050M	Powder	(Meth)Acrylic polymer	200,000–250,000	74	340
MARPROOF®G-01100	Flake	(Meth)Acrylic polymer	12,000	47	170
MARPROOF®G-017581 ※Under development	Block	(Meth)Acrylic polymer	10,000	45	240

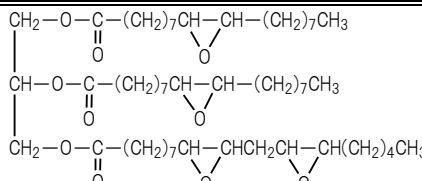
Characteristics

MARPROOF®series improve adhesion, reactivity, and dispersibility of paints, glue, synthetic resin, textile and other materials.

Due to its epoxy group, it can be used as a stabilizer (hydrogen halide scavenger for resins containing halogen elements) for polyvinyl chloride, polyvinylidene chloride, chlorinated polyolefins, etc.

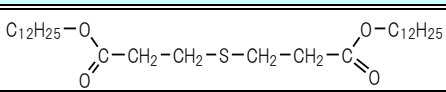
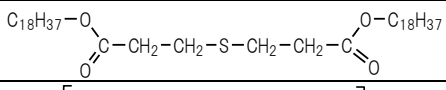
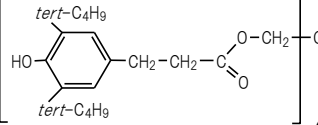


15. EPOXIDIZED SOYBEAN OIL

Product Name	Appearance	Structural Formula	Oxyrane Oxygen (%)	Melting Point (°C)
NEWCIZER®510R	Light Yellow Viscous Liquid		6.7 ↑	5

Epoxy Equivalent (g/eq.) = $16 \times 100 \div \text{Oxyrane Oxygen (\%)}$

16. ANTIOXIDANT

Product Name	Appearance	Chemical Name	Structural Formula	Melting Point (°C)
ANTIOX®L	White Powder	Dilauryl thiodipropionate		39-42
ANTIOX®S	White-Light Yellow Powder	Distearyl thiodistearate		65
ANTIOX®10	Light Yellow Powder	Pentaerythrityl tetrakis-[3-(3,5-di- <i>t</i> -butyl-4-hydroxy-phenyl)-propionate]		120

17. POLYMERIZATION MODIFIER

Product Name	Appearance	Chemical Name	Structural Formula	Freezing Point (°C)
N-DODECYL MERCAPTAN	Colorless Liquid	n-Dodecyl mercaptan	$\text{C}_{12}\text{H}_{25}\text{-SH}$	-7
NOFMER®MSD	Clear Liquid	α-Methylstyrene dimer	—	—

18. ANTISTATIC AGENT

18.1 MASTER BATCH POWDER TYPE

Product Name	Appearance	Ionicity	Surface Resistivity (Example) (Ω/r) [20°C, Humidity 50%]	Dilution Agent	Melting Point (°C)	Fire Service Law Classification
NEW ELEGAN®ASK	Light Yellow Powder	Cationic	Flexible PVC 0.3% added 3.2×10^{10} Flexible PVC 0.6% added 1.9×10^{10}	PVC etc. (Approx.60%)	60	Non-hazardous
FARPACK®Z-MK	Light Yellow Powder	Anionic	Flexible PVC 1.0% added 4.0×10^{11} ABS 1.0% added 5.0×10^{11} EVA 0.5% added 2.0×10^{10}	Industrial pure materials	Approx.70	Designated combustible material
ELEGAN®N-119	Light Yellow Powder	Nonionic	LDPE 1.0% added 5.0×10^{12}	Silica (Approx.20%)	Approx.60	

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18.2 MASTER BATCH LIQUID TYPE (For Flexible PVC)

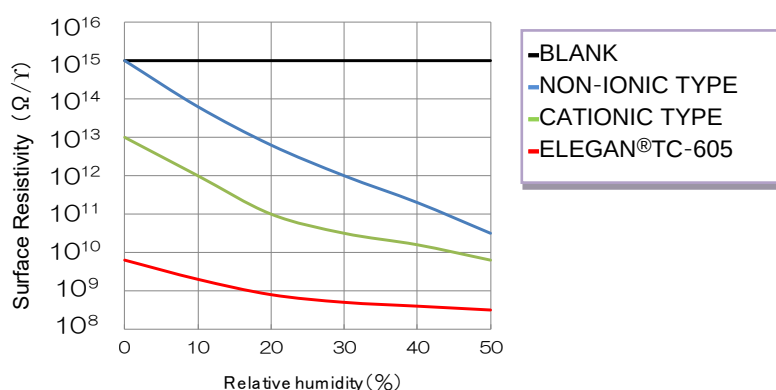
Product Name	Appearance	Ionicity	Surface Resistivity (Example) (Ω/γ) [20°C, Humidity 50%]	Dilution Agent	Flow Point (°C)	Flash Point (°C)
NEW ELEGAN®AI	Yellow-Dark Brown Liquid	Cationic	Flexible PVC 0.3% added 4.6×10^{10} Flexible PVC 0.6% added 2.2×10^{10}	IPA (30–40%)	–10 ↓	19.5
NEW ELEGAN®C	Yellow-Dark Brown Liquid		Flexible PVC 0.6% added 3.0×10^{10} Flexible PVC 1.0% added 6.0×10^{11}	IPA (25%)	–	18.7
ELEGAN®LD-204	Clear-Light Yellow Liquid		Flexible PVC 1.0% added 8.0×10^{11}	Industrial pure materials	–5	152

18.3 MASTER BATCH LIQUID TYPE (For Ink, Acrylic resin, Polyurethane)

Product Name	Appearance	Ionicity	Main Use	Dilution Agent	Pour Point (°C)
ELEGAN®264WAX	White-Light Yellow Viscous Paste	Cationic (Halogen Free)	For Ink, Polyurethane, Acrylic resin	Industrial pure materials	50–55

18.4 SURFACE COATING TYPE

Product Name	Appearance	Ionicity	Surface Resistivity (Example) (Ω/γ) [20°C, Humidity 50%]	Dilution Agent	Flash Point (°C)
ELEGAN®264WAX	White-Light Yellow Viscous Paste	Cationic (Halogen Free)	1.6×10^8 (x 100 Dilution with water)	Industrial pure materials	175
ELEGAN®264-30	Light Yellow Liquid		1.6×10^8 (x 30 Dilution with water)	Water (70%)	No existence
ELEGAN®TA-100	Light Yellow Liquid	Anionic	7.4×10^9 (x 60 Dilution with water)	Water	No existence
ELEGAN®TC-605	Light Yellow Liquid	Cationic (Halogen Free)	2.4×10^8 (x20 Dilution with water) *Low humidity dependence	Water	No existence



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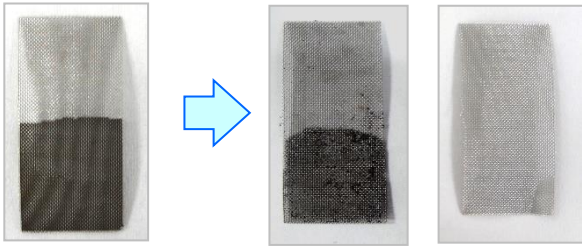
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19. INDUSTRIAL DETERGENT

19. 1 NEUTRAL DETERGENT for METAL

Product Name	Appearance	Viscosity (mPa·s)		pH (1.0wt% aq.)	Specific gravity (25/4°C)	Main use
		0°C	20°C			
FALCORAN®DM-1 ※Under development	Clear Liquid	10	7	7.0–8.0	1.0	Grease stains Oil stains

Cleaning test (asphalt / wire mesh)

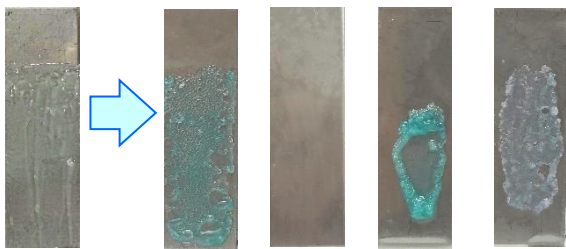


Blank Water **DM-1**

- Conditions: 10-fold dilutions
- Coated with an asphalt solution to the wire netting of 100 mesh and dries the test pieces.
- Ultrasonic cleaning for 20 minutes after immersing the test piece in the cleaning agent.

[Dirt on fine parts like wire mesh.](#)

Cleaning test (grease / stainless plate)



Blank Water **DM-1** Detergent A Detergent B

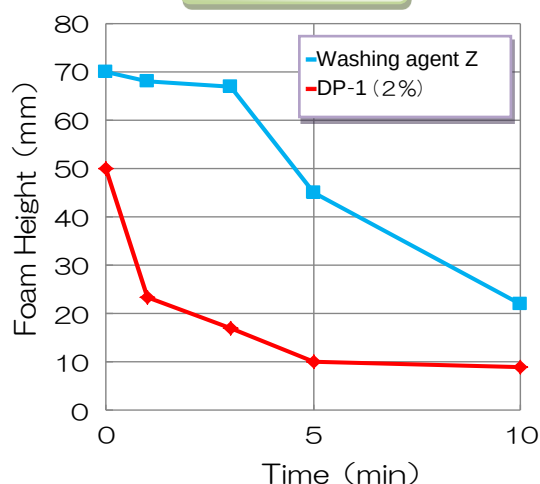
- Conditions: 2-fold dilutions
- Coated with a silicone grease to a stainless steel test pieces.
- Ultrasonic cleaning for 30 minutes after immersing the test piece in the cleaning agent.

[It can wash out a high viscosity oil.](#)

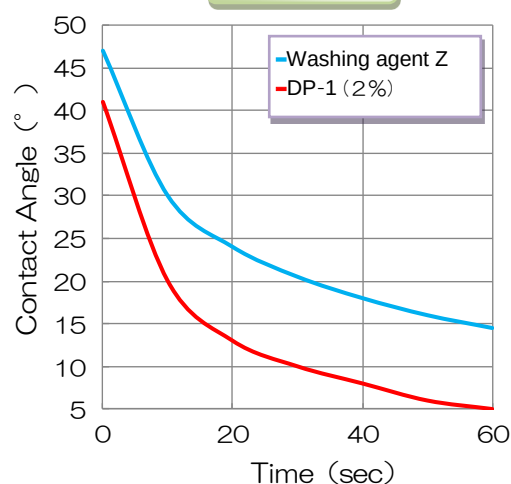
19. 2 NEUTRAL DETERGENT for RESIN and GLASS

Product Name	Appearance	Viscosity (mPa·s)		pH (1.0wt% aq.)	Specific gravity (25/4°C)	Main use
		0°C	20°C			
FALCORAN®DP-1	Clear Liquid	13	11	6.5–7.5	1.0	Mineral stains

Low foaming



Wettability



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20. FOR CONSTRUCTION & BUILDING MATERIALS

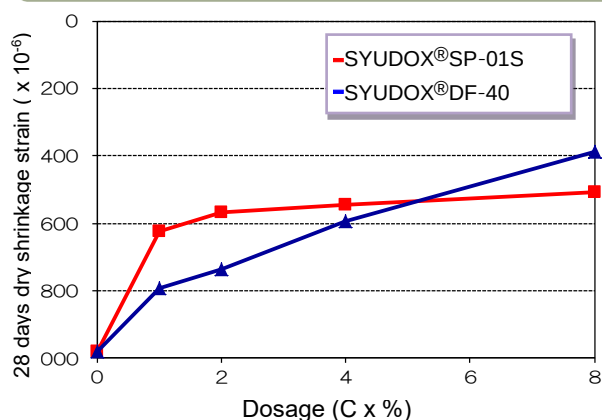
20.1 CONCRETE AGENT

Product Name	Appearance	Chemical Name	Main Application
SYUDOX®DEF-001	Clear-Light Yellow Liquid	—	Defoaming agent

20.2 PREMIX MORTAR CONCRETE AGENT

Product Name	Appearance	Chemical Name	Main Application
SYUDOX®PRF-C180	White Fine Powder	Special Metallic soap type	Water repellent agent
SYUDOX®PRF-A180	White Fine Powder		
SYUDOX®PR-30RS	White Fine Powder		
SYUDOX®PR-11LS	White Powder		
SYUDOX®DF-40	White Powder	Polyoxyalkylene type	Reducing of drying shrinkage
SYUDOX®SP-01S	White Flake	Polyoxyalkylene type (Contains approx. 40% silica)	

Dosage dependence of dry shrinkage reducing agents



Water repellency



Control



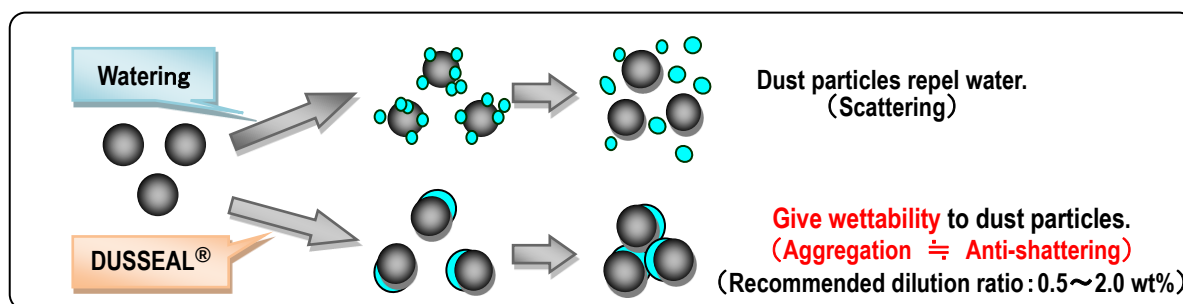
Waterproofing agent added
(SYUDOX®PR-30RS)

20.3 DUST & COAL DUST CONTROL AGENT (Suppression of Spontaneous Combustion)

Product Name	Appearance	Chemical Name	Viscosity (mPa·s)		pH (1.0wt% aq.)	Specific gravity (25/4°C)	Pour Point (°C)
			0°C	20°C			
DUSSEAL®F-10	Clear Viscous Liquid	· Natural fats derivatives · Surfactant etc. (mixture)	550	150	7.2	1.1	-35 ↓

(Features) Coal dust control, good water retentivity, easy to handle, excellent water solubility.

(Main Application) Dust control of coal, coal coke, oil coke and other particulates, Spontaneous combustion control of coal.

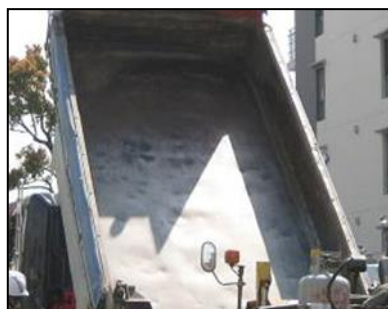


20.4 ASPHALT RELEASE AGENT

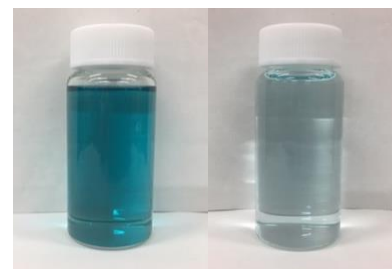
Product Name	Appearance	Chemical Name	Freezing Point (°C)	Dilution degree with water			Flash Point (°C)
				Plant	Dump truck	Tire roller	
ASPHARUB®LF	Blue Clear Viscous Liquid	· Natural fats derivatives · Surfactant etc. (mixture)	-30 ↓	x 15	x 15	x 50	No existence

ASPHARUB® is registered with the Eco Mark and NETIS of the Ministry of Land, Infrastructure, Transport and Tourism.
《Eco Mark Certification Number: 12110001》《NITES Registration Number: KK-100039-VE》

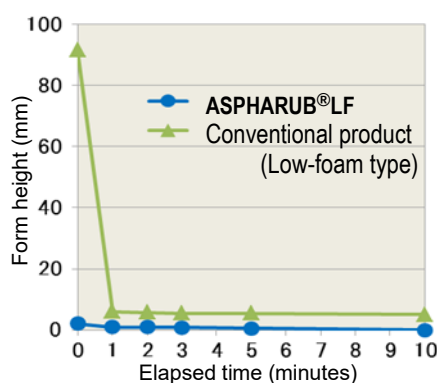
Release ability & Low foaming



Stability of water solution

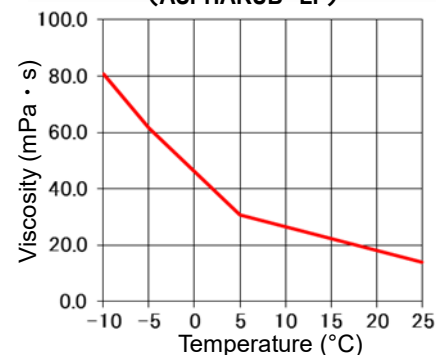


Undiluted solution x 10



Test method: Ross-Miles method
(Based on JIS K 3362)
Temperature: 25°C
Concentration: 10%

Temperature-Viscosity Diagram (ASPHARUB®LF)



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21. DEFOAMING AGENT

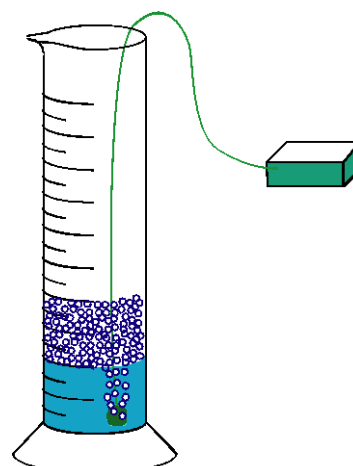
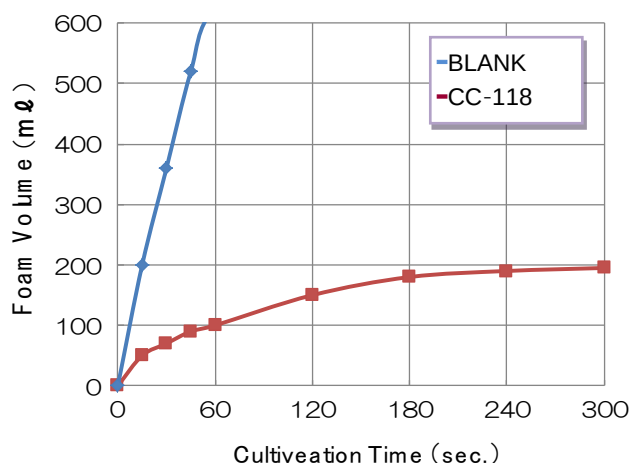
Product Name	Appearance	Main Application	Solubility in water	Cloud Point (°C)	Viscosity(40°C) (mm ² /s)
DISFOAM®CA-104C	Clear - Light Yellow Liquid	PVA, PEO, Acryl	Insoluble	0 ↓	20
DISFOAM®FDS-2224	Clear - Light Yellow Liquid	Paper making, Slate, Water treatment, Fermentation	Dispersion	0 ↓	170
DISFOAM®NKL-5450	Clear - Light Yellow Liquid	Paper making, Slate, Water treatment, Fermentation	Dispersion	0 ↓	180
DISFOAM®CC-130B	Clear - Light Yellow Liquid	Sewage disposal, Stock breeding, Fermentation (Yeast), Water treatment	Dispersion	5 ↓	210
DISFOAM®CC-118	Clear - Light Yellow Liquid	Sewage disposal, Stock breeding, Fermentation (Yeast), Water treatment	Dispersion	5	150
DISFOAM®CC-118WS	Clear - Light Yellow Liquid	Sewage disposal, Stock breeding, Fermentation (Yeast), Water treatment	<u>Soluble</u>	5.5	186
DISFOAM®CA-123	Clear - Light Yellow Liquid	Fermentation, Glutamic acid, Antibiotics	Dispersion	9	380
DISFOAM®CA-330	Clear - Light Yellow Liquid	Fermentation	Dispersion	12	240
DISFOAM®CB-442	Clear - Light Yellow Liquid	Fermentation, Aqueous high molecular solution, Antibiotics	Dispersion	15	300
DISFOAM®CE-457	Clear - Light Yellow Liquid	PVA, Starch, HPC, HMPC	Dispersion	15	400
DISFOAM®CA-220	Clear - Light Yellow Liquid	Fermentation	Dispersion	18	160
DISFOAM®CC-438	Clear - Light Yellow Liquid	Fermentation, CO ₂ Gas, Aqueous high molecular solution	Dispersion	18	280
DISFOAM®CC-222	Clear - Light Yellow Liquid	Fermentation, Carbonic acid absorbent, Aqueous high molecular solution	Dispersion	20	190
DISFOAM®CC-218	Clear - Light Yellow Liquid	Drain treatment	Dispersion	23	170
DISFOAM®CD-432	Clear - Light Yellow Liquid	Paper making	<u>Soluble</u>	25	270
DISFOAM®CK-140	Clear - Light Yellow Liquid	Latex, CO ₂ absorption solution, Aqueous high molecular solution	<u>Soluble</u>	48	1,100
DISFOAM®BC-51Y	Yellow Liquid	Fermentation	Dispersion	—	25
DISFOAM®FD-2 (Food Additive)	Light Yellow Viscous Liquid	Food product	Dispersion	3	1,200 (30°C)

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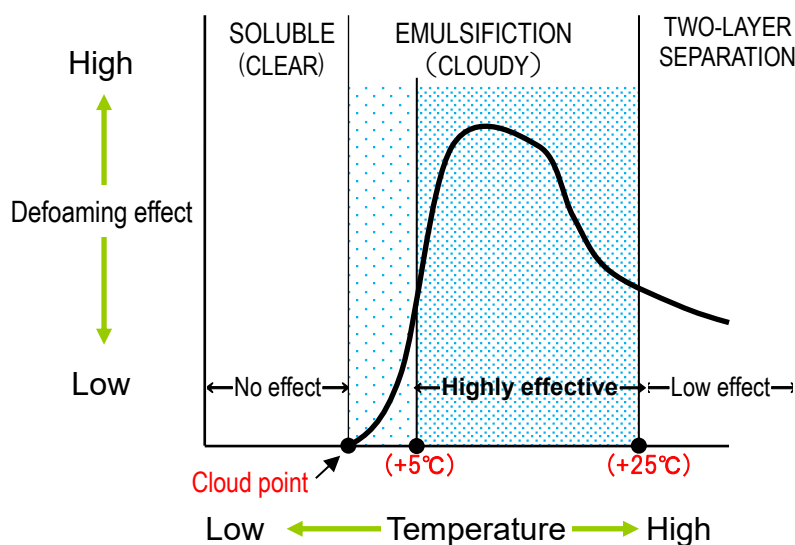
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Defoaming test example



0.01% surfactant (Polyoxyethylene isotridecyl ether HLB=13) aqueous 200ml be in a graduated cylinder of 1 liter and keep it 25 degrees Celsius. Add "defoaming agent" 200ppm; blew air at 500ml/min from a diffuser stone and measured the height of bubble.

Defoaming performance / Cloud point



- At the temperature that +5-25 degrees Celsius is higher than "clouding point", defoamer disperse moderately and shows a high effect to defoam.
- The defoaming agent is water-soluble in lower temperature than clouding point, and it is non-water-soluble in higher than.

Defoamers have their greatest effect when they are "emulsified and dispersed" as finer particles than when they are "dissolved".

COMPREHENSIVE CATALOGUE

Handling for contents of mention

The item mentioned here doesn't assure contents of mention, but has a purpose to offer an information based on the materials, information and data which could obtain at present. And deal with it when you take safety countermeasures in all the users' responsibility when you do special handling because usual handling is being made the target.



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