

# COMPREHENSIVE CATALOGUE

**Oleo & Speciality Chemicals Division**

 **NOF CORPORATION**

## Products Index

1. FATTY ACID.....	1~3
2. HARDENED OIL (Triglyceride) .....	4
3. GLYCERIN.....	5~6
4. HIGHER ALCOHOL.....	7
5. FATTY ACID AMIDE.....	8
6. METALLIC SOAP.....	9~12
7. ESTERS	
7-1. ESTER.....	13
7-2. MEDIUM CHAIN FATTY ACID TRIGLYCERIDE.....	14
7-3. HIGH-PURIFIED SOLID TYPE ESTER.....	14
7-4. POLYOL ESTERS for LUBRICATING OIL.....	15~16
7-5. MONO ESTERS for LUBRICATING OIL.....	16
7-6. COMPLEX ESTER.....	17
7-7. ADDITIVE for KEROSENE POWER GENERATION	17
7-8. RUST PREVENTIVE LUBRICATING OIL.....	17
7-9. BIODEGRADABLE HYDRAULIC FLUIDS.....	18
8. AMINE.....	19~20
9. FATTY ACID CHLORIDE.....	21
10. MONOMERS and OLIGOMER.....	22~32
11. POLYMER with GLYCIDYL METHACRYLATE.....	33
12. FATTY ACID with GLYCIDYL.....	34
13. POLYMERIZATION MODIFIER.....	34
14. ANTIOXIDANT.....	34
15. SURFACTANTS	
15-1. ANIONIC SURFACTANT.....	37~40
15-2. CATIONIC SURFACTANT.....	41~42
15-3. NONIONIC SURFACTANT.....	43~51
15-4. AMPHOTERIC SURFACTANT.....	52
15-5. POLYMER SURFACTANT.....	53~54
16. POLYETHER.....	55~63
17. DUST & COAL DUST CONTROL AGENT.....	64
18. FOR CONSTRUCTION & BUILDING MATERIALS.....	65~66
19. DEFOAMING AGENT.....	67~68
20. ANTISTATIC AGENT.....	69~70

## Trade Name Index

<b><u>1</u></b>		Behenyl methacrylate	23	Diamine	20
1,9-Nonanediol dimethacrylate	22	Behenyl trimethyl ammonium chloride	41	DIAPON <sup>®</sup>	40
12-Hydroxystearic Acid	3	benzalkonium chloride	42	Diglyceryl polyethylene glycol	58
1214 Fatty Acid	1、2	Betaine	52	DISFOAM <sup>®</sup>	67、68
<b><u>2</u></b>		BLEMMER <sup>®</sup>	22~31	DISPANOL <sup>®</sup>	44、45
2-Ethylhexyl glycidyl ether	32	BLEMMER <sup>®</sup> TGL	34	Dodecylamine	19
2-Ethylhexyl methacrylate	23	(BOO)STEARIC ACID	1、2	Dodecyl dimetyl amine	20
<b><u>A</u></b>		Butyl glycidyl ether	32	DODECYL MERCAPTAN	34
Acrylic polymer	33	BUTYL LAURATE	13	DUSSEAL <sup>®</sup>	64
ALFLOW <sup>®</sup>	8	BUTYL STEARATE	13	DYNAMITE GLYCERIN	5
Alkanol amide	50	<b><u>C</u></b>		<b><u>E</u></b>	
Alkylbenzene Sulfonate	38	CALCIUM CASTOR STEARATE	10	ELEGAN <sup>®</sup>	69、70
Alkyl ethersulfate	37	CALCIUM STEARATE	9~12	EPIOL <sup>®</sup>	32
Allyl glycidyl ether	32	CAPRIC ACID	1、2	Epoxidized soybean oil	34
Allyl polyethers	63	CAPROIC ACID	1、2	Erucamide	8
Alkyl sulfate	38	CAPRYLIC ACID	1、2	ERUCIC ACID	3
ALUMINUM STEARATE	10	CASTER WAX	4	ESLEAM <sup>®</sup>	53、54
AMINE	19、20	CATION	41、42	Ethoxysulfate	37
Amine functional polymer	53、54	CATIONIC SURFACTANTS	41、42	Ethylene bis oleylamide	8
Amine Oxide	51	Cetyl acrylate	24	Ethylene bis stearamide	8
AMPHOTERIC SURFACTANT	52	CETYL ALCOHOL	7	EXTRA OLEIN	3
ANIONIC SURFACTANTS	37~40	Cetyl myristate	13	<b><u>F</u></b>	
ANTIOX	34	CETYL STEARYL ALCOHOL	7	FAK-2、FAK-4	3
ANTIOXIDANT	34	Cloud point	35	FARPACK	70
ANTISTATIC AGENTS	69、70	Coco-alkylamine	19	Fatty ACID	1~4
Asphalt Emulsions Agents	65	Coconut alkyl dimethyl amine	20	FATTY ACID CHLORIDE	21
Asphalt Release Agents	66	COCONUT FATTY ACID	1、2	FATTY ACID (FOR SOAP)	3
ASPHARUB <sup>®</sup>	66	COMPLEX™ESTER	17	FATTY ACID SOAP	39
ASPHASOL <sup>®</sup>	65、66	CONCENTRATED GLYCERIN	6	FEED GRADE GLYCERIN	5
AULABRITE <sup>®</sup>	11	COSMETICS GRADE GLYCERIN	6	FILLANOL <sup>®</sup>	53、54
<b><u>B</u></b>		Cyclohexyl acrylate	24	FIRET <sup>®</sup>	40
BARIUM STEARATE	9、10	Cyclohexyl methacrylate	23	FOOD ADDITIVE GLYCERIN	5
BEHENIC ACID	1、2	<b><u>D</u></b>		<b><u>G</u></b>	
Behenyl acrylate	24	Decyl methacrylate	23	GLYCERIN	5、6
Behenylamine	19	Defoaming agent	65,67,68	Glyceryl dimethacrylate	22
Behenyl behenate	13	DG	5	Glyceryl monomethacrylate	22

## Trade Name Index

Glyceryl polyethylene glycol	56、57	MALIALIM <sup>®</sup>	53,54,65	<b>O</b>	
Glycidol	32	MARPROOF <sup>®</sup>	33	Octadecylamine	19
GLYCIDYL ETHER	31	MARSEILLE SOAP	39	Octadecyl dimethyl amine	20
Glycidyl methacrylate	22	MC-570J	17	Octyl mercaptan	34
<b>H</b>		ME-175	13	Octyl oleate	13、16
Hardened oil	4	MEDIUM CHAIN FATTY ACID	14	Octyl palmitate	13、16
Hardened tallow alkylamine	19	METALLIC SOAP	9~12	Octyl stearate	13、16
Hardened tallow fattyacid	3	METHYL LAURATE	13	OLEIC ACID	3
Hexadecyl amine	19	Methyl oleate	13、15	OLEOYL SARCOSINE	40
Hexadecyl dimethyl amine	20	METHYL STEARATE	13	Oleylamide	8
HIGHR ALCOHL	7	Methylstyrene dimer	34	Oleylamine	19
HLB	36	MILBOND <sup>®</sup>	17	Oleyl chloride	21
HYDRAULIC FLUID	18	MILLBE <sup>®</sup>	18	<b>P</b>	
HYDROGENATED CASTOR OIL	4	MONOGLY	47	PALMITIC ACID	1、2
HYDROGENATED CASTOR OIL		Monoglyceride	47	PALMITOYL CHLORIDE	21
-FATTY ACID	3	MYRISTIC ACID	1、2	PANACET <sup>®</sup>	14
<b>I</b>		MYRISTOYL CHLORIDE	21	PBG	58
IPM-R	13	MYRISTYL ALCOHOL	7	PEG	55
IPP-R	13	<b>N</b>		Pentaerythitol ester	13
Isopalmitoyl chloride	21	NAA <sup>®</sup>	1~3、7	PERSOFT <sup>®</sup>	37、43
Isopropyl myristate	13	N-DODECYL MERCAPTAN	34	Phenyl glycidyl ether	32
Isopropyl palmitate	13	NEWCIZER <sup>®</sup>	34	PLONON <sup>®</sup>	51、59
Isostearoyl chloride	21	NEW ELEGAN <sup>®</sup>	70	Polybutylene glycol	58
<b>K</b>		NEWREX <sup>®</sup>	38	Polycarboxylic acid	53、54、65
Krafft point	35	NOFMER <sup>®</sup>	34	POLYOL ESTER	15、16
<b>L</b>		NOM	34	POLYGERIN <sup>®</sup>	59
LAURIC ACID	1、2	Nonandiol dimethacrylate	22	Polyethylene glycol	55
Lauryl acrylate	24	NONION	43~47	Polyethyleneglycol acrylate	26
LAURYL ALCOHL	7	NONIONIC SURFACTANTS	43~51	Polyethyleneglycol methacrylate	25
Lauryl methacrylate	23	NONSOUL	39	Polyglycerin Alkyl Ester	48
LAUROYL CHLORIDE	21	NISSAN AMINE <sup>®</sup>	19、20	Polyglycerin monoglyceride	47
Lauroyl sarcosine	40	NISSAN ANON <sup>®</sup>	52	Polymerization modifiers	34
LE191A	17	NISSAN CATION <sup>®</sup>	41、42	Polymer surfactant	53、54
LUBURICANT ESTER	15、16	NISSAN TRAX <sup>®</sup>	37	Polyoxyethylene alkyl amine	49
<b>M</b>		NYMEEN <sup>®</sup>	49、54	Polypropylene glycol	57
MAGNESIUM STEARATE	9~12	NYMID <sup>®</sup>	50	Polypropyleneglycol acrylate	26

## Trade Name Index

POLYSTER <sup>®</sup>	53、54	SYUDOX <sup>®</sup>	65
Potassium salt of fatty acids	39	<b>T</b>	
POWDER BASE	10	Tallow alkylamine	19
PPG	57	TALLOW FATTY ACID	3
PREMIX MORTAR CONCRETE AGENT	65	TALLOW HARDENED OIL	4
PRIMARY AMINES	19	Tertiary amine	20
<b>R</b>		Tetradecylamine	19
RAPISOL <sup>®</sup>	38	Tetradecylamine acetate	41
Reducing of drying shrinkage	65	Tetradecyl dimethyl amine	20
REFAINED GLYCERIN	5	Tetramethylene glycol derivatives	59
RG	5	Thioglycerol	34
RG·CO·	6	TRAX	37
RUST PREVENTIVE LUBRICATING OIL	17	<b>U</b>	
<b>S</b>		UNIGLY <sup>®</sup>	47、48
SEBACOYL DICHLORIDE	21	UNILUBE <sup>®</sup>	51、58~63
SINTREX	37	UNIOL <sup>®</sup>	57、58、60
Soap base	3	UNIOX <sup>®</sup>	48、56、63
Sodium Dialkyl Sulfosuccinate	38	UNISAFE	47、51、62
Sodium lauroyl sarcosine	40	UNISAFE PKA Series	63
Sodium laurylamino diacetate	52	UNISTER <sup>®</sup>	13~17、47
Sodium salt of fatty acids	39	URETHANE ACRYLATE	31
SOFTILT <sup>®</sup>	40	<b>W</b>	
Sorbitan Derivatives	46	Water Reducing Agent	65
Sorbitol polypropylene glycol	58	WE-476-H	13
Soybean alkylamine	19	WEP Series	14
Spermaceti	13	WILSURF <sup>®</sup>	46
STAFOAM <sup>®</sup>	50	<b>Z</b>	
Stearamide	8	ZINC BEHENATE	10
STEARIC ACID	1、2	ZINC LAURATE	9、10
STEAROYL CHLORIDE	21	ZINC MYRISTEATE	10
Stearyl acrylate	24	ZINC STEARATE	9~12
STEARYL ALCOHOL	7		
Stearyl methacrylate	23		
Stearyl stearate	13		
SUNAMIDE <sup>®</sup>	40		
Sunbase <sup>®</sup>	40		

# 1.FATTY ACID

## 1. 1 SATURATED FATTY ACID (Typical specifications)

Ingredient	Product Name	Appearance	Neutralization Value	Iodine Value	Melting Point (°C)	Color (APHA)
CAPROIC ACID	NAA <sup>®</sup> -60	Liquid	425~483	7 ↓	Approx.-3 (Freezing Point)	—
CAPRYLIC ACID	NAA <sup>®</sup> -82		382~390	0.5 ↓	15.5~16.5 (Titer Test)	120 ↓
CAPRIC ACID	NAA <sup>®</sup> -102	Solid	323~327	0.5 ↓	29.5~31.5 (Titer Test)	120 ↓
LAURIC ACID	NAA <sup>®</sup> -122	Beads	278~282	0.5 ↓	32~45	120 ↓
	1214 Fatty Acid	Solid	269~273		32~39 (Titer Test)	
	NAA <sup>®</sup> -312	Solid (20°C)	277~283	1.0 ↓	32~36	150 ↓
	COCONUT FATTY ACID		260~270	10 ↓	23~28	300 ↓
MYRISTIC ACID	NAA <sup>®</sup> -142	Beads	242~248	0.5 ↓	45~56	120 ↓
PALMITIC ACID	NAA <sup>®</sup> -160	Beads	215~220	1 ↓	50~63	120 ↓
	NAA <sup>®</sup> -171		209.5~215.5	2 ↓	52~57	
(SPECIAL) STEARIC ACID	NAA <sup>®</sup> -180	Beads	195~206	2 ↓	65~69	80 ↓
	NAA <sup>®</sup> -173K					100 ↓
	NAA <sup>®</sup> -175		204~210	0.5 ↓	52~58	
	NAA <sup>®</sup> -176		207~212		52~57	
STEARIC ACID	STEARIC ACID CHERRY	Beads	197~207	0.5 ↓	57.5 ↑	100 ↓
		Powder				
		Fine Powder				
	STEARIC ACID CAMELLIA	Beads		4 ↓	53 ↑	6 ↓ (Gardner)
		Powder				
	STEARIC ACID (BOO)	Stick		—	—	50 ↑
BEHENIC ACID	NAA <sup>®</sup> -222S	Beads	161~169	3 ↓	69~80	120 ↓
		Powder				

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## 1. 2 SATURATED FATTY ACID (Fatty acid composition)

Ingredient	Product Name	Typical fatty acid composition (%)												
		Saturated acid										Unsaturated		
		C6	C8	C10	C12	C14	C16	C18	C20	C22	C24	C18	C18	
CAPROIC ACID	NAA <sup>®</sup> -60	99	1											
CAPRYLIC ACID	NAA <sup>®</sup> -82	0.5	99	0.5										
CAPRIC ACID	NAA <sup>®</sup> -102		0.5	99	0.5									
LAURIC ACID	NAA <sup>®</sup> -122			0.5	99	0.5								
	1214 Fatty Acid			0.5	75	24.5								
	NAA <sup>®</sup> -312			10	75	15								
	COCONUT FATTY ACID		5	6	55	17	10	1				5	1	
MYRISTIC ACID	NAA <sup>®</sup> -142				0.5	99	0.5							
PALMITIC ACID	NAA <sup>®</sup> -160					1	96	3						
	NAA <sup>®</sup> -171					1	70	28				1		
(SPECIAL) STEARIC ACID	NAA <sup>®</sup> -180						2	97				1		
	NAA <sup>®</sup> -173K						6	93				1		
	NAA <sup>®</sup> -175					4	43	52	1					
	NAA <sup>®</sup> -176					3	50	47						
STEARIC ACID	STEARIC ACID CHERRY					2	31	66	1					
	STEARIC ACID CAMELLIA					3	32	63	1	1				
	STEARIC ACID (BOO)	φ 66mm×H208mm (25/Set)												
BEHENIC ACID	NAA <sup>®</sup> -222S						13		85	2				

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### 1.3 UNSATURATED ACID (Typical specifications)

Ingredient	Product Name	Unsaturated Acid (%)	Appearance	Neutralization Value	Iodine Value	Titer Test (°C)	Color (APHA)
OLEIC ACID	NAA <sup>®</sup> -35	89	Light Yellow Viscous Liquid	196~205	85~95	8 ↓	8 ↓ (Gardner)
	NAA <sup>®</sup> -34	90		198~205	87~93		260 ↓
	EXTRA OLEIN	92		198~204	86~91	7 ↓	100 ↓
	EXTRA OS-85	92		195~204 (Acid Value)	80~95	15 ↓ (Freezing Point)	80 ↓
ERUCIC ACID	ERUCIC ACID	88 ↑ (C22)	Light Yellow Solid	158~168	71~81	25~35	200 ↓

### 1.4 OTHER FATTY ACID (Typical specifications)

Ingredient	Product Name	Appearance	Neutralization Value	Iodine Value	Melting Point(°C)	Color (APHA)
HARDENED TALLOW FATTY ACID	HARDENED TALLOW FATTY ACID 45° HFA	Light Yellow Solid	202~207	38~46	41~50	120 ↓
	HARDENED TALLOW FATTY ACID 51°	Light Yellow Flake	197~207	28 ↓	51~54	3 ↓ (Gardner)
TALLOW FATTY ACID	TALLOW FATTY ACID No.0	Yellow Solid	200~208	51~63	38~44	6 ↓ (Gardner)
	TALLOW FATTY ACID No.1		197~207	45~53	40~44	
FATTY ACID FOR SOAP	FATTY ACID FOR SOAP	Light Yellow Solid	212~225	34~38	39~44	120 ↓
	FAK-2 (for Soap)		220~230	31~39	38~42	100 ↓
	FAK-4 (for Soap)		205~225	29~44	39~46	
HYDROGENATED CASTOR OIL FATTY ACID	HYDROGENATED CASTOR OIL FATTY ACID (12-Hydroxystearic Acid)	White Flake	178~187	6 ↓	70 ↑	—

### 1.5 OTHER FATTY ACID (Fatty acid composition)

Product Name	Typical fatty acid composition (%)								
	Saturated acid						Unsaturated acid		
	C12	C14	C16	C18	*C18	C20	C16	C18	C18
HARDENED TALLOW FATTY ACID 45° HFA		3	25	23			4	40	1
HARDENED TALLOW FATTY ACID 51°		3	42	40				10	2
TALLOW FATTY ACID No.0		2	22	22			2	35	12
TALLOW FATTY ACID No.1		3	24	25			4	35	8
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		*2	

\*Contains a Hydroxyl Group

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## 2.HARDENED OIL (Triglyceride)

### 2.1 TALLOW HARDENED OIL (Typical specifications)

Ingredient	Product Name	Appearance	Saponification Value	Acid Value	Iodine Value	Melting Point (°C)	Color (APHA)
TALLOW HARDENED OIL	TALLOW HARDENED OIL 51° HO	Flake	190~200	2 ↓	32 ↓	50~52	150 ↓
	TALLOW HARDENED OIL 54° HO				25 ↓	53~55	200 ↓
	TALLOW HARDENED OIL EXTREMELY HARD				2 ↓	57 ↑	140 ↓

### 2.2 TALLOW HARDENED OIL (Fatty acid composition)

Product Name	Typical fatty acid composition (%)							
	Saturated acid					Unsaturated acid		
	C10	C12	C14	C16	C18	C16	C18	C18
TALLOW HARDENED OIL 51° HO	1	1	4	27	34	3	30	
TALLOW HARDENED OIL 54° HO	1	1	4	27	44	3	20	
TALLOW HARDENED OIL EXTREMELY HARD	1	1	4	30	63		1	

### 2.3 HYDROGENATED CASTOR OIL

Ingredient	Product Name	Appearance	Saponification Value	Acid Value	Iodine Value	Melting Point (°C)	Hydroxyl Value
HYDROGENATED CASTOR OIL	CASTER WAX	Flake	176~187	2 ↓	2.5 ↓	85 ↑	155~ 165

### 2.4 HYDROGENATED CASTOR OIL (Fatty acid composition)

Product Name	Typical fatty acid composition (%)							
	Saturated acid					Unsaturated acid		
	C14	C16	C18	*C18	C20	C18	*C18	C18
CASTER WAX FLAKE		2	12	*83	1		*2	

\* Contains a Hydroxyl Group.

### 3. GLYCERIN

#### 3.1 INDUSTRIAL-GRADE

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

#### 3.2 FOOD ADDITIVE-GRADE

Product Name	Glycerin (%)	Identification	Specific Gravity (20/20°C)	Heavy Metals (μg/g)
FOOD ADDITIVE GLYCERIN	98.5 ↑	Pass	1.260~1.264	5.0 ↓

Arsenic (μg/g)	Chloride (Cl %)	Reducing Matter	Residue on Ignition (%)
2.0 ↓	0.003 ↓	Pass	0.01 ↓

#### 3.3 FEED-GRADE

Product Name	Glycerin (%)	Identification	Specific Gravity (20/20°C)	Heavy Metals (ppm)	Arsenic (ppm)
FEED GRADE GLYCERIN	98.5 ↑	Pass	1.260 ↑	5.0 ↓	2.0 ↓

Chloride (Cl %)	Reducing Matter	Residue on Ignition (%)	Color (APHA)
0.001 ↓	Pass	0.01 ↓	10 ↓

### 3.4 COSMETICS-GRADE

Product Name	Glycerin (%)	Identification	Specific Gravity (20/20°C)	Color of Solution	Acidity or Alkalinity	Chloride (%)
RG·CO·	95.0 ↑	Pass	1.251 ↑	Pass	Pass	0.0013 ↓

Sulfate	Ammonium	Heavy Metals (ppm)	Calcium	Arsenic (ppm)	Acrolein or Other Reducing Substance
Pass	Pass	5 ↓	Pass	2 ↓	Pass

Volatile Fatty Acids and Dyes	Fatty Acid and Esters (mL)	Readily Carbonizable Substances	Residue on Ignition (%)
Pass	5 ↑	LIGHT than H	0.01 ↓

### 3.5 JAPANESE PHARMACOPOEIA-GRADE

Product Name	Glycerin (%)	Identification	Refractive Index (20°C)	Specific Gravity (20/20°C)	Color (APHA)	Property of Solution
GLYCERIN PG (JP)	84.0~87.0	Pass	1.449~1.454	1.221~1.230	10 ↓	Neutral
CONCENTRATED GLYCERIN (JP)	98.0~101.0	Pass	1.470 ↑	1.258 ↑	10 ↓	Neutral

Chloride as NaCl (%)	Sulfate (%)	Ammonium Test	Heavy Metals (ppm)	Calcium Test	Arsenic (ppm)	Acrolein, Glucose & Other Reducing Matter
0.001 ↓	0.002 ↓	Pass	5 ↓	Pass	2 ↓	Pass
0.001 ↓	0.002 ↓	Pass	5 ↓	Pass	2 ↓	Pass

Fatty Acid and Esters (mL)	Sulfuric Acid Coloration	Residue on Ignition (%)	Moisture (%)	Diethyleneglycol and Related Substances
3.0 ↓	LIGHT than H	0.01 ↓	13~17	Pass
3.0 ↓	LIGHT than H	0.01 ↓	2.0 ↓	Pass

## 4.HIGHER ALCOHOL

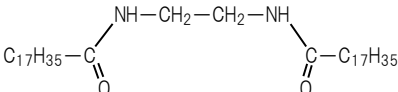
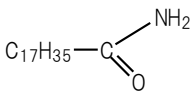
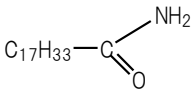
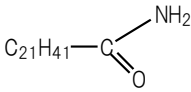
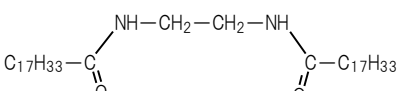
### 4.1 HIGHER ALCOHOL (Typical specifications)

Ingredient	Product Name	Appearance	Saponnification Value	Iodine Value	Hydroxyl Value	Melting Point (°C)	Color (APHA)
LAURYL ALCOHOL	NAA <sup>®</sup> -42	White Solid	1 ↓	0.1 ↓	294~304	23~28	30 ↓
MYRISTYL ALCOHOL	NAA <sup>®</sup> -43		2 ↓		254~264	35~43	
CETYL ALCOHOL	NAA <sup>®</sup> -44	White Beads	1 ↓	1 ↓	220~235	48.5~52.5	
STEARYL ALCOHOL	NAA <sup>®</sup> -45				200~220	56.5~60.5	
	NAA <sup>®</sup> -46		2 ↓		200~225	55.0~60.0	
CETYL STEARYL ALCOHOL	NAA <sup>®</sup> -48				205~230	51.0~56.0	

### 4.2 HIGHER ALCOHOL (Typical composition)

Ingredient	Product Name	Saturated alcohol (%)					
		C10	C12	C14	C16	C18	C20
LAURYL ALCOHOL	NAA <sup>®</sup> -42	2	95	3			
MYRISTYL ALCOHOL	NAA <sup>®</sup> -43		2	95	3		
CETYL ALCOHOL	NAA <sup>®</sup> -44			2	95	3	
STEARYL ALCOHOL	NAA <sup>®</sup> -45				5	95	
	NAA <sup>®</sup> -46				15	85	
CETYL STEARYL ALCOHOL	NAA <sup>®</sup> -48				50	50	

## 5.FATTY ACID AMIDE

Product Name	Appearance	Chemical Name	Structural Formula	Melting Point C.MP (°C)
ALFLOW <sup>®</sup> H-50L	Pale Yellow Beads	Ethylene bis stearamide		140~145
ALFLOW <sup>®</sup> H-50S	Pale Yellow Granule * (190 μm)			
ALFLOW <sup>®</sup> H-50F	Pale Yellow Powder * (50 μm)			
ALFLOW <sup>®</sup> H-50T	Pale Yellow Fine Powder * (40 μm)			
ALFLOW <sup>®</sup> H-50P	Pale Yellow Fine Powder * (25 μm)			
ALFLOW <sup>®</sup> H-50TF	Pale Yellow Fine Powder * (18 μm)			
ALFLOW <sup>®</sup> H-50ES	White Emulsified Liquid	Ethylene bis stearamide (Active ingredient : 58% Aqueous dispersion)		—
ALFLOW <sup>®</sup> S-10	White Powder	Stearamide		100~105
ALFLOW <sup>®</sup> E-10	White Beads	Oleylamide		72~76
ALFLOW <sup>®</sup> P-10	White Powder	Erucamide		79~84
ALFLOW <sup>®</sup> AD-281F	Pale Yellow Flake	Ethylene bis oleylamide		115
ALFLOW <sup>®</sup> AD-281P ※Small-lot production	Pale Yellow Powder			

\* Average particle size

## 6.METALLIC SOAP

### 6.1 DIRECT METHOD

Product Name	Appearance	Structural Formula	Moisture (%)	Metal Content (%)	Melting Point C.MP (°C)	Free Fatty Acid (%)
CALCIUM STEARATE G	Granule	$\begin{array}{c} \text{C}_{17}\text{H}_{35}\text{COO} \\ \diagdown \quad \diagup \\ \text{Ca} \\ \diagup \quad \diagdown \\ \text{C}_{17}\text{H}_{35}\text{COO} \end{array}$	3.0 ↓	6.5~7.5	145~160	1.0 ↓
CALCIUM STEARATE GP	Powder					
CALCIUM STEARATE GF-200	Fine Powder					
ZINC LAURATE G	Granule	$\begin{array}{c} \text{C}_{11}\text{H}_{23}\text{COO} \\ \diagdown \quad \diagup \\ \text{Zn} \\ \diagup \quad \diagdown \\ \text{C}_{11}\text{H}_{23}\text{COO} \end{array}$	1.0 ↓	12.0~14.0	125~140	0.5 ↓
ZINC LAURATE GP	Powder					
ZINC STEARATE G	Granule	$\begin{array}{c} \text{C}_{17}\text{H}_{35}\text{COO} \\ \diagdown \quad \diagup \\ \text{Zn} \\ \diagup \quad \diagdown \\ \text{C}_{17}\text{H}_{35}\text{COO} \end{array}$	0.8 ↓	10.5~11.5	116~125	0.5 ↓
ZINC STEARATE GP	Powder					
ZINC STEARATE GF-200	Fine Powder					
MAGNESIUM STEARATE G	Granule	$\begin{array}{c} \text{C}_{17}\text{H}_{35}\text{COO} \\ \diagdown \quad \diagup \\ \text{Mg} \\ \diagup \quad \diagdown \\ \text{C}_{17}\text{H}_{35}\text{COO} \end{array}$	6.0 ↓	4.0~4.8	120~140	1.0 ↓
MAGNESIUM STEARATE GR	Powder					
MAGNESIUM STEARATE GP	Powder					
MAGNESIUM STEARATE GF-200	Fine Powder					
BARIUM STEARATE GF ※	Powder	$\begin{array}{c} \text{C}_{17}\text{H}_{35}\text{COO} \\ \diagdown \quad \diagup \\ \text{Ba} \\ \diagup \quad \diagdown \\ \text{C}_{17}\text{H}_{35}\text{COO} \end{array}$	0.5 ↓	19.5~21.0	—	0.5 ↓

※ **WARNING** : BARIUM STEARATE GF falls under “Non-medicinal deleterious substance.” Please handle with care.

## 6.2 DOUBLE DECOMPOSITION METHOD(1)

Product Name	Appearance	Structural Formula	Moisture (%)	Metal Content (%)	Melting Point C.M.P (°C)	Free Fatty Acid (%)	
CALCIUM STEARATE	Fine Powder	$\begin{array}{c} \text{C}_{17}\text{H}_{35}\text{COO} \\ \diagdown \quad \diagup \\ \text{Ca} \\ \diagup \quad \diagdown \\ \text{C}_{17}\text{H}_{35}\text{COO} \end{array}$	3.0 ↓	6.5~7.0	150~165	0.5 ↓	
CALCIUM STEARATE S			2.0 ↓	6.4~6.8	148~160		
CALCIUM STEARATE FX (For Coated Sand)			3.0 ↓	6.5~7.0	150~165		
CALCIUM LAURATE ※Manufactured-by-Order		$\begin{array}{c} \text{C}_{11}\text{H}_{23}\text{COO} \\ \diagdown \quad \diagup \\ \text{Ca} \\ \diagup \quad \diagdown \\ \text{C}_{11}\text{H}_{23}\text{COO} \end{array}$	5.0 ↓	8.4~9.4	140~160	1.0 ↓	
CALCIUM CASTOR STEARATE ※Manufactured-by-Order		$\begin{array}{c} \text{RCOO} \\ \diagdown \quad \diagup \\ \text{Ca} \\ \diagup \quad \diagdown \\ \text{RCOO} \end{array}$ RCOO=12-HydroxyStearic Acid	3.0 ↓	6.0~7.0	140~160	1.0 ↓	
POWDER BASE L	Fine Powder	$\begin{array}{c} \text{C}_{11}\text{H}_{23}\text{COO} \\ \diagdown \quad \diagup \\ \text{Zn} \\ \diagup \quad \diagdown \\ \text{C}_{11}\text{H}_{23}\text{COO} \end{array}$	—	13.2~14.2	123~130	0.5 ↓	
POWDER BASE M				$\begin{array}{c} \text{C}_{13}\text{H}_{27}\text{COO} \\ \diagdown \quad \diagup \\ \text{Zn} \\ \diagup \quad \diagdown \\ \text{C}_{13}\text{H}_{27}\text{COO} \end{array}$			12.2~13.2
ZINC STEARATE		$\begin{array}{c} \text{C}_{17}\text{H}_{35}\text{COO} \\ \diagdown \quad \diagup \\ \text{Zn} \\ \diagup \quad \diagdown \\ \text{C}_{17}\text{H}_{35}\text{COO} \end{array}$	0.8 ↓	10.5~11.3	116~124	0.5 ↓	
ZINC STEARATE S			0.5 ↓				
ZINC BEHENATE ※Manufactured-by-Order			$\begin{array}{c} \text{C}_{21}\text{H}_{43}\text{COO} \\ \diagdown \quad \diagup \\ \text{Zn} \\ \diagup \quad \diagdown \\ \text{C}_{21}\text{H}_{43}\text{COO} \end{array}$	0.5 ↓	8.2~9.2	125~135	1.0 ↓
MAGNESIUM STEARATE	Fine Powder	$\begin{array}{c} \text{C}_{17}\text{H}_{35}\text{COO} \\ \diagdown \quad \diagup \\ \text{Mg} \\ \diagup \quad \diagdown \\ \text{C}_{17}\text{H}_{35}\text{COO} \end{array}$	4.0 ↓	4.0~4.5	110~135	1.0 ↓	
ALUMINUM STEARATE 300	Fine Powder	$\begin{array}{c} \text{HO} \\ \diagdown \quad \diagup \\ \text{HO} \quad \text{Al} \\ \diagup \quad \diagdown \\ \text{C}_{17}\text{H}_{35}\text{COO} \end{array}$	1.5 ↓	10.0~11.5 (Ash)	150~165	8.0 ↓	
ALUMINUM STEARATE 600				$\begin{array}{c} \text{C}_{17}\text{H}_{35}\text{COO} \\ \diagdown \quad \diagup \\ \text{HO} \quad \text{Al} \\ \diagup \quad \diagdown \\ \text{C}_{17}\text{H}_{35}\text{COO} \end{array}$	8.5~10.0 (Ash)	140~155	12.0 ↓
ALUMINUM STEARATE 900				$\begin{array}{c} \text{C}_{17}\text{H}_{35}\text{COO} \\ \diagdown \quad \diagup \\ \text{C}_{17}\text{H}_{35}\text{COO} \quad \text{Al} \\ \diagup \quad \diagdown \\ \text{C}_{17}\text{H}_{35}\text{COO} \end{array}$	6.5~8.0 (Ash)	110~125	20~30
BARIUM STEARATE ※				Fine Powder	$\begin{array}{c} \text{C}_{17}\text{H}_{35}\text{COO} \\ \diagdown \quad \diagup \\ \text{Ba} \\ \diagup \quad \diagdown \\ \text{C}_{17}\text{H}_{35}\text{COO} \end{array}$	0.5 ↓	19.5~20.5

※ **WARNING** : BARIUM STEARATE falls under “Non-medicinal deleterious substance.” Please handle with care.

### 6.3 JAPANESE PHARMACOPOEIA-GRADE

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

### 6.4 FOOD ADDITIVE-GRADE

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

### 6.5 NEUTRAL TYPE

Product Name	Appearance	Structural Formula	Moisture (%)	Metal Content (%)	Melting Point C.M.P (°C)	pH(2%aq.) (Dispersion)
AULABRITE®NC	Fine Powder	$\begin{array}{l} \text{C}_{17}\text{H}_{35}\text{COO} \\ \text{C}_{17}\text{H}_{35}\text{COO} \end{array} \text{Ca}$	3.0 ↓	6.0~7.0	155~165	6~7
AULABRITE®NM ※Under development	Fine Powder	$\begin{array}{l} \text{C}_{17}\text{H}_{35}\text{COO} \\ \text{C}_{17}\text{H}_{35}\text{COO} \end{array} \text{Mg}$	4.0 ↓	4.0~4.5	110~135	6~7

#### Characteristics

- **Temporal Xanthosis Restraint of Resin**  
AULABRITE® presents neutrality (pH =6-7 degree).It prevent inhibition action for the additives such as antioxidants and so on, and restrain xanthosis of resin.
- **Decomposition Restraint of Resin**  
We can use AULABRITE® as color dispersant of the polyesters, polycarbonate which was not use so far.
- **High Thermal Stability**  
AULABRITE® is superior in heat stability, it can restrain the coloration to the resin in highmolding temperature in comparison with the conventional grades.

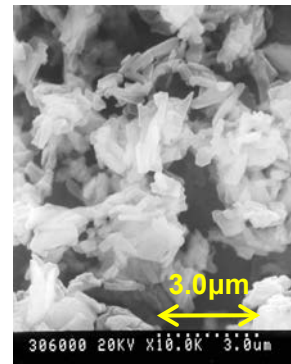
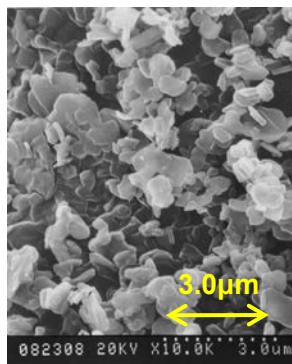
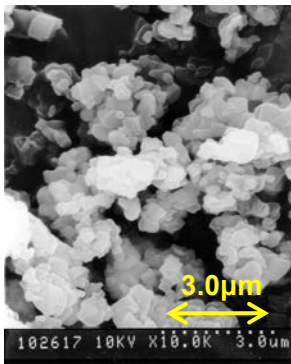
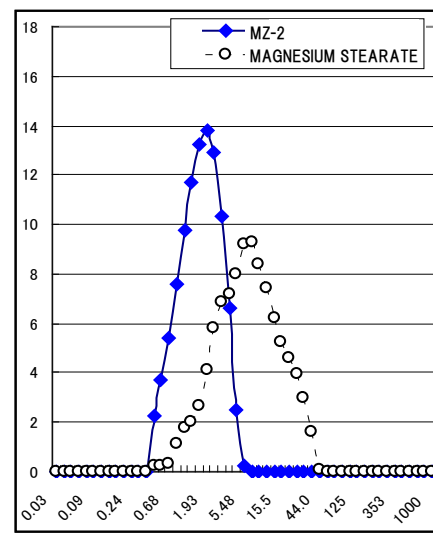
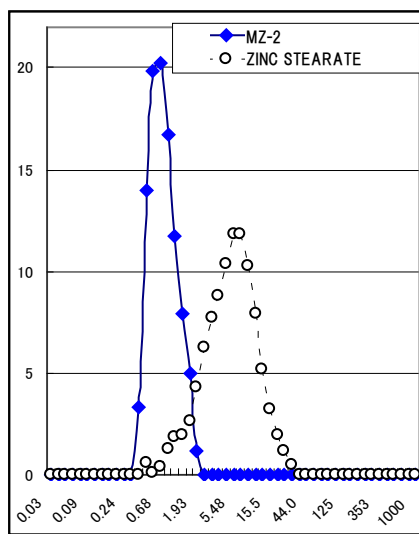
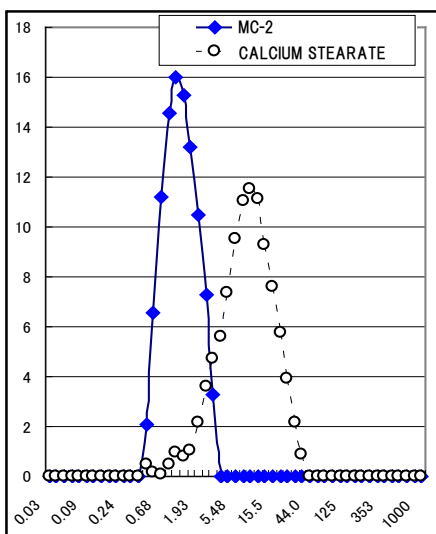
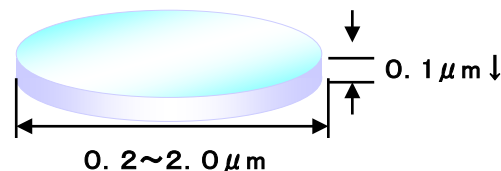


## 6.6 HYPERFINE PARTICLES TYPE

Product Name	Average Particle Size ( $\mu\text{m}$ )	Structural Formula	Moisture (%)	Metal Content (%)	Melting Point C.M.P ( $^{\circ}\text{C}$ )	Free Fatty Acid (%)
MC-2	2.0 ↓	$\begin{array}{c} \text{C}_{17}\text{H}_{35}\text{COO} \\ \diagdown \\ \text{Ca} \\ \diagup \\ \text{C}_{17}\text{H}_{35}\text{COO} \end{array}$	2.0 ↓	6.0~7.0	155~165	0.5 ↓
MZ-2	1.5 ↓	$\begin{array}{c} \text{C}_{17}\text{H}_{35}\text{COO} \\ \diagdown \\ \text{Zn} \\ \diagup \\ \text{C}_{17}\text{H}_{35}\text{COO} \end{array}$	1.5 ↓	10.0~11.0	125~135	0.5 ↓
MM-2	3.0 ↓	$\begin{array}{c} \text{C}_{17}\text{H}_{35}\text{COO} \\ \diagdown \\ \text{Mg} \\ \diagup \\ \text{C}_{17}\text{H}_{35}\text{COO} \end{array}$	3.0 ↓	4.0~5.0	110~135	0.5 ↓

### Characteristics

- Average particle size 3.0 $\mu\text{m}$ ↓
- Narrow particle size distribution of this product



## 7.ESTERS

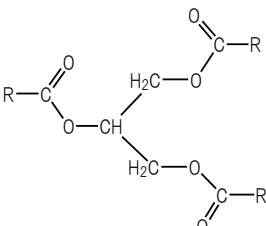
### 7.1 ESTER

Product Name	Appearance	Chemical Name	Main Application	Melting Point (°C)
METHYL LAURATE 95	Clear Liquid	Methyl laurate	·Raw materials for organic intermediates ·Solvent	Approx.7 (Freezing Point)
ME-175 ※Small-lot production	Light Yellow Liquid in Summer Light Yellow Solid in Winter	Methyl stearate		27~29
METHYL STEARATE 95	Light Yellow Solid			39
UNISTER®M-182A	Light Yellow Liquid	Methyl oleate		0 ↓ (Freezing Point)
BUTYL LAURATE	Yellow Liquid	Butyl laurate	Lubricant (for textile)	-13~-16 (Freezing Point)
BUTYL STEARATE	Light Yellow Solid	Butyl stearate	Slipping agent	23
IPM-R	Clear Liquid	Isopropyl myristate	Cosmetic and industrial emollient	3~9 (Freezing Point)
IPP-R		Isopropyl palmitate		11 (Freezing Point)
UNISTER®MB-816	Light Yellow Liquid	Octyl palmitate	·Fiber lubricant ·Metal working oil	0 (Pour Point)
UNISTER®MB-876		Octyl stearate		0 (Pour Point)
UNISTER®MB-871		Special fatty acid ester		Approx.1 (Freezing Point)
UNISTER®MB-881		Octyl oleate		-40 (Pour Point)
UNISTER®H-470T	Dark Brown Solid	Pentaerythritol -fatty acid ester	Lubricant	25
UNISTER®H-470D				35
Spermaceti	White Flake	Cetyl myristate	Whale oil replacement	Approx.50
UNISTER®M-9676	Light Yellow Flake	Stearyl stearate	·Slipping agent (Engineering plastic, Hard PVC, PC, PBT, ABS etc.)	52~58
UNISTER®M-2222SL	White Powder	Behenyl behenate		70
UNISTER®H-476	White Flake	Pentaerythritol -tetrastearate		60~65
WE-476	Beads			
UNISTER®H-476D	White Flake	Pentaerythritol- -distearate		53

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## 7.2 MEDIUM CHAIN FATTY ACID TRIGLYCERIDE

Product Name	Appearance	Structural Formula	Main Application	Kinematic Viscosity (40°C) (mm <sup>2</sup> /s)	Freezing Point(°C)
PANACET <sup>®</sup> 800 ※Small-lot production	Clear~Light Yellow Liquid		<ul style="list-style-type: none"> <li>· Food lubricating agent</li> <li>· Food oils and fats</li> <li>· Releasing oil</li> <li>· Solubilizer</li> <li>· Plasticizer</li> </ul>	12	-5 ↓
PANACET <sup>®</sup> 810 PANACET <sup>®</sup> 810S PANACET <sup>®</sup> 810S (JPE)				13	0 ↓
PANACET <sup>®</sup> 800B (Food oils and fats not applicable)				Light Yellow Liquid	800 R=C <sub>7</sub> H <sub>15</sub> 810 R=C <sub>7</sub> H <sub>15</sub> R=C <sub>9</sub> H <sub>19</sub> 800B R=C <sub>4</sub> H <sub>9</sub> CH(C <sub>2</sub> H <sub>5</sub> )

(JPE) Japanese Pharmaceutical Excipients

## 7.3 HIGH-PURIFIED SOLID TYPE ESTER (Typical specifications)

Product Name	Appearance	Acid Value (mgKOH/g)	Melting Point C.M.P (°C)	Residue on Drying (%)	Hydroxyl Value	Color (Gardner)
WEP-2	Beads	0.1	60±1	0.1~0.3	4.0 ↓	1
WEP-3			73±1			
WEP-4			71±1			1
WEP-5			82±1			
WEP-6			77±1			1
WEP-7			70±1			8.0 ↓
WEP-8		79±1	4.0 ↓		1	
WEP-9		0.5	80±1		—	9
WEP-10		0.1	69±1		4.0 ↓	1

WE series (WE-2 - WE-6) are high-purified solid type esters developed by our new manufacturing technology of fatty acid derivatives. They have various interesting properties. They are used for wax for toners from the feature of sharp melting curve, and are used for mold-releasing agent from the feature of high heat stability.

## 7. 4 POLYOL ESTER for LUBRICATING OIL (Typical specifications) (1)

Product Name	Acid Value (mgKOH/g)	Flash Point (°C)	Kinematic Viscosity (mm <sup>2</sup> /s)		Viscosity Index	Pour Point (°C)
			40°C	100°C		
UNISTER <sup>®</sup> HR-208BRS	0.1 ↓	168	7.6	2.1	52	-50
UNISTER <sup>®</sup> HP-210R	0.1	216	10.6	3.0	146	-7.5
UNISTER <sup>®</sup> HP-281R	0.1	278	24.1	5.9	206	-30
UNISTER <sup>®</sup> H-334R	0.1	261	19.6	4.4	140	-40
UNISTER <sup>®</sup> H-327R	0.1	265	20.4	4.5	138	-45
UNISTER <sup>®</sup> H-310R	0.1	273	24.8	5.2	148	-10
UNISTER <sup>®</sup> H-310D	2.8	216	33.1	5.6	104	-37.5
UNISTER <sup>®</sup> H-312R	0.2	284	33.7	6.7	160	0
UNISTER <sup>®</sup> H-330 ※Manufactured-by-Order	3.3	280	38.2	7.1	152	-5
UNISTER <sup>®</sup> H-385	2.2	277	46.7	9.2	184	-5
UNISTER <sup>®</sup> H-385R ※Manufactured-by-Order	0.4	282	49.9	9.9	189	-5
UNISTER <sup>®</sup> H-381	2.3	314	49.5	9.6	183	-32.5
UNISTER <sup>®</sup> H-381R	0.3	324	48.7	9.8	192	-32.5
UNISTER <sup>®</sup> H-345	3.5	238	83.2	12.4	146	-5
UNISTER <sup>®</sup> H-481R	0.5	330	64.6	12.3	191	-20
UNISTER <sup>®</sup> H-445R	2.3	240	120	17.2	157	-2.5
UNISTER <sup>®</sup> H-481T	1.6	310	76.2	12.4	162	-27.5
UNISTER <sup>®</sup> H-481D	1.5	286	130	14.9	116	-27.5
UNISTER <sup>®</sup> G-1027 ※Manufactured-by-Order	0.1	258	16.0	3.8	136	-5
UNISTER <sup>®</sup> HR-20B	0.1	266	19.4	4.9	190	-17.5
UNISTER <sup>®</sup> HR-22 ※Manufactured-by-Order	0.1	244	22.1	4.7	135	-35

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#### 7. 4 POLYOL ESTER for LUBRICATING OIL (Typical specifications) (2)

Product Name	Acid Value (mgKOH/g)	Flash Point (°C)	Kinematic Viscosity (mm <sup>2</sup> /s)		Viscosity Index	Pour Point (°C)
			40°C	100°C		
UNISTER <sup>®</sup> HR-32	0.1 ↓	273	33.5	5.8	114	-50
UNISTER <sup>®</sup> HR-46 ※Manufactured-by-Order	0.1	272	45.5	7.4	130	-42.5
UNISTER <sup>®</sup> HR-64	0.1	283	64.8	9.0	113	-37.5
UNISTER <sup>®</sup> HR-170R	0.1	303	167	17.6	115	-35
UNISTER <sup>®</sup> HR-200	0.1 ↓	298	235	17.9	81	-30
UNISTER <sup>®</sup> H-609BR	0.3	302	462	28.1	85	-17.5

#### 7. 5 MONO ESTER for LUBRICATING OIL (Typical specifications)

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

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## 7.6 COMPLEX ESTER (Typical specifications)

Product Name	Acid Value (mgKOH/g)	Flash Point (°C)	Kinematic Viscosity (mm <sup>2</sup> /s)		Viscosity Index	Pour Point (°C)
			40°C	100°C		
UNISTER <sup>®</sup> C-3371A	1.7	270	77.4	11.4	141	-47.5
UNISTER <sup>®</sup> C-3373A	2.8	271	245	29.5	159	-32.5
UNISTER <sup>®</sup> C-400B	0.5	308	390	38.9	153	-40
UNISTER <sup>®</sup> C-6910BE ※Manufactured-by-Order	4.0	315	557	42.0	122	-25
UNISTER <sup>®</sup> TOE-500	3.6	284	557	58.9	175	-32.5
UNISTER <sup>®</sup> TOE-2500	3.6	290	2,622	199	198	-12.5
UNISTER <sup>®</sup> TYE-100	5.4	256	96.8	14.2	150	-7.5

## 7.7 ADDITIVE for KEROSENE POWER GENERATION (For diesel engine)

Product Name	Appearance	Flash Point (°C)	Kinematic Viscosity (mm <sup>2</sup> /s)	Density (g/cm <sup>3</sup> )	pH	Pour Point (°C)
			40°C	15°C		
LE191A	Colorless~Light Milk-White Liquid	63	617	0.898	—	-20

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

## 7.8 RUST PREVENTIVE LUBRICATING OIL

Product Name	Appearance	Active Component (%)	Viscosity (mPa·s)	Specific gravity	pH	Freezing Point (°C)
			25°C	25°C		
MC-560-J (MILBOND)	Milk-White Liquid (Aqueous solution)	25	700~1,000	1.03~1.05	7.5~8.5	0 ↓

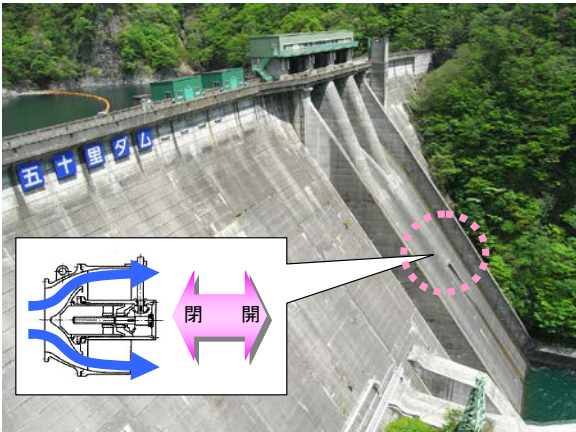


## 7.9 BIODEGRADABLE HYDRAULIC FLUIDS (Typical specifications)

Product Name	Acid Value (mgKOH/g)	Flash Point (°C)	Kinematic Viscosity (mm <sup>2</sup> /s)		Viscosity Index	Pour Point (°C)
			40°C	100°C		
MILLUBE <sup>®</sup> E-22A ※Manufactured-by-Order	0.6	284	24.2	6.0	211	-30
MILLUBE <sup>®</sup> E-32A	0.6	286	32.0	7.0	189	-30
MILLUBE <sup>®</sup> E-46A	0.6	296	45.7	9.0	184	-30

“MILLUBE<sup>®</sup>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.

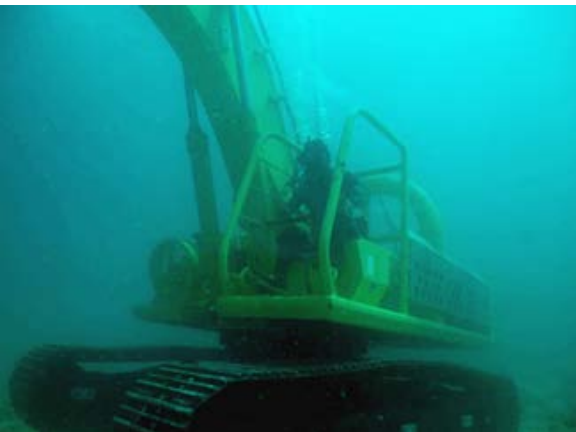
### Application of MILLUBE<sup>®</sup>



(FLOODGATE OF DAM)



(WATERWEED CUTTER)



(UNDERWATER BACKHOE)



(PIERLESS FLOODGATE)

## 8.AMINE

### 8.1 PRIMARY AMINE

Product Name	Appearance	Chemical Name	Structural Formula	Total Amine Value	Freezing Point (°C)
NISSAN AMINE <sup>®</sup> BB	White Waxy Solid	Dodecylamine	C <sub>12</sub> H <sub>25</sub> -NH <sub>2</sub>	292~306	Approx.28 (Melting Point)
NISSAN AMINE <sup>®</sup> FB	Light Yellow Liquid	Coco-alkylamine	R-NH <sub>2</sub>	270~290	17
NISSAN AMINE <sup>®</sup> MB	White Waxy Solid	Tetradecylamine	C <sub>14</sub> H <sub>29</sub> -NH <sub>2</sub>	253~265	Approx.38
NISSAN AMINE <sup>®</sup> PB	White Waxy Solid	Hexadecylamine	C <sub>16</sub> H <sub>33</sub> -NH <sub>2</sub>	223~233	47
NISSAN AMINE <sup>®</sup> PB FLAKE	White~Light Yellow Brown Flake				
NISSAN AMINE <sup>®</sup> AB	White~Light Yellow Solid	Octadecylamine	C <sub>18</sub> H <sub>37</sub> -NH <sub>2</sub>	203~213	Approx.53 (Melting Point)
NISSAN AMINE <sup>®</sup> AB FLAKE	White Flake				
NISSAN AMINE <sup>®</sup> ABT	White~Light Yellow Solid	Hardened tallow -alkylamine	R-NH <sub>2</sub>	204~219	40~46
NISSAN AMINE <sup>®</sup> ABT FLAKE	White~Light Yellow Flake				
NISSAN AMINE <sup>®</sup> ABT-2	White Waxy Solid (20°C)	Tallow alkylamine	R-NH <sub>2</sub>	208~220	30~40
NISSAN AMINE <sup>®</sup> M-14	Light Yellow Liquid	1-amino-3-undecanoxy -propane	RO(CH <sub>2</sub> ) <sub>3</sub> NH <sub>2</sub>	214~244	0 ↓
NISSAN AMINE <sup>®</sup> OB	Dark Brown Liquid in Summer Light Yellow Solid in Winter	Oleylamine	C <sub>18</sub> H <sub>35</sub> -NH <sub>2</sub>	200~216	Approx.15
NISSAN AMINE <sup>®</sup> SB	Light Yellow Solid	Soybean alkylamine	R-NH <sub>2</sub>	197~217	20~30
NISSAN AMINE <sup>®</sup> VB-S	White Waxy Solid	Behenylamine	C <sub>22</sub> H <sub>45</sub> -NH <sub>2</sub>	165~185	55~65

(Main Application) Curling agent for epoxy resin, pigment flushing agent, rust inhibitor, intermediate products.

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8/28/2015



## 8.2 TERTIARY AMINE

Product Name	Appearance	Chemical Name	Structural Formula	Total Amine Value	Freezing Point (°C)
TERTIARY NISSAN AMINE <sup>®</sup> BB	Clear~Light Yellow Liquid	Dodecyl -dimethyl amine	$C_{12}H_{25}-N\begin{matrix} \diagup CH_3 \\ \diagdown CH_3 \end{matrix}$	243~266	-15
TERTIARY NISSAN AMINE <sup>®</sup> FB *Smoll-lot production	Light Yellow Liquid	Coconut alkyl -dimethyl amine	$R-N\begin{matrix} \diagup CH_3 \\ \diagdown CH_3 \end{matrix}$	230~250	-15 ↓
TERTIARY NISSAN AMINE <sup>®</sup> MB *Manufactured-by-Order	Clear~Light Yellow Liquid	Tetradecyl -dimethyl amine	$C_{14}H_{29}-N\begin{matrix} \diagup CH_3 \\ \diagdown CH_3 \end{matrix}$	217~237	-8
TERTIARY NISSAN AMINE <sup>®</sup> PB *Manufactured-by-Order		Hexadecyl -dimethyl amine	$C_{16}H_{33}-N\begin{matrix} \diagup CH_3 \\ \diagdown CH_3 \end{matrix}$	190~210	—
TERTIARY NISSAN AMINE <sup>®</sup> AB	White~Light Yellow Waxy Solid	Octadecyl -dimethyl amine	$C_{18}H_{37}-N\begin{matrix} \diagup CH_3 \\ \diagdown CH_3 \end{matrix}$	170~192	20~23
TERTIARY NISSAN AMINE <sup>®</sup> ABT	Light Yellow Liquid	Hardened tallow alkyl -dimethyl amine	$R-N\begin{matrix} \diagup CH_3 \\ \diagdown CH_3 \end{matrix}$	180~200	18~21

(Main Application) Anti-rust/corrosion agent for lubricating oil, intermediate products.

## 8.3 DIAMINE

Product Name	Appearance	Chemical Name	Structural Formula	Total Amine Value	Freezing Point (°C)
NISSAN AMINE <sup>®</sup> DT	Yellow Waxy Solid	Tallow akyl -propylene diamine	$R-NH-C_3H_6-NH_2$	290 ↑	25~34
NISSAN AMINE <sup>®</sup> DT-H	Dark Brown Flake	Hardened tallow akyl -propylene diamine		320 ↑	40~42
NISSAN AMINE <sup>®</sup> DOB-R	Yellow~Brown Liquid	Oleyl -propylene diamine	$C_{18}H_{35}-NH-C_3H_6-NH_2$	320~350	Approx.20

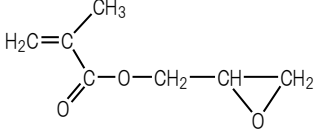
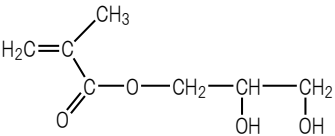
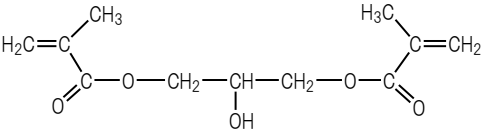
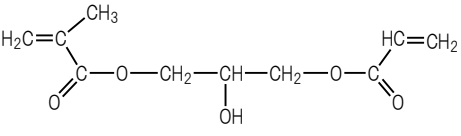
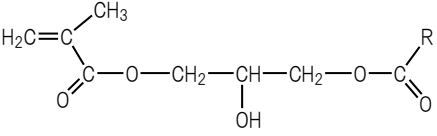
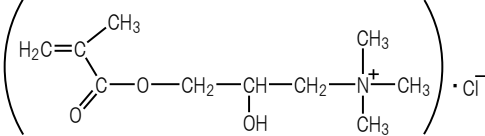
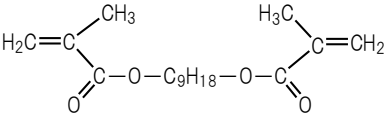
(Main Application) Anti-rust/corrosion agent for lubricating oil, intermediate products.

## 9.FATTY ACID CHLORIDE

Product Name	Appearance	Structural Formula	Chloride (%)	Phosphorus (%)	Free Fatty Acid (%)	Freezing Point (°C)
LAUROYL CHLORIDE	Light Yellow Liquid	$C_{11}H_{23}-C \begin{matrix} \nearrow O \\ \searrow Cl \end{matrix}$	17.5~20.5	1.5 ↓	4.0 ↓	-17
MYRISTOYL CHLORIDE		$C_{13}H_{27}-C \begin{matrix} \nearrow O \\ \searrow Cl \end{matrix}$	15.0~18.0	1.5 ↓	3.0 ↓	3
DISTILLED PALMITOYL CHLORIDE	Light Yellow Liquid (Solid in winter)	$C_{15}H_{31}-C \begin{matrix} \nearrow O \\ \searrow Cl \end{matrix}$	12.0~13.5	0.1 ↓	0.8 ↓	11~12
DISTILLED ISOPALMITOYL CHLORIDE	Light Yellow Liquid	$C_{15}H_{31}-C \begin{matrix} \nearrow O \\ \searrow Cl \end{matrix}$	12.0~14.0	0.2 ↓	1.5 ↓	-50 ↓
REFINED STEAROYL CHLORIDE	Light Yellow Liquid (Solid in winter)	$C_{17}H_{35}-C \begin{matrix} \nearrow O \\ \searrow Cl \end{matrix}$	11.5~13.0	0.1 ↓	1.5 ↓	Approx.10
REFINED ISOSTEAROYL CHLORIDE	Light Yellow Liquid	$C_{17}H_{35}-C \begin{matrix} \nearrow O \\ \searrow Cl \end{matrix}$	10.1~12.1	0.1 ↓	2.5 ↓	-50 ↓
OLEYL CHLORIDE	Dark Brown Liquid	$C_{17}H_{33}-C \begin{matrix} \nearrow O \\ \searrow Cl \end{matrix}$	12.5~15.5	1.5 ↓	6.5 ↓	Approx.-44
DISTILLED SEBACOYL DICHLORIDE ※Under development	Light Yellow Liquid	$O=C-Cl-C_8H_{16}-C \begin{matrix} \nearrow O \\ \searrow Cl \end{matrix}$	28.6~30.6	0.2 ↓	1.5 ↓	-5

## 10. MONOMERS and OLIGOMER

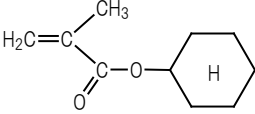
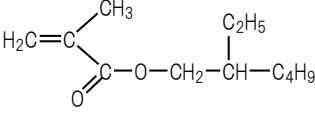
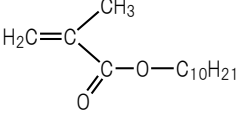
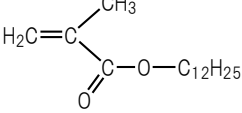
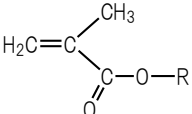
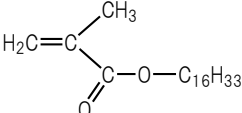
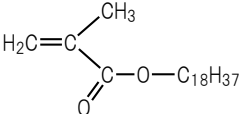
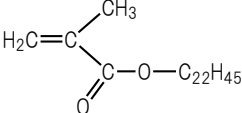
### 10.1 GLYCIDYL METHACRYLATE and SPECIALITY MONOMER

Product Name	Chemical Name	Structural Formula	CAS No. (Tg: Polymer)
BLEMMER <sup>®</sup> G	Glycidyl methacrylate		106-91-2 (46°C)
BLEMMER <sup>®</sup> GH	Glycidyl methacrylate (Low epichlorohydrin grade)		
BLEMMER <sup>®</sup> GS	Glycidyl methacrylate (Chlorine-free)		
BLEMMER <sup>®</sup> GLM	Glyceryl monomethacrylate		5919-74-4 (55°C)
BLEMMER <sup>®</sup> GLM-R ※Under development	Glyceryl monomethacrylate (Chlorine-free)		
BLEMMER <sup>®</sup> GMR-M ※Under development	Glyceryl dimethacrylate		1830-78-0 ( - )
BLEMMER <sup>®</sup> GMR-R ※Under development	Glyceryl dimethacrylate (Chlorine-free)		
BLEMMER <sup>®</sup> GAM ※Under development	2-Hydroxy-3-acryloyl -oxypropylmethacrylate		1709-71-3 ( - )
BLEMMER <sup>®</sup> GAM-R ※Under development	2-Hydroxy-3-acryloyl -oxypropylmethacrylate (Chlorine-free)		
BLEMMER <sup>®</sup> G-FA80	Fatty acid modified -glycidyl methacrylate (20% Solvent dilution)		Registered ( - )
BLEMMER <sup>®</sup> QA	N,N,N-Trimethyl-N-(2-hydroxy -3-metacryloyloxypropyl) -ammonium chloride (50% Aqueous solution)		13052-11-4 ( - )
BLEMMER <sup>®</sup> NDMA	1,9-Nonanediol dimethacrylate		65833-30-9 ( - )

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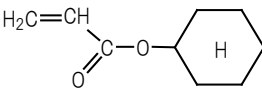
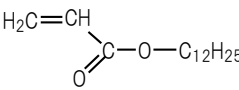
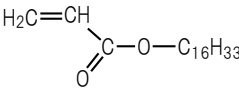
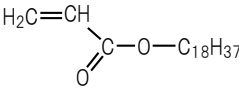
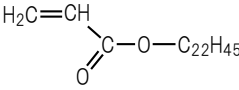
## 10.2 ALKYL METHACRYLATE

Product Name	Chemical Name	Structural Formula	Pour Point (°C)	CAS No. (Tg: Polymer)
BLEMMER <sup>®</sup> CHMA	Cyclohexyl methacrylate		-50 ↓	101-43-9 (66°C)
BLEMMER <sup>®</sup> EHMA-25	2-Ethylhexyl methacrylate		—	688-84-6 (-10°C)
BLEMMER <sup>®</sup> DMA ※Manufactured-by-Order	Decyl methacrylate		—	3179-47-3 (-70°C)
BLEMMER <sup>®</sup> LMA	Lauryl methacrylate		-20	142-90-5 (-65°C)
BLEMMER <sup>®</sup> SLMA-S	Alkyl (C <sub>12</sub> , 13) methacrylate	 R=C <sub>12</sub> H <sub>25</sub> , C <sub>13</sub> H <sub>27</sub>	—	142-90-5 2495-25-2 (-64°C)
BLEMMER <sup>®</sup> SLMA-SH				
BLEMMER <sup>®</sup> CMA ※Manufactured-by-Order	Alkyl methacrylate (C <sub>16</sub> :70%)		Approx.12 (Freezing Point)	2495-27-4 (-9°C)
BLEMMER <sup>®</sup> SMA	Stearyl methacrylate		18~20	32360-05-7 (38°C)
BLEMMER <sup>®</sup> VMA ※Manufactured-by-Order	Behenyl methacrylate (C <sub>22</sub> :98%)		Approx.44	16669-27-5 ( - )
BLEMMER <sup>®</sup> VMA-70	Behenyl methacrylate (C <sub>22</sub> :70%)		Approx.38	16669-27-5 (47°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.

### 10.3 ALKYL ACRYLATE

Product Name	Chemical Name	Structural Formula	Pour Point (°C)	CAS No. (Tg: Polymer)
BLEMMER <sup>®</sup> CHA	Cyclohexyl acrylate		-60 ↓	3066-71-5 (16°C)
BLEMMER <sup>®</sup> LA	Lauryl acrylate		0	2156-97-0 (-5°C)
BLEMMER <sup>®</sup> CA ※Small-lot production	Cetyl acrylate (C <sub>16</sub> :95%)		19 (Freezing Point)	13402-02-3 (35°C)
BLEMMER <sup>®</sup> SA	Stearyl acrylate		Approx.30	4813-57-4 (30°C)
BLEMMER <sup>®</sup> VA	Behenyl acrylate (C <sub>22</sub> :98%)		Approx.46	18299-85-9 (50°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.

### 10. 4 OH GROUP TERMINATED (POLYALKYLENEGLYCOL MONOMETHACRYLATE)

Product Name	Chemical Name	Structural Formula	CAS No. (Tg: Polymer)
BLEMMER <sup>®</sup> PE-90	Polyethyleneglycol -methacrylate	$\begin{array}{c} \text{CH}_3 \\   \\ \text{H}_2\text{C}=\text{C} \\   \\ \text{C}=\text{O} \\   \\ \text{O} \end{array} - \text{O} - (\text{C}_2\text{H}_4\text{O})_n - \text{H}$ <p>PE-90 <math>n \doteq 2</math> PE-200 <math>n \doteq 4.5</math> PE-350 <math>n \doteq 8</math></p>	25736-86-1 ( - )
BLEMMER <sup>®</sup> PE-200			25736-86-1 (-53°C)
BLEMMER <sup>®</sup> PE-350			25736-86-1 (-58°C)
BLEMMER <sup>®</sup> PE-350G	Polyethyleneglycol -methacrylate (60% Aqueous solution)		
BLEMMER <sup>®</sup> PP-1000	Polypropyleneglycol -methacrylate	$\begin{array}{c} \text{CH}_3 \\   \\ \text{H}_2\text{C}=\text{C} \\   \\ \text{C}=\text{O} \\   \\ \text{O} \end{array} - \text{O} - (\text{C}_3\text{H}_6\text{O})_n - \text{H}$ <p>PP-1000 <math>n \doteq 4 \sim 6</math> PP-500 <math>n \doteq 9</math> PP-800 <math>n \doteq 13</math></p>	39420-45-6 (-49°C)
BLEMMER <sup>®</sup> PP-500			39420-45-6 (-57°C)
BLEMMER <sup>®</sup> PP-800			39420-45-6 (-62°C)
BLEMMER <sup>®</sup> 50PEP-300	Poly (ethyleneglycol -propyleneglycol) -methacrylate	$\begin{array}{c} \text{CH}_3 \\   \\ \text{H}_2\text{C}=\text{C} \\   \\ \text{C}=\text{O} \\   \\ \text{O} \end{array} - \text{O} - \left[ (\text{C}_2\text{H}_4\text{O})_m - (\text{C}_3\text{H}_6\text{O})_n \right] - \text{H}$ <p><math>m \doteq 3.5</math> <math>n \doteq 2.5</math> * [ ]: Random addition</p>	58916-75-9 (-60°C)
BLEMMER <sup>®</sup> 70PEP-350B	Polyethyleneglycol -polypropyleneglycol -methacrylate	$\begin{array}{c} \text{CH}_3 \\   \\ \text{H}_2\text{C}=\text{C} \\   \\ \text{C}=\text{O} \\   \\ \text{O} \end{array} - \text{O} - (\text{C}_2\text{H}_4\text{O})_m - (\text{C}_3\text{H}_6\text{O})_n - \text{H}$ <p><math>m \doteq 5</math> <math>n \doteq 2</math></p>	58916-75-9 (-60°C)
BLEMMER <sup>®</sup> 55PET-800	Poly (ethyleneglycol -tetramethyleneglycol) -methacrylate	$\begin{array}{c} \text{CH}_3 \\   \\ \text{H}_2\text{C}=\text{C} \\   \\ \text{C}=\text{O} \\   \\ \text{O} \end{array} - \text{O} - \left[ (\text{C}_2\text{H}_4\text{O})_m - (\text{C}_4\text{H}_8\text{O})_n \right] - \text{H}$ <p><math>m \doteq 10</math> <math>n \doteq 5</math> * [ ]: Random addition</p>	72514-28-4 (-66°C)
BLEMMER <sup>®</sup> 10PPB-500B	Propyleneglycol -polybutyleneglycol -methacrylate	$\begin{array}{c} \text{CH}_3 \\   \\ \text{H}_2\text{C}=\text{C} \\   \\ \text{C}=\text{O} \\   \\ \text{O} \end{array} - \text{O} - \text{C}_3\text{H}_6\text{O} - (\text{C}_4\text{H}_8\text{O})_n - \text{H}$ <p><math>n \doteq 6</math></p>	800379-55-9 ( - )

#### Characteristics

Terminal Hydroxyl Group (-OH) is a special monomer that utilizes the surfactant technology of addition polymerization.

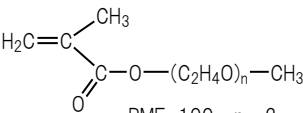
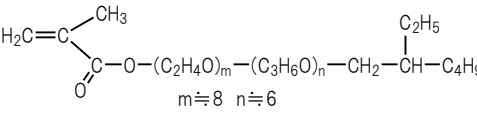
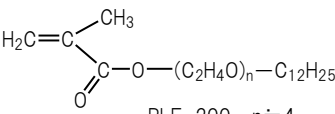
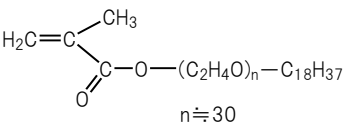
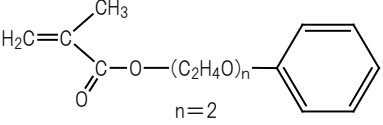
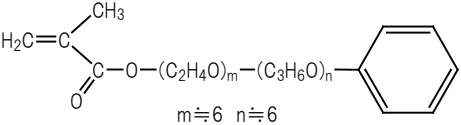
### 10.5 OH GROUP TERMINATED (POLYALKYLENEGLYCOL MONOACRYLATE)

Product Name	Chemical Name	Structural Formula	CAS No. (Tg: Polymer)
BLEMMER <sup>®</sup> AE-90U ※Under development	Polyethyleneglycol -acrylate	$\begin{array}{c} \text{H}_2\text{C}=\text{CH} \\   \\ \text{C}=\text{O}-\text{O}-(\text{C}_2\text{H}_4\text{O})_n-\text{H} \\    \\ \text{O} \end{array}$ <p style="text-align: center;">AE-90 <math>n \approx 2</math> AE-200 <math>n \approx 4.5</math> AE-400 <math>n \approx 10</math></p>	26403-58-7 818-61-1 (-49°C)
BLEMMER <sup>®</sup> AE-200			26403-58-7 (-54°C)
BLEMMER <sup>®</sup> AE-400			26403-58-7 (-64°C)
BLEMMER <sup>®</sup> AP-200 ※Small-lot production	Polypropyleneglycol -acrylate	$\begin{array}{c} \text{H}_2\text{C}=\text{CH} \\   \\ \text{C}=\text{O}-\text{O}-(\text{C}_3\text{H}_6\text{O})_n-\text{H} \\    \\ \text{O} \end{array}$ <p style="text-align: center;">AP-200 <math>n \approx 3.5</math> AP-400 <math>n \approx 6</math> AP-550 <math>n \approx 9</math> AP-800 <math>n \approx 13</math></p>	50858-51-0 (-40°C)
BLEMMER <sup>®</sup> AP-400			50858-51-0 (-59°C)
BLEMMER <sup>®</sup> AP-550 ※Manufactured-by-Order			50858-51-0 (-59°C)
BLEMMER <sup>®</sup> AP-800 ※Under development			50858-51-0 (-62°C)

#### Characteristics

Terminal Hydroxyl Group (-OH) is a special monomer that utilizes the surfactant technology of addition polymerization.

### 10.6 ALKYL GROUP TERMINATED (POLYALKYLENEGLYCOL MONOMETHACRYLATE)

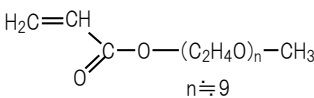
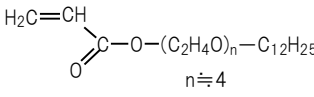
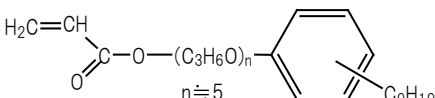
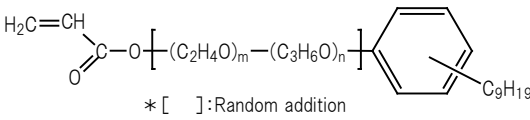
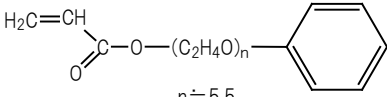
Product Name	Chemical Name	Structural Formula	CAS No. (Tg: Polymer)
BLEMMER <sup>®</sup> PME-100	Methoxy polyethyleneglycol -methacrylate	 <p>PME-100 n≐2 PME-200 n≐4 PME-400 n≐9 PME-1000 n≐23 PME-4000 n≐90</p>	45103-58-0 (-26°C)
BLEMMER <sup>®</sup> PME-200			26915-72-0 (-59°C)
BLEMMER <sup>®</sup> PME-400			26915-72-0 (-60°C)
BLEMMER <sup>®</sup> PME-1000			26915-72-0 (-52°C)
BLEMMER <sup>®</sup> PME-4000 ※Small-lot production			26915-72-0 ( - )
BLEMMER <sup>®</sup> 50POEP-800B	Octoxy polyethyleneglycol -polypropyleneglycol -methacrylate	 <p>m≐8 n≐6</p>	146181-50-2 ( - )
BLEMMER <sup>®</sup> PLE-200 ※Small-lot production	Lauroxy polyethyleneglycol -methacrylate	 <p>PLE-200 n≐4 PLE-1300 n≐30</p>	Registered ( - )
BLEMMER <sup>®</sup> PLE-1300 ※Manufactured-by-Order			Registered ( - )
BLEMMER <sup>®</sup> PSE-1300	Stearoxy polyethyleneglycol -methacrylate	 <p>n≐30</p>	52352-43-9 (-51°C)
BLEMMER <sup>®</sup> PAE-100 ※Small-lot production	Phenoxy polyethyleneglycol -methacrylate	 <p>n=2</p>	77136-95-9 (2°C)
BLEMMER <sup>®</sup> 43PAPE-600B ※Manufactured-by-Order	Phenoxy polyethyleneglycol -polypropyleneglycol -methacrylate	 <p>m≐6 n≐6</p>	197980-43-1 ( - )

**(WARNING)**

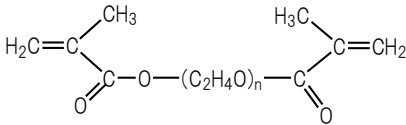
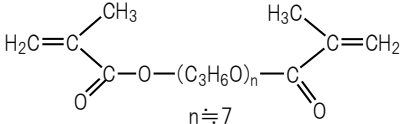
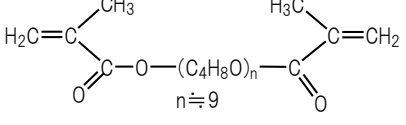
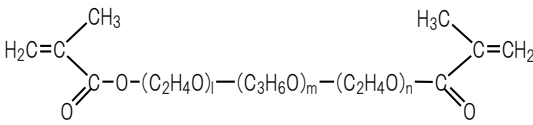
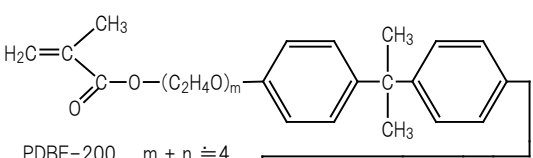
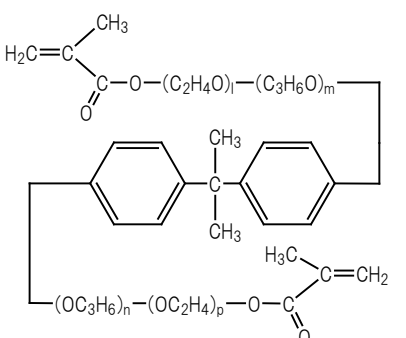
When melting solid monomer, avoid local heating. Heating temperature should not exceed 60°C.  
Wait until monomer is completely melted before using.  
In locally melted states, composition and distribution of polymerization inhibitor may not stay uniform.



### 10.7 ALKYL GROUP TERMINATED (POLYALKYLENEGLYCOL MONOACRYLATE)

Product Name	Chemical Name	Structural Formula	CAS No. (Tg: Polymer)
BLEMMER <sup>®</sup> AME-400	Methoxy -polyethyleneglycol -acrylate		32171-39-4 (-65°C)
BLEMMER <sup>®</sup> ALE-200 ※Under development	Lauroxy -polyethyleneglycol -acrylate		39927-09-8 (-16°C)
BLEMMER <sup>®</sup> ANP-300	Nonilphenoxy -polypropyleneglycol -acrylate		71926-19-7 (-39°C)
BLEMMER <sup>®</sup> 75ANEP-600	Nonilphenoxy -poly (ethyleneglycol -propyleneglycol) -acrylate		115166-38-6 (-48°C)
BLEMMER <sup>®</sup> AAE-300	Phenoxy -polyethyleneglycol -acrylate		56641-05-5 (-40°C)

## 10.8 POLYALKYLENEGLYCOL DIMETHACRYLATE

Product Name	Chemical Name	Structural Formula	CAS No. (Tg:Polymer)
BLEMMER <sup>®</sup> PDE-100 ※Small-lot production	Polyethyleneglycol -dimethacrylate	 <p style="text-align: center;">           PDE-100 n=2            PDE-150 n=3            PDE-200 n=4            PDE-400 n=9            PDE-600 n=14         </p>	25852-47-5 ( - )
BLEMMER <sup>®</sup> PDE-150 ※Small-lot production			25852-47-5 ( - )
BLEMMER <sup>®</sup> PDE-200			25852-47-5 ( - )
BLEMMER <sup>®</sup> PDE-400			25852-47-5 (-9°C)
BLEMMER <sup>®</sup> PDE-600			25852-47-5 (-34°C)
BLEMMER <sup>®</sup> PDP-400N	Polypropyleneglycol -dimethacrylate	 <p style="text-align: center;">n=7</p>	25852-49-7 (-11°C)
BLEMMER <sup>®</sup> PDT-650 ※Small-lot production	Polytetramethyleneglycol -dimethacrylate	 <p style="text-align: center;">n=9</p>	28883-57-0 (-53°C)
BLEMMER <sup>®</sup> PDC SERIES ※Manufactured-by-Order	Polyethyleneglycol -polypropyleneglycol -polyethyleneglycol -dimethacrylate		87003-89-2 ( - )
BLEMMER <sup>®</sup> PDBE-200A	Ethoxylated bisphenol A -dimethacrylate	 <p style="text-align: center;">           PDBE-200 m + n = 4            PDBE-250 m + n = 6            PDBE-450 m + n = 10            PDBE-1300 m + n = 30         </p>	41637-38-1 (105°C)
BLEMMER <sup>®</sup> PDBE-250 ※Manufactured-by-Order			41637-38-1 (88°C)
BLEMMER <sup>®</sup> PDBE-450A			41637-38-1 (17°C)
BLEMMER <sup>®</sup> PDBE-1300 ※Manufactured-by-Order			41637-38-1 (-38°C)
BLEMMER <sup>®</sup> PDPE SERIES ※Manufactured-by-Order	Ethoxylated propoxylated -bisphenol A -dimethacrylate		146478-33-3 ( - )

NOF CORPORATION don't acknowleg and undertake any gurantees for any date,evaluation results,chemical hazaeds etc.

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## 10.9 POLYALKYLENEGLYCOL DIACRYLATE

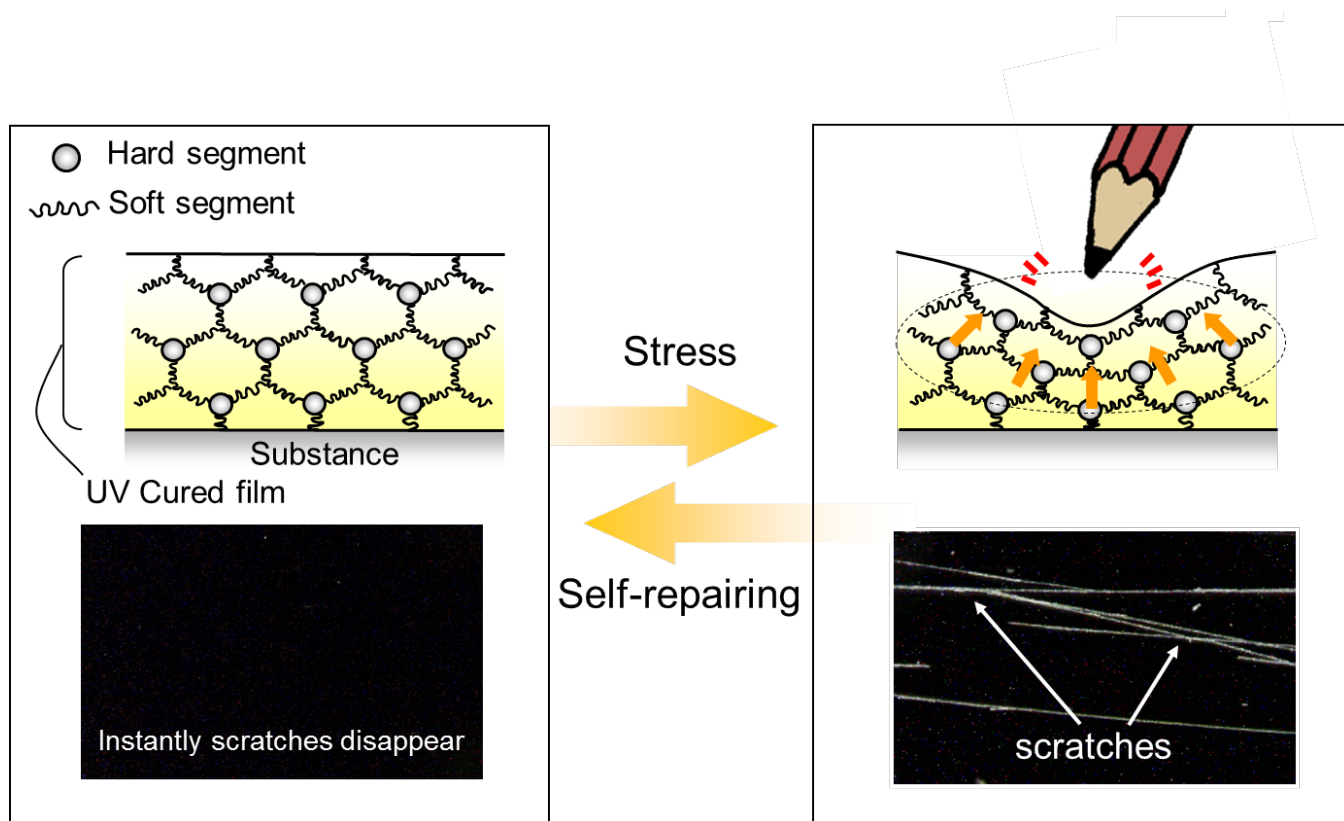
Product Name	Chemical Name	Structural Formula	CAS No. (Tg: Polymer)
BLEMMER <sup>®</sup> ADE-200	Polyethyleneglycol -diacrylate	$\begin{array}{c} \text{H}_2\text{C}=\text{CH} \\ \diagdown \\ \text{C}=\text{O} \\ \diagup \\ \text{O} \end{array} - \text{O} - (\text{C}_2\text{H}_4\text{O})_n - \begin{array}{c} \text{O} \\ \diagdown \\ \text{C} \\ \diagup \\ \text{CH}=\text{CH}_2 \end{array}$ <p style="text-align: center;">ADE-200 <math>n \doteq 4</math> ADE-300 <math>n \doteq 7</math> ADE-400 <math>n \doteq 9</math> ADE-600 <math>n \doteq 14</math></p>	26570-48-9 (50°C)
BLEMMER <sup>®</sup> ADE-300			26570-48-9 ( - )
BLEMMER <sup>®</sup> ADE-400A			26570-48-9 (-23°C)
BLEMMER <sup>®</sup> ADE-600 ※Smoll-lot production			26570-48-9 ( - )
BLEMMER <sup>®</sup> ADP-400	Polypropylenglycol -diacrylate	$\begin{array}{c} \text{H}_2\text{C}=\text{CH} \\ \diagdown \\ \text{C}=\text{O} \\ \diagup \\ \text{O} \end{array} - \text{O} - (\text{C}_3\text{H}_6\text{O})_n - \begin{array}{c} \text{O} \\ \diagdown \\ \text{C} \\ \diagup \\ \text{CH}=\text{CH}_2 \end{array}$ <p style="text-align: center;"><math>n \doteq 7</math></p>	52496-08-9 (-18°C)
BLEMMER <sup>®</sup> ADT-250 ※Smoll-lot production	Polytetramethyleneglycol -diacrylate	$\begin{array}{c} \text{H}_2\text{C}=\text{CH} \\ \diagdown \\ \text{C}=\text{O} \\ \diagup \\ \text{O} \end{array} - \text{O} - (\text{C}_4\text{H}_8\text{O})_n - \begin{array}{c} \text{O} \\ \diagdown \\ \text{C} \\ \diagup \\ \text{CH}=\text{CH}_2 \end{array}$ <p style="text-align: center;"><math>n \doteq 3</math></p>	52277-33-5 ( - )
BLEMMER <sup>®</sup> ADC SERIES ※Manufactured-by-Order	Polyethyleneglycol -polypropylenglycol -polyethyleneglycol -diacrylate	$\begin{array}{c} \text{H}_2\text{C}=\text{CH} \\ \diagdown \\ \text{C}=\text{O} \\ \diagup \\ \text{O} \end{array} - \text{O} - (\text{C}_2\text{H}_4\text{O})_l - (\text{C}_3\text{H}_6\text{O})_m - (\text{C}_2\text{H}_4\text{O})_n - \begin{array}{c} \text{O} \\ \diagdown \\ \text{C} \\ \diagup \\ \text{CH}=\text{CH}_2 \end{array}$	—

## 10. 10 URETHANE ACRYLATE OLIGOMER

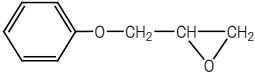
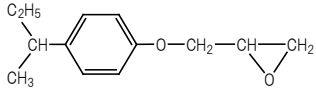
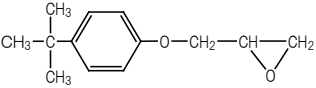
Product Name	Properties			Cured film properties		
	Average Molecular Weight	Viscosity(25°C) (mPa·s)	Functional group	Tg: Polymer (°C)	Pencil hardness (PET)	Tensile elongation (%)
BLEMMER <sup>®</sup> DA-800AU	Approx.1,100	Approx.1,500	2	-30	6B	56
BLEMMER <sup>®</sup> DA-400AU ※Under development	Approx.800	Approx.1,100	2	-20	3B	39
BLEMMER <sup>®</sup> TA-604BU2	Approx.2,000	Approx.12,000	3 ↑	10	B	100
BLEMMER <sup>®</sup> TA-604AU	Approx.2,300	Approx.20,000	3 ↑	5	HB	56

### Characteristics

- Very high cure speed
- Good flexibility and elasticity
- Cured films of TA-604BU2 or TA-604AU show “Self-repairing” that means slight scratches are instantly repaired.



## 10.11 GLYCIDYL ETHER & ESTER

Product Name	Appearance	Chemical Name	Structural Formula	Viscosity (25°C) (mPa·s)	Epoxy Equivalent (g/eq.)
EPIOL <sup>®</sup> ES-F ※Small-hot production	Light Yellow Liquid	Coconut fattyacid-glycidyl ester	$\text{R}-\overset{\text{O}}{\underset{\text{O}}{\parallel}}\text{C}-\text{O}-\text{CH}_2-\text{CH}-\text{CH}_2$	6.2 (60°C)	400 ↓
EPIOL <sup>®</sup> B ※	Clear~Light Yellow Liquid	1-Butyl-glycidyl ether	$\text{C}_4\text{H}_9-\text{O}-\text{CH}_2-\text{CH}-\text{CH}_2$	1.4	145 ↓
EPIOL <sup>®</sup> B-4 ※				5.5	155 ↓
EPIOL <sup>®</sup> EH-N	Light Yellow Liquid	2-Ethylhexyl-glycidyl ether	$\text{C}_4\text{H}_9-\underset{\text{C}_2\text{H}_5}{\text{CH}}-\text{CH}_2-\text{O}-\text{CH}_2-\text{CH}-\text{CH}_2$	2.0	168~262
EPIOL <sup>®</sup> A ※	Clear~Light Yellow Liquid	Allyl-glycidyl ether	$\text{CH}_2=\text{CH}-\text{CH}_2-\text{O}-\text{CH}_2-\text{CH}-\text{CH}_2$	1.1	—
EPIOL <sup>®</sup> P ※	Clear~Light Yellow Liquid	Phenyl-glycidyl ether		6	150~163
EPIOL <sup>®</sup> SB	Light Yellow Liquid	<i>p</i> -sec-Butylphenyl-glycidyl ether		15	220~250
EPIOL <sup>®</sup> TB	Light Yellow Liquid	<i>p</i> -tert-Butylphenyl-glycidyl ether		30	4.2 ↑ (Epoxy Contents) (eq./kg)
EPIOL <sup>®</sup> OH ※	Colorless Liquid	Glycidol	$\text{HO}-\text{CH}_2-\text{CH}-\text{CH}_2$	4 (20°C)	—
EPIOL <sup>®</sup> G-100	Light Yellow Liquid	1,2,3-Propanetriol-polymer with-(chloromethyl)-oxirane	$\begin{array}{c} \text{H}_2\text{C}-\text{O}-\text{CH}_2-\text{CH}-\text{CH}_2 \\   \\ \text{HC}-\text{O}-\text{R} \\   \\ \text{H}_2\text{C}-\text{O}-(\text{CH}_2-\underset{\text{CH}_2\text{Cl}}{\text{CH}}-\text{O})_n-\text{CH}_2-\text{CH}-\text{CH}_2 \\ \qquad \qquad \qquad n=0, 1 \end{array}$ R=H, $-\text{CH}_2-\text{CH}-\text{CH}_2$	120~175	160 ↓
EPIOL <sup>®</sup> E-100LC		2,2'-[Ethylenebis-(oxymethylene)]-bisoxirane	$\begin{array}{c} \text{H}_2\text{C}-\text{O}-(\text{C}_2\text{H}_4\text{O})_n-\text{CH}_2-\text{CH}-\text{CH}_2 \\   \\ \text{H}_2\text{C}-\text{O}-(\text{C}_2\text{H}_4\text{O})_n-\text{CH}_2-\text{CH}-\text{CH}_2 \\ \qquad \qquad \qquad n=0\sim 2 \end{array}$	15	145 ↓
EPIOL <sup>®</sup> E-400 ※Small-hot production		Polyethyleneglycol-diglycidyl ether	$\text{CH}_2-\text{CH}-\text{CH}_2-\text{O}-(\text{C}_2\text{H}_4\text{O})_n-\text{CH}_2-\text{CH}-\text{CH}_2$ E-400 $n \cong 9$ E-1000 $n \cong 23$	60	263~303
EPIOL <sup>®</sup> E-1000 ※Small-hot production				—	1.35~1.90 (Epoxy Contents) (eq./kg)

Epoxy Equivalent (g/eq.)=16X100÷Oxyran Oxygen (%)

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

**※ WARNING**

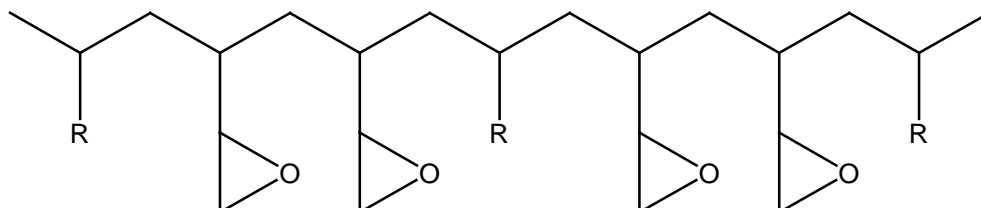
On February 4, 1991, Labour Standards Bureau in its official notice (#80-2) announced 48 types of existing chemical compounds found to have shown significant mutigenicity. Of our products, EPIOL B, B-4, A, P, and OH are included in the group. **HANDLE THESE PRODUCTS WITH EXTRA CARE.**

## 11. POLYMER WITH GLYCIDYL METHACRYLATE

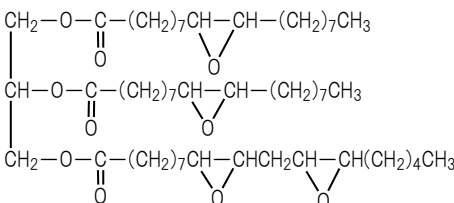
Product Name	Appearance	Category	Average Molecular Weight	Tg (°C)	Epoxy Equivalent (g/eq.)
MARPROOF <sup>®</sup> G-0105SA	Flake	Copolymer with styrene	10,000	90	3,000
MARPROOF <sup>®</sup> G-0130SP	Powder	Copolymer with styrene	9,000	69	530
MARPROOF <sup>®</sup> G-0150M		(Meth)Acrylic polymer	10,000	71	310
MARPROOF <sup>®</sup> G-0250SP		Copolymer with styrene	20,000	74	310
MARPROOF <sup>®</sup> G-1005S		Copolymer with styrene	100,000	96	3,300
MARPROOF <sup>®</sup> G-1005SA ※Small-lot production		Copolymer with styrene	100,000	98	3,300
MARPROOF <sup>®</sup> G-1010S ※Manufactured-by-Order		Copolymer with styrene	100,000	93	1,700
MARPROOF <sup>®</sup> G-2050M		(Meth)Acrylic polymer	200,000~250,000	74	340
MARPROOF <sup>®</sup> G-01100		Flake	(Meth)Acrylic polymer	12,000	47
MARPROOF <sup>®</sup> G-017581 ※Under development	Block	(Meth)Acrylic polymer	10,000	0 ↓	240

### Characteristics

MARPROOF<sup>®</sup>series improve adherence, reactivity and dispersion of paints, glue, synthetic resin, textile and other materials. MARPROOF<sup>®</sup>series can be used as a stabilizing agent (chlorine catcher) for vinyl chloride resin, vinylidene chloride resin and so on.

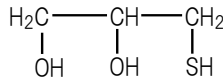


## 12.FATTY ACID WITH GLYCIDYL

Product Name	Appearance	Structural Formula	Oxyran Oxygen (%)	Melting Point (°C)
<b>NEWCIZER®510R</b> (Epoxidized Soybean Oil)	Light Yellow Viscous Liquid		6.7 ↑	5

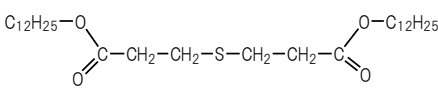
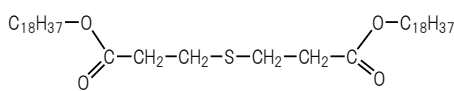
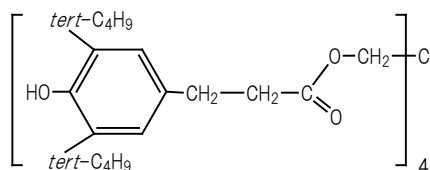
Epoxy Equivalent (g/eq.)=16X100÷Oxyran Oxygen (%)

## 13.POLYMERIZATION MODIFIER

Product Name	Appearance	Chemical Name	Structural Formula	Freezing Point (°C)
<b>N-DODECYL MERCAPTAN</b>	Colorless Liquid	n-Dodecyl mercaptan	$C_{12}H_{25}-SH$	-7
<b>NOM</b>		n-Octyl mercaptan	$C_8H_{17}-SH$	-51
<b>BLEMER®TGL</b> ※Small-lot production	Clear Viscous Liquid	1-Thioglycerol		—
<b>NOFMER®MSD</b> ★	Clear Liquid	α-Methylstyrene dimer	—	—

★ Contact to : Functional Chemicals & Polymers Division

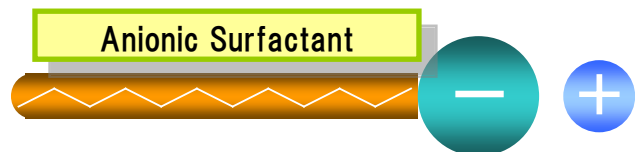
## 14.ANTIOXIDANT

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

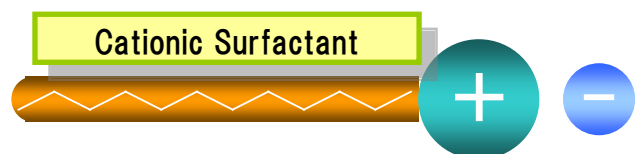
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## 15.SURFACTANTS



A surfactant with a negative-charged lipophilic part when dissolved in water.  
The representative counter ion is Na<sup>+</sup> and K<sup>+</sup>.



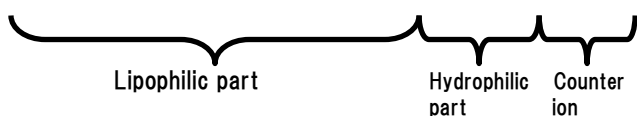
A surfactant with a positive-charged lipophilic part when dissolved in water.  
The representative counter ion is Cl<sup>-</sup> and SO<sub>4</sub><sup>-</sup>.



A surfactant with both cationic and anionic centers in the molecule, showing cationic or anionic behavior based on pH.



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.

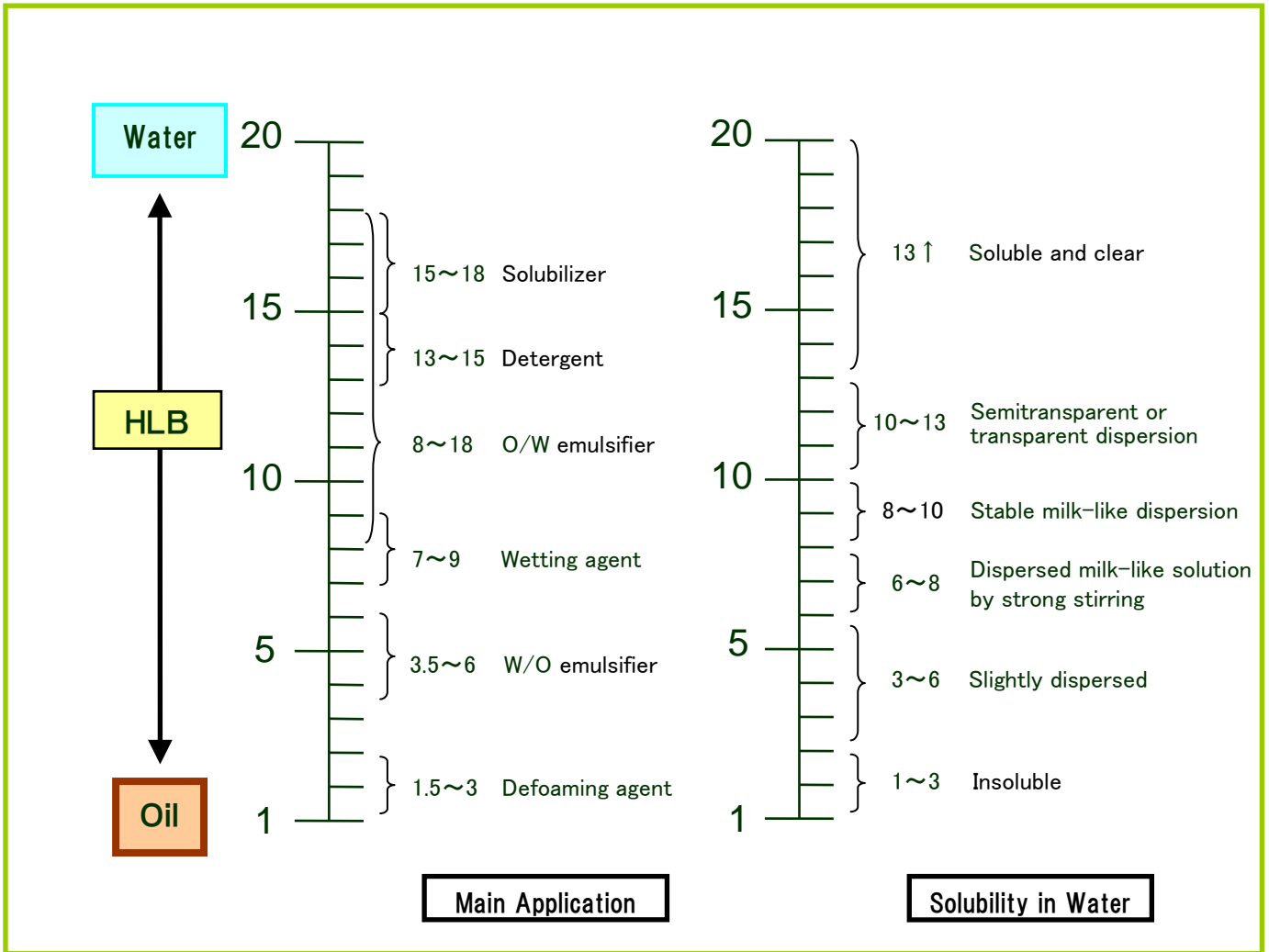
### (4) Calculation formula for average molecular weight from OHV

$$\text{Average Molecular Weight} = \frac{56.11 \times \text{Functional group}}{\text{OHV}} \times 1000$$



**(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).



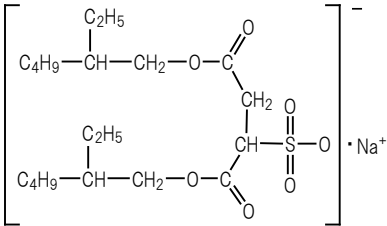
## 15. 1 ANIONIC SURFACTANT

### 15. 1. 1 Alkylsulfate, Ethoxysulfate, Alkylethersulfate

Product Name	Appearance	Chemical Name	Structural Formula	Alkyl Composition	Active Component (%)
PERSOFT <sup>®</sup> SP※	Light Yellow Liquid (Solid in Winter)	Lauryl sulfate ester -sodium salt	$C_{12}H_{25}-O-SO_3Na$	$C_{12}:96 \uparrow$	30
PERSOFT <sup>®</sup> SF※		Alkyl sulfate ester -sodium salt	$R-O-SO_3Na$	$C_{10}\sim C_{16}$	26
PERSOFT <sup>®</sup> SK				$C_8\sim C_{18}$	30
NISSAN TRAX <sup>®</sup> K-40	Light Yellow Liquid	Polyoxyethylene -lauryl ether sulfate -sodium salt	$C_{12}H_{25}-O-(C_2H_4O)_n-SO_3Na$	$C_{12}$	28
NISSAN TRAX <sup>®</sup> K-300				$C_{12}$	30
PERSOFT <sup>®</sup> EF	Light Yellow Liquid	Polyoxyethylene -alkyl ether sulfate -sodium salt	$R-O-(C_2H_4O)_n-SO_3Na$	$C_{12}, C_{14}$	25
PERSOFT <sup>®</sup> EDO				$C_{12}, C_{14}$	26
PERSOFT <sup>®</sup> EL	Light Yellow Liquid (Turbid in Winter)				
PERSOFT <sup>®</sup> EK				Coconut	30
PERSOFT <sup>®</sup> SF-T	Light Yellow Liquid	Lauryl sulfate ester -triethanolamine salt	$C_{12}H_{25}-O-SO_3H \cdot N(C_2H_4OH)_3$	$C_{12}, C_{14}$	40
PERSOFT <sup>®</sup> EF-T		Polyoxyethylene -lauryl ether sulfate -triethanolamine salt	$R-O-(C_2H_4O)_n-SO_3H \cdot N(C_2H_4OH)_3$	$C_{12}, C_{14}$	36
PERSOFT <sup>®</sup> EL-T※					Coconut
SINTREX EH-R	Light Yellow Liquid	2-Ethylehexyl sulfate -ester sodium salt	$  \begin{array}{c}  C_2H_5 \\    \\  C_4H_9-CH-CH_2-O-SO_3Na  \end{array}  $	$C_8$ (Branch)	40

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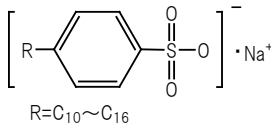
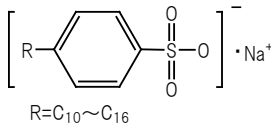
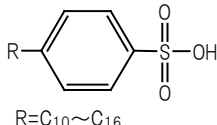
### 15. 1. 2 Sodium dialkyl sulfosuccinate

Product Name	Appearance	Chemical Name	Structural Formula	Active Component (%)
RAPISOL <sup>®</sup> A-30	Clear Viscous Liquid	1,4-Bis(2-ethylhexyl)-sodium sulfosuccinate		30
RAPISOL <sup>®</sup> A-70 ※Small-lot production	Clear~Light Yellow Viscous Liquid			70
RAPISOL <sup>®</sup> A-80				80
RAPISOL <sup>®</sup> A-90	White Solid			90

Surface tension of aqueous solution (20°C)	Concentration of RAPISOL <sup>®</sup> (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 <sup>®</sup> (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.

### 15. 1. 3 Alkylbenzene sulfonate

Product Name	Appearance	Chemical Name	Structural Formula	Active Component (%)
NEWREX <sup>®</sup> R-25L	Yellowish White Liquid	Linear alkylbenzene-sulfonic acid sodium salt (Aqueous solution)		Approx.25
NEWREX <sup>®</sup> R	Yellowish White Paste			Approx.50
NEWREX <sup>®</sup> SOFT 30	White Powder	Linear alkylbenzene-sulfonic acid sodium salt (Na <sub>2</sub> SO <sub>4</sub> dilution)		Approx.30
NEWREX <sup>®</sup> SOFT 60-N				Approx.60
NEWREX <sup>®</sup> SOFT 5S	Dark Brown Viscous Liquid	Linear alkylbenzene-sulfonic acid		96 ↑

## 15. 1. 4 Fatty acid soap

Product Name	Appearance	Chemical Name	Water (%)	Pure Soap (%)
NONSOUL LK-2	White Flake	Potassium laurate	5 ↓	98 ↑
NONSOUL LK-5	Light Yellow Flake	Potassium cocoate	5 ↓	98 ↑
NONSOUL LK-30	Light Yellow Liquid	Potassium cocoate (Aqueous solution)	70	—
NONSOUL MK-1	White Flake	Potassium myristate	10 ↓	98 ↑
NONSOUL PK-1	White Flake	Potassium palmitate	10 ↓	97 ↑
NONSOUL SK-1	White Needle-Shaped	Potassium stearate	8 ↓	96 ↑
NONSOUL OK-1	Yellow Liquid	Potassium oleate (Aqueous solution)	80~92	—
NONSOUL OK-2	Yellow Liquid	Potassium oleate (Aqueous solution)	60	—
NONSOUL TK-1	Light Yellow Flake	Potassium salt of fatty acids	10 ↓	—

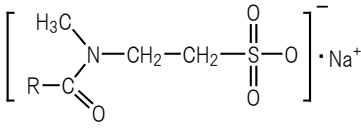
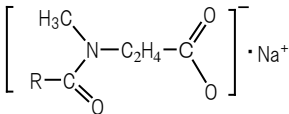
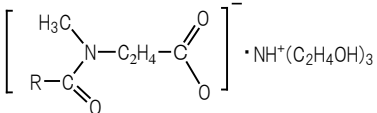
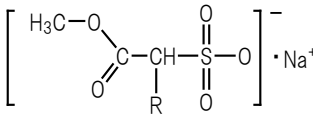
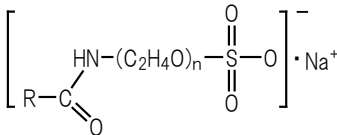
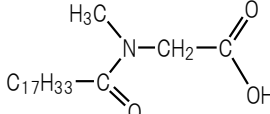
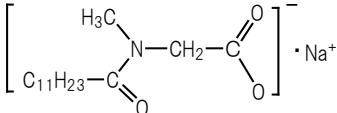
Product Name	Appearance	Chemical Name	Water (%)	Pure Soap (%)
NONSOUL LN-1	White Flake	Sodium cocoate	20 ↓	97 ↑
NONSOUL MN-1	White Flake	Sodium myristate	10 ↓	—
NONSOUL PN-1	Yellow Needle-Shaped	Sodium salt of fatty acids	13 ↓	97 ↑
NONSOUL PN-1 POWDER	Light Yellow Powder		7 ↓	
NONSOUL SN-1	White Flake	Sodium stearate	25 ↓	96 ↑
NONSOUL SN-1A	White Needle-Shaped		15 ↓	
NONSOUL SN-15	White Flake		10~15	97 ↑
NONSOUL SN-1 POWDER	White Powder		15 ↓	96 ↑
NONSOUL SN-1W1	White Powder		2 ↓	
NONSOUL ON-A	Yellow Needle-Shaped	Sodium oleate	6 ↓	95 ↑
NONSOUL ON-A POWDER	Light Yellow Powder			
NONSOUL ON-1N	Yellow Flake			
NONSOUL TN-1	White Needle-Shaped	Sodium salt of fatty acids	10 ↓	—
MARSEILLE SOAP	Yellow Needle-Shaped	Sodium salt of fatty acids	10 ↓	96 ↑
MARSEILLE SOAP T POWDER	Yellow Powder		7 ↓	92 ↑

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### 15. 1. 5 Other anionic surfactant

Product Name	Appearance	Chemical Name	Structural Formula	Active Component (%)
DIAPON <sup>®</sup> S	White Liquid	N-(Fatty acid acyl) -N-methyltaurine sodium salt (Mixed with anionic surfactant)		13
DIAPON <sup>®</sup> LM	White~Light Yellow Paste (Room temperature)	N-(Coconut oil acyl) -N-methyltaurine sodium salt		26~29
DIAPON <sup>®</sup> K				26
DIAPON <sup>®</sup> K-SF	Clear~Light Yellow Liquid			30
DIAPON <sup>®</sup> K-SF POWDER	White~Light Yellow Powder			95
DIAPON <sup>®</sup> HF-SF	Clear~Light Yellow Liquid	N-Decanoyl -N-methyltaurine sodium salt		24~30
SOFTILT <sup>®</sup> AS-L	Clear~Light Yellow Liquid	N-dodecanoyl-N-methyl -β-alanine sodium salt		30
SOFTILT <sup>®</sup> AT-L		TEA-lauroyl -methylaminopropionate		30
Sunbase <sup>®</sup>	Light Yellow Liquid	α-Sulfonated fatty acid -methyl ester sodium salt		28~32
Sunbase <sup>®</sup> FM-2				38~42
SUNAMIDE <sup>®</sup> CF-3	Light Yellow Liquid (Solid in winter)	Polyoxyethylene fatty acid -monoethanolamide sulfate		34~38
SUNAMIDE <sup>®</sup> CF-10				41~46
OLEOYLSARCOSINE 221P	Light Yellow~Dark Brown Liquid	N-Oleoyl-N-methylglycine (Oleoyl sarcosine)		100
FIRET <sup>®</sup> L	Light Yellow Liquid	N-Lauroyl-N-methylglycine -sodium salt (Sodium lauroyl sarcosine)		30

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## 15. 2 CATIONIC SURFACTANT

### 15. 2. 1 Amine salt type

Product Name	Appearance	Chemical Name	Structural Formula	Active Component (%)
NISSAN CATION <sup>®</sup> MA	Light Yellow Flake	Tetradecylamine acetate	$C_{14}H_{29}-NH_2 \cdot CH_3-C \begin{matrix} /OH \\ \backslash O \end{matrix}$	100

### 15. 2. 2 Trimethyl type

Product Name	Appearance	Chemical Name	Structural Formula	Active Component (%)
NISSAN CATION <sup>®</sup> 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
NISSAN CATION <sup>®</sup> FB		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
NISSAN CATION <sup>®</sup> 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
NISSAN CATION <sup>®</sup> ABT2-500 ※Manufactured-by-Order	Light Yellow Viscous Liquid	Tallow-alkyl trimethyl -ammonium chloride (Aqueous & IPA solution)	$\left[ \begin{array}{c} CH_3 \\   \\ R-N^+-CH_3 \\   \\ CH_3 \end{array} \right] \cdot Cl^-$	50
NISSAN CATION <sup>®</sup> 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
NISSAN CATION <sup>®</sup> AB-600				60~66
ISSNAN CATION <sup>®</sup> 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
NISSAN CATION <sup>®</sup> VB-F	Light Yellow Flake	Behenyl trimethyl -ammonium chloride (Contains 20% ethanol)		

### 15. 2. 3 Dialkyl type

Product Name	Appearance	Chemical Name	Structural Formula	Active Component (%)
NISSAN CATION <sup>®</sup> 2-DB-500E	Light Yellow Liquid	Didecyl dimethyl -ammonium chloride (Aqueous & ethanol solution)	$\left[ \begin{array}{c} \text{CH}_3 \\   \\ \text{C}_{10}\text{H}_{21}-\text{N}^+-\text{C}_{10}\text{H}_{21} \\   \\ \text{CH}_3 \end{array} \right] \cdot \text{Cl}^-$	48~52
NISSAN CATION <sup>®</sup> 2-DB-800E				Approx.80
NISSAN CATION <sup>®</sup> 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
NISSAN CATION <sup>®</sup> 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

### 15. 2. 4 Benzyl & special type

Product Name	Appearance	Chemical Name	Structural Formula	Active Component (%)
NISSAN CATION <sup>®</sup> F <sub>2</sub> -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
NISSAN CATION <sup>®</sup> M <sub>2</sub> -100R	White~Light Yellow Powder	Tetradecyl dimethyl benzyl -ammonium 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 ↑
NISSAN CATION <sup>®</sup> 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
NISSAN CATION <sup>®</sup> AR-4	Light Yellow Liquid	1-Methyl-1-hydroxyethyl -2-alkyl tallow Imidazolium -chloride (Aqueous & IBA solution)	$\left[ \begin{array}{c} \text{HO}-\text{CH}_2-\text{CH}_2 \\   \\ \text{H}_3\text{C}-\text{N}^+ \\   \\ \text{H}_2\text{C}-\text{CH}_2 \\ \diagup \quad \diagdown \\ \text{R} \quad \text{N} \end{array} \right] \cdot \text{Cl}^-$	35

## 15.3 NONIONIC SURFACTANT

### 15.3.1 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				100 ↑	17.5	Approx.45
PERSOFT <sup>®</sup> NK-60	Light Yellow Liquid	Polyoxyethylene alkyl ether (Contains 10% water)	R-O-(C <sub>2</sub> H <sub>4</sub> O) <sub>n</sub> -H	55~63	12.0	5 ↓
PERSOFT <sup>®</sup> NH-90C	Light Yellow~Brown Solid	Polyoxyethylene alkyl ether		Approx.78	13.5	Approx.30
PERSOFT <sup>®</sup> NK-100	Light Yellow Liquid	Polyoxyethylene alkyl ether (Contains 20% water)		90 ↑	14.0	10 ↓ (Pour Point)
PERSOFT <sup>®</sup> NK-100C	White~Light Yellow Solid (Milky~White Liquid in Summer)	Polyoxyethylene alkyl ether				Approx.25
NONION EAD-13	Clear~Light Yellow Liquid	Polyoxyethylene alkyl ether	$R-O-(C_2H_4O)_n-H$	45~55	13.0	5~25
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				60~75	12.9	Approx.28
NONION P-213				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				0 ↓	9.0	Approx.4
NONION E-212	White~Light Yellow Solid			80 ↑	13.3	Approx.31
NONION E-215				95 ↑	14.2	Approx.35
NONION E-230				100 ↑	16.6	Approx.40
NONION S-202				White~Light Yellow Solid	0 ↓	4.9
NONION S-207	0 ↓	10.7	30~36			
NONION S-215	90 ↑	14.2	Approx.40			
NONION S-220	100 ↑	15.3	Approx.45			

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### 15. 3. 1 Ether type (2)

Product Name	Appearance	Chemical Name	Structural Formula	Cloud Point (°C)	HLB	Freezing Point (°C)
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				44~54	12.5	Approx.4
NONION ID-209				70 ↑	14.3	Approx.15
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				73~79	14.6	Approx.-10
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-507 ※Under development				10~25	7	Approx.-2
NONION HT-510				60~75	10	Approx.19
NONION HT-512 ※Under development	White~Light Yellow Solid	Polyoxyethylene -polyoxypropylene -alkyl ether	—	80~90	12	Approx.26
NONION HT-515 ※Under development				100 ↑	15	Approx.42
NONION HT-518 ※Under development				100 ↑	18	Approx.51

### 15. 3. 2 Special ether type(1)

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		0 ↓		—	30~36	
DISPANOL® LS-100	Clear~Light Yellow Liquid	Special Type	—	23~29	9.7	-25 ↓
NONION MN-811				Approx.45	8.3	Approx.20

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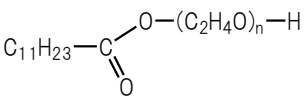
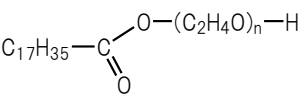
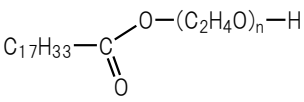
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### 15. 3. 2 Special ether type(2)

Product Name	Appearance	Viscosity (mm <sup>2</sup> /s)	Solubility in water (%)	HLB	Freezing Point (°C)	(*)Dynamic surface tension at each surface age (mN/m)		
		25°C				10ms	100ms	1,000ms
DISPANOL <sup>®</sup> WI-106	Clear Liquid	28	0.1 ↓	5	-20 ↓	49.2	44.6	38.8
DISPANOL <sup>®</sup> WI-115		38	Approx.0.1	5	-20 ↓	44.3	40.6	36.7
DISPANOL <sup>®</sup> WI-133		65	Soluble	11	-6	52.9	50.0	47.1

(\*)Concentration: WI-106(0.05wt%)、WI-115(0.1wt%)、WI-133(0.1wt%)

### 15. 3. 3 Ester type

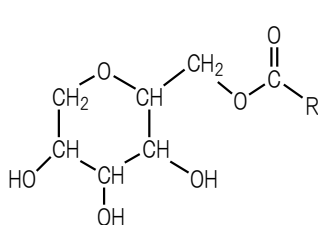
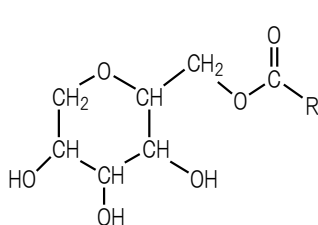
Product Name	Appearance	Chemical Name	Structural Formula	Cloud Point (°C)	HLB	Freezing Point (°C)		
NONION L-2	Light Yellow Liquid	Polyoxyethylene -monolaurate		—	10.0	-3~10		
NONION L-4	Clear~Light Yellow Liquid			40~50	13.3	Approx.10		
NONION S-2	White~Light Yellow Solid	Polyoxyethylene -monostearate		—	8.0	33~41		
NONION S-4				—	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				—	13.6	Approx.40		
NONION S-15.4	White~Light Yellow Solid			100 ↑	16.8	40~45		
NONION S-15.4V				100 ↑	18.3	Approx.50		
NONION S-40	White Flake			100 ↑	18.3	Approx.50		
NONION O-2	Yellow~Yellowish Dark Brown Liquid			Polyoxyethylene -monooleate		—	8.3	-20 ↓ (Pour Point)
NONION O-3						—	10.2	Approx.-8
NONION O-4	Yellow~Dark Brown Viscous Liquid	—	11.6			Approx.-5		
NONION O-6		40~50	13.5			Approx.13		

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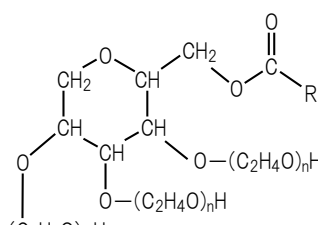
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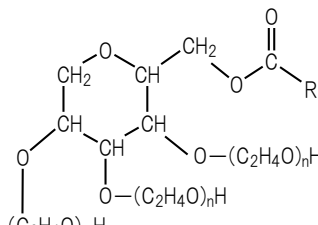
### 5. 3. 4 Sorbitan derivatives

Product Name	Appearance	Chemical Name	Structural Formula	HLB	Freezing Point (°C)	
NONION CP-08R	Yellow~Brown Viscous Liquid	Sorbitan mono -caprylate	 <p>(Structural formula is monoester)</p>	9.6	0 ↓	
NONION CP-08R (Food Additive)						
NONION LP-20R	Light Yellow Viscous Liquid	Sorbitan mono -laurate		 <p>(Structural formula is monoester)</p>	8.6	Approx.16
NONION LP-20R (Food Additive)						
NONION MP-30R ※Under development	Yellow Solid	Sorbitan mono -myristate			—	Approx.33
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 ↓	

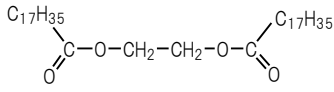
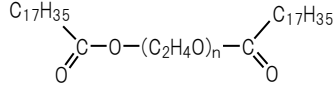
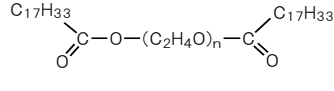
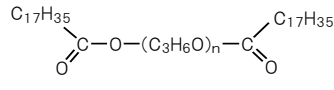
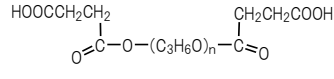
### 15. 3. 5 Polyoxyethylene sorbitan derivatives

Product Name	Appearance	Chemical Name	Structural Formula	HLB	Freezing Point (°C)
NONION LT-221	Yellow~Dark Brown Viscous Liquid	Polyoxyethylene -sorbitan mono -laurate		16.7	Approx.-5
NONION ST-221	Light Yellow~Yellow Paste~Solid	Polyoxyethylene -sorbitan mono -stearate		15.7	Approx.25
NONION OT-221	Light Yellow~Yellow Liquid	Polyoxyethylene -sorbitan mono -oleate		15.7	Approx.-10

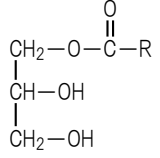
### 15. 3. 6 Polyoxyethylene sorbitan derivatives (Food additive)

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

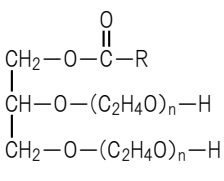
### 15. 3. 7 Diester type

Product Name	Appearance	Chemical Name	Structural Formula	HLB	Freezing Point (°C)
UNISTER®E-275	Light Yellow Solid	Ethylene glycol -distearate		—	Approx.63 (Melting Point)
NONION DS-60HN	Light Yellow Flake	Polyethylene glycol -distearate		19.0	Approx.60 (Melting Point)
NONION DO-4	Yellow~Dark Brown Liquid	Polyethylene glycol -dioleate		8.6	25 ↓
NONION DO-6				10.6	
UNISAFE NKL-9520	Clear~Light Yellow Liquid	Polypropylene glycol -distearate		—	-10
UNISAFE NUL-6589 ※Manufactured-by-Order		Polypropylene glycol -disuccinate		—	-5 ↓

### 15. 3. 8 Monoglyceride type

Product Name	Appearance	Chemical Name	Structural Formula	HLB	Freezing Point (°C)
MONOGLY D	White Powder	Glycerol mono stearate (Distilled grade)		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)

### 15. 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		13.0	Approx.-1.5
UNIGLY®MK-230	Light Yellow Liquid			17.4	Approx.12
UNIGLY®MK-278 ※Small-lot production	White~Light Yellow Solid			18.9	Approx.40

### 15. 3. 10 Polyoxyethylene glyceride type

Product Name	Appearance	Chemical Name	Structural Formula	HLB	Freezing Point (°C)
UNIOX <sup>®</sup> HC-8	Light Yellow Liquid		$\begin{array}{c} \text{O} \qquad \text{O}-(\text{C}_2\text{H}_4\text{O})_n\text{H} \\ \parallel \qquad   \\ \text{H}_2\text{C}-\text{O}-(\text{C}_2\text{H}_4\text{O})_n-\text{C}-\text{(CH}_2\text{)}_{10}\text{CH}(\text{CH}_2)_5\text{CH}_3 \end{array}$	5.5	Approx.6
UNIOX <sup>®</sup> HC-40	Waxy Solid	Polyoxyethylene -hydrogenated -castor oil	$\begin{array}{c} \text{O} \qquad \text{O}-(\text{C}_2\text{H}_4\text{O})_n\text{H} \\ \parallel \qquad   \\ \text{HC}-\text{O}-(\text{C}_2\text{H}_4\text{O})_n-\text{C}-\text{(CH}_2\text{)}_{10}\text{CH}(\text{CH}_2)_5\text{CH}_3 \end{array}$	13.3	Approx.25
UNIOX <sup>®</sup> HC-60			$\begin{array}{c} \text{O} \qquad \text{O}-(\text{C}_2\text{H}_4\text{O})_n\text{H} \\ \parallel \qquad   \\ \text{H}_2\text{C}-\text{O}-(\text{C}_2\text{H}_4\text{O})_n-\text{C}-\text{(CH}_2\text{)}_{10}\text{CH}(\text{CH}_2)_5\text{CH}_3 \end{array}$	15.0	30~35
UNIOX <sup>®</sup> GT-20IS	Light Yellow Liquid	Triisostearic acid -polyoxyethylene -glyceryl	$\begin{array}{c} \text{O} \qquad \text{O} \qquad \text{O} \\ \parallel \qquad \parallel \qquad \parallel \\ \text{H}_2\text{C}-\text{O}-(\text{C}_2\text{H}_4\text{O})_n-\text{C}-\text{R} \\   \\ \text{HC}-\text{O}-(\text{C}_2\text{H}_4\text{O})_n-\text{C}-\text{R} \\   \\ \text{H}_2\text{C}-\text{O}-(\text{C}_2\text{H}_4\text{O})_n-\text{C}-\text{R} \end{array}$	10.4	0 ↓

### 15. 3. 11 Sorbitol derivatives

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

### 15. 3. 12 Polyglycerin alkyl ester type

Product Name	Appearance	Chemical Name	Structural Formula	HLB	Freezing Point (°C)
UNIGLY <sup>®</sup> GO-102R	Light Yellow Liquid	Polyglycerin -oleate ester	$\text{C}_{17}\text{H}_{33}-\text{C}(=\text{O})-\text{O}-(\text{CH}_2\text{CH}(\text{CH}_2\text{O})_n-\text{H})$	8.8	—
UNIGLY <sup>®</sup> GO-106 ※Manufactured-by-Order			$\text{C}_{17}\text{H}_{33}-\text{C}(=\text{O})-\text{O}-(\text{CH}_2\text{CH}(\text{CH}_2\text{O})_n-\text{H})$	10.5	—
UNIGLY <sup>®</sup> GL-106		Polyglycerin -laurate ester	$\text{C}_{11}\text{H}_{23}-\text{C}(=\text{O})-\text{O}-(\text{CH}_2\text{CH}(\text{CH}_2\text{O})_n-\text{H})$	14.5	Approx.-9
UNIGLY <sup>®</sup> GS-106	Light Yellow Solid	Polyglycerin -stearate ester	$\text{C}_{17}\text{H}_{35}-\text{C}(=\text{O})-\text{O}-(\text{CH}_2\text{CH}(\text{CH}_2\text{O})_n-\text{H})$	11.4	Approx.60

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### 15. 3. 13 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	Amines, coco, alkyl, -ethoxylated	$C_{12}H_{25}-N \begin{cases} CH_2CH_2OH \\ H \end{cases}$	0 ↓	3.8	Approx.10
NYMEEN®L-202		Ethanol, 2,2'-(dodecylimino)bis	$C_{12}H_{25}-N \begin{cases} (C_2H_4O)_n-H \\ (C_2H_4O)_n-H \end{cases}$	0 ↓	6.4	Approx.15 (Pour Point)
NYMEEN®L-207		Polyoxyethylene-lauryl amine	$C_{12}H_{25}-N \begin{cases} (C_2H_4O)_n-H \\ (C_2H_4O)_n-H \end{cases}$	80 ↑	12.5	Approx.-5
NYMEEN®L-703 ※Small-hot production		Polyoxyethylene-polyoxypropylene-lauryl amine	$C_{12}H_{25}-N \begin{cases} (C_2H_4O)_m(C_3H_6O)_n-H \\ (C_2H_4O)_m(C_3H_6O)_n-H \end{cases}$	—	9.2	-30 ↓
NYMEEN®F-202	Yellow~Dark Brown Liquid	Polyoxyethylene-coco alkyl amine	$R-N \begin{cases} (C_2H_4O)_n-H \\ (C_2H_4O)_n-H \end{cases}$	0 ↓	6.1	Approx.0
NYMEEN®F-215				100 ↑	15.4	5 ↓
NYMEEN®S-202	Yellow~Dark Brown Solid	Polyoxyethylene-stearyl amine	$C_{18}H_{37}-N \begin{cases} (C_2H_4O)_n-H \\ (C_2H_4O)_n-H \end{cases}$	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				90 ↑	14.5	Approx.2
NYMEEN®S-220				100 ↑	15.4	Approx.5
NYMEEN®O-205				Yellow~Dark Brown Liquid	Polyoxyethylene-oleyl amine	$C_{18}H_{35}-N \begin{cases} (C_2H_4O)_n-H \\ (C_2H_4O)_n-H \end{cases}$
NYMEEN®T2-202	Yellow~Dark Brown Solid	Polyoxyethylene-tallow alkyl amine	$R-N \begin{cases} (C_2H_4O)_n-H \\ (C_2H_4O)_n-H \end{cases}$	0 ↓	5.0	Approx.25
NYMEEN®T2-210	Light Yellow~Dark Brown Liquid			95 ↑	12.5	0 ↓
NYMEEN®T2-230				100 ↑	16.7	Approx.20
NYMEEN®DT-203	Dark Brown Liquid	Polyoxyethylene-alkyl propylene-diamine	$R-N-C_3H_6-N \begin{cases} (C_2H_4O)_n-H \\ (C_2H_4O)_n-H \end{cases}$ $(C_2H_4O)_n-H$	0 ↓	6.0	Approx.15
NYMEEN®DT-208				100 ↑	10.7	Approx.5

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### 15. 3. 14 Alkanol amide type

Product Name	Appearance	Chemical Name	Structural Formula	Freezing Point (°C)
STAFOAM <sup>®</sup> F	Yellow Viscous Liquid	Coconut fatty acid -diethanolamide (1:2 type)		-10
STAFOAM <sup>®</sup> T	Dark Brown Viscous Liquid	Tallow fatty acid -diethanolamide (1:2 type)		25 (Pour Point)
STAFOAM <sup>®</sup> FK	Yellow Viscous Liquid	Mixture of anionic and nonionic surfactant	—	—
STAFOAM <sup>®</sup> DL	Light Yellow Solid	Lauric acid diethanolamide		40~47 (Pour Point)
STAFOAM <sup>®</sup> DF-1	Light Yellow Viscous Liquid	Coconut fatty acid -diethanol amide		-4~-7
STAFOAM <sup>®</sup> DF-2				Approx.-5
STAFOAM <sup>®</sup> DF-4	Light Yellow~Yellowish Dark Brown Liquid (Solid in winter)		DF-1: R=C <sub>12</sub> (Approx.60%) DF-2: R=C <sub>12</sub> (Approx.50%) DF-4: R=C <sub>12</sub> (Approx.70%) DFC : R=C <sub>12</sub> (Approx.50%)	12.9
STAFOAM <sup>®</sup> DFC	Light Yellow Viscous Liquid	Coconut fatty acid -diethanol amide (Containing glycerin)		Approx.-7
STAFOAM <sup>®</sup> DO	Yellow Viscous Liquid	Oleic acid diethanolamide		Approx.6
STAFOAM <sup>®</sup> DOS				
STAFOAM <sup>®</sup> MF PELLET	Light Yellow Pellet	Coconut fatty acid -monoethanolamide		65~75 (Pour Point)
STAFOAM <sup>®</sup> LIPA	Light Yellow Waxy Solid	Lauric acid -monoisopropanolamide		Approx.60 (Pour Point)

### 15. 3. 15 Polyoxyethylene alkanol amide type

Product Name	Appearance	Chemical Name	Structural Formula	Freezing Point (°C)
NYMID <sup>®</sup> MF-203	White~Light Yellow Solid	Polyoxyethylene fatty acid -monoethanolamide		Approx.23
NYMID <sup>®</sup> MF-210				Approx.25
NYMID <sup>®</sup> MT-215				40

### 15. 3. 16 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	$C_{12}H_{25}-N \begin{matrix} \nearrow CH_3 \\ \searrow CH_3 \end{matrix} \rightarrow O$	35	-1
UNISAFE A-SM ※Manufactured-by-Order	White~Light Yellow Paster	Stearyl dimethylamine -oxide solution	$C_{18}H_{37}-N \begin{matrix} \nearrow CH_3 \\ \searrow CH_3 \end{matrix} \rightarrow O$	35	Approx.25
UNISAFE A-LE	Light Yellow Turbid Liquid	Dihydroxyethyl -laurylamine oxide solution	$C_{12}H_{25}-N \begin{matrix} \nearrow CH_2CH_2OH \\ \searrow CH_2CH_2OH \end{matrix} \rightarrow O$	40	Approx.-4
UNISAFE WHS-10	Light Yellow Liquid	Dihydroxyethyl -laurylamine oxide solution (Mixed with surfactant)	—	10	—

### 15. 3. 17 Polyoxyethylene polypropylene glycol

Product Name	Appearance	Chemical Name/Structural Formula	Cloud Point (°C)	EO (wt%)	Average Molecular Weight	Freezing Point (°C)	
PLONON® #102	Clear~Light Yellow Liquid	Polyethyleneglycol-polypropyleneglycol -polyethyleneglycol (Block copolymer type) $HO-(C_2H_4O)_n-(C_3H_6O)_m-(C_2H_4O)_n-H$	28	20	1,250	-20 ↓	
PLONON® #104			62	40	1,670	5 (Pour Point)	
PLONON® #201			20	10	2,220	-10 ↓	
PLONON® #202B			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
UNILUBE® 70DP-600B	White~Light Yellow Flake			100 ↑	70	10,000	Approx.56
UNILUBE® 70DP-950B				100 ↑	70	13,000	Approx.55



## 15. 4 AMPHOTERIC SURFACTANT

Product Name	Appearance	Chemical Name	Structural Formula	Ash (%)	Active Component (%)
NISSAN ANON <sup>®</sup> BF	Light Yellow Liquid	Betaines, coco alkyldimethyl		9 ↓	Approx.25
NISSAN ANON <sup>®</sup> BL	Light Yellow Liquid	1-Dodecanaminium, -N-(carboxymethyl)-N,N-dimethyl-, inner salt		6 ↓	33.5 ~38.5
NISSAN ANON <sup>®</sup> BL-SF				2 ↓	33.5 ~37.5
NISSAN ANON <sup>®</sup> BDF-R	Light Yellow Liquid	1-Propanaminium,3-amino -N-(carboxymethyl)-N,N-dimethyl-N-coco acyl derivs -hydroxides, inner salts		8 ↓	Approx.30
NISSAN ANON <sup>®</sup> BDF-SF				2 ↓	Approx.30
NISSAN ANON <sup>®</sup> BDC-SF	Clear~Light Yellow Liquid	1-Propanaminium, -N-(carboxymethyl)-N,N-dimethyl-3-[(1-oxododecyl)-amino]-, inner salt		1.5 ↓	Approx.30
NISSAN ANON <sup>®</sup> BDL-SF	Light Yellow Liquid	1-Propanaminium, -N-(carboxymethyl)-N,N-dimethyl-3-[(1-oxododecyl)-amino]-, inner salt		1.5 ↓	Approx.30
NISSAN ANON <sup>®</sup> LG-R	Light Yellow Viscous Liquid (Turbid upper 20°C)	Glycine, -N-[2-[[2-(dodecylamino)-ethyl]amino]ethyl]-ethano	$C_{12}H_{25}-(NHC_2H_4)_2-NH-CH_2COONa$	—	30~32
NISSAN ANON <sup>®</sup> GLM-R	Yellow Liquid	Lmidazolium compounds, 1-(carboxymethyl)-4,5-dihydro-1-(hydroxyethyl)-2-norcoco alkyl, hydroxides, -inner salts		8~10	Approx.30
NISSAN ANON <sup>®</sup> GLM-R-LV				5.5 ~6.5	Approx.30
NISSAN ANON <sup>®</sup> LA	Light Yellow Liquid (Turbid under 20°C)	Sodium laurylamino -diacetate		1.5 ↓	25~31
NISSAN ANON <sup>®</sup> LA POWDER	White~Light Yellow Powder			5~7	Approx.90

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## 15.5 POLYMER SURFACTANT

### 15.5.1 Polymer surfactant (1)

Product Name	Appearance	Chemical Name	Solubility in water	Viscosity (25°C) (mm <sup>2</sup> /s)	Active Component (%)
POLYSTER <sup>®</sup> OMP ※Manufactured-by-Order	White Powder	Sodium salts of high molecular weight polycarbonates	◎	—	100
POLYSTER <sup>®</sup> OM	Light Yellow Clear or Cloudy Liquid	Sodium salts of high molecular weight polycarbonates (Aqueous solution)	◎	50 (20°C)	Approx.25
POLYSTER <sup>®</sup> OMR	Light Yellow Clear Liquid		◎	50 (20°C)	
POLYSTER <sup>®</sup> A-1060	Light Yellow Liquid		◎	—	Approx.43
POLYSTER <sup>®</sup> OMA	Light Yellow Clear or Cloudy Liquid	Ammonium salts of high molecular weight polycarbonates (Aqueous solution)	◎	90	Approx.21
MALIALIM <sup>®</sup> HKM-50A	Yellow~Dark Brown		◎	350	Approx.50
MALIALIM <sup>®</sup> HKM-150A	Viscous Liquid		◎	200	Approx.50
FILLANOL <sup>®</sup> PA-075F	Light Yellow~Dark Brown Liquid	Amine functional polymer	○	500~700	100
FILLANOL <sup>®</sup> PA-085C			△	400~600	100
FILLANOL <sup>®</sup> PA-107P			×	1,600~1,800	100
ESLEAM <sup>®</sup> AD-3172M	Light Yellow~Yellow Liquid	Amine functional polymer	○	Approx.600	100
ESLEAM <sup>®</sup> AD-374M			△	Approx.500	100
ESLEAM <sup>®</sup> AD-508E			×	Approx.1700	100

### 15.5.2 Polymer surfactant (2)

Product Name	Appearance	Chemical Name	Solubility in water	Viscosity (100°C) (mm <sup>2</sup> /s)	Active Component (%)
MALIALIM <sup>®</sup> AKM-1511-60	Yellow~Dark Brown Liquid	High molecular weight Polycarbonates (Aqueous solution)	◎	350 (25°C)	Approx.60
MALIALIM <sup>®</sup> AKM-0531	Yellow~Dark Brown Viscous Liquid	High molecular weight polycarbonates	◎	200	100
MALIALIM <sup>®</sup> AFB-1521			△	300	100
MALIALIM <sup>®</sup> AAB-0851			×	300	100
MALIALIM <sup>®</sup> AWS-0851	500			100	
MALIALIM <sup>®</sup> SC-0505K	Redish Liquid		◎	60	100
MALIALIM <sup>®</sup> SC-1015F	Yellow~Dark Brown Viscous Liquid		△	120	100
MALIALIM <sup>®</sup> SC-0708A ※Under development			×	120	100

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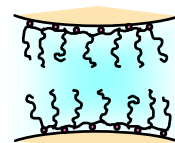
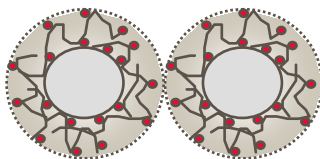
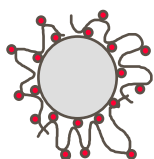
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15. 5. 3 Applications of dispersant (Ceramics & Metals)

Solubility	Molecular weight	Adsorption part	Powders Systems Particle size	Ceramics (Oxide·Nitride)				Ceramics (Carbide·Carbon material)				Metals (Ni:○ Ag:◇ Al:□)				
				Aqueous		Solvent		Aqueous		Solvent		Aqueous		Solvent		
				1 μm		1 μm		1 μm		1 μm		1 μm		1 μm		
				↓	↑	↓	↑	↓	↑	↓	↑	↓	↑	↓	↑	
Water-soluble	Low	Base	ESLEAM <sup>®</sup> EF-T	○	○			○	○			○◇□	○◇□			
		Acid	MALIALIM <sup>®</sup> SC-0505K	●	○	●	○					○◇□	○◇□	○◇□	○◇□	
	Middle	Base	ESLEAM <sup>®</sup> AD-3172M	○	○	○	○					○◇□	○◇□	○◇□	○◇□	
		Base	FILLANOL <sup>®</sup> PA-075F					○	○	○	○					
	Middle	Acid	MALIALIM <sup>®</sup> AKM-0531	○	●	○	●					○◇□	○◇□	○◇□	○◇□	
		Base	MALIALIM <sup>®</sup> HKM-50A	○	●			○	○			○◇□	○◇□			
			MALIALIM <sup>®</sup> HKM-150A	○	●			○	○			○◇□	○◇□			
			POLYSTER <sup>®</sup> OMA	○	●			○	○			○◇□	○◇□			
	Non-water-soluble	Low	Acid	ESLEAM <sup>®</sup> 221P											●◇□	●◇□
			Base	ESLEAM <sup>®</sup> DP-2 ※Under development											○◇□	○◇□
NYMEEN <sup>®</sup> L-201														○◇□	○◇□	
NYMEEN <sup>®</sup> L-202														○◇□	○◇□	
Middle		Acid	MALIALIM <sup>®</sup> SC-1015F			●	○							○◇■	○◇□	
			MALIALIM <sup>®</sup> SC-0708A ※Under development			○	○							●◇□	○◇□	
		Base	ESLEAM <sup>®</sup> AD-374M			○	●							○◇□	○◇□	
			ESLEAM <sup>®</sup> AD-508E			○	●							○◇□	○◇□	
			FILLANOL <sup>®</sup> PA-085C							○	○					
			FILLANOL <sup>®</sup> PA-107P							○	○					
Hight		Acid	MALIALIM <sup>®</sup> AFB-1521			○	●							○◇□	○◇□	
			MALIALIM <sup>®</sup> AAB-0851			○	●							○◇□	○◇□	
			MALIALIM <sup>®</sup> AWS-0851			○	○							○◇□	●◇□	

●◇■: Excellent



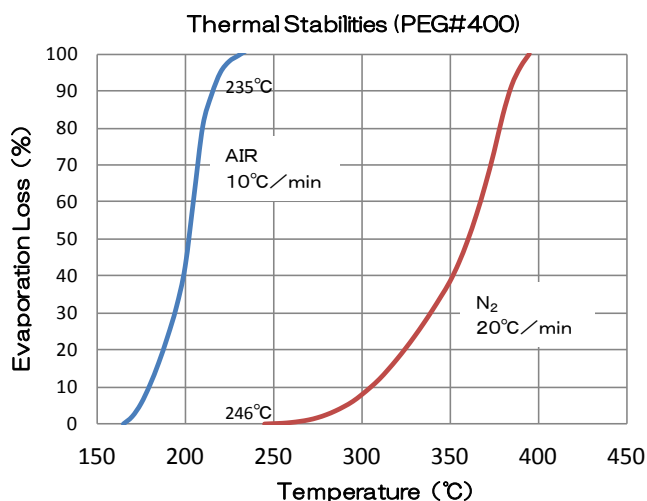
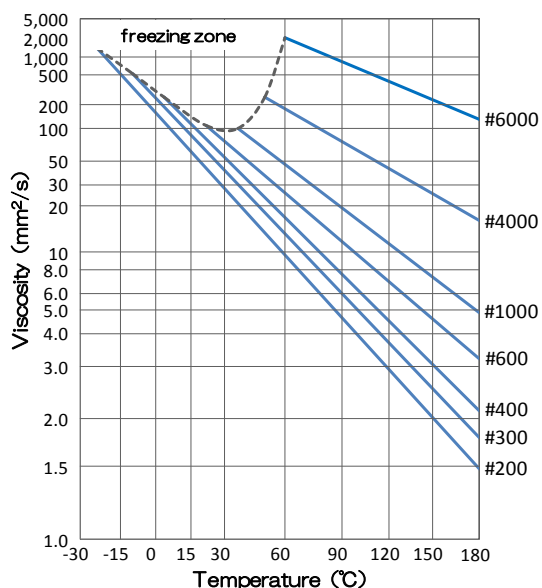
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## 16.POLYETHER

### 16.1 POLYETHYLENE GLYCOL

Product Name	Appearance	Chemical Name/ Structural Formula	Average Molecular Weight	Viscosity (100°C) (mm <sup>2</sup> /s)	Freezing Point (°C)			
PEG#200T	Clear~Light Yellow Liquid	Polyethyleneglycol (DEG:0.3% ↓)  Polyethyleneglycol HO-(C <sub>2</sub> H <sub>4</sub> O) <sub>n</sub> -H	200	3.8~4.8	-45 ↓			
PEG#200	Clear~Light Yellow Liquid		200	3.6~4.6	-45 ↓			
PEG#300			300	5.0~6.2	-8 ↓			
PEG#400			400	6.0~8.0	6			
PEG#600			600	10.0~12.0	20			
PEG#1000			1,000	17.0~20.0	40			
PEG#1500	White~Light Yellow Solid		PEG#300、1540 (Mixture)	13.0~18.0	38			
PEG#1540			1,540	25.0~32.0	45			
PEG#2000			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		8,800	700~900	60			
PEG#6000	White~Light Yellow Flake							
PEG#6000P	White~Light Yellow Powder							
PEG#11000	White~Light Yellow Flake					11,000	1,000~1,750	58
PEG#20000						20,000	10,000~15,000	65



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## 16.2 SPECIAL POLYETHYLENE GLYCOL

Product Name	Appearance	Chemical Name	Structural Formula	Average Molecular Weight	Freezing Point (°C)
UNIOX <sup>®</sup> M-400	Clear~Light Yellow Liquid	Polyethyleneglycol -monomethyl ether	$\text{CH}_3\text{-O-(C}_2\text{H}_4\text{O)}_n\text{-H}$	400	0 ↓
UNIOX <sup>®</sup> M-550				550	15~20
UNIOX <sup>®</sup> M-1000	White~Light Yellow Solid			1,000	Approx.40
UNIOX <sup>®</sup> M-2000	White~Light Yellow Flake			2,000	Approx.50
UNIOX <sup>®</sup> M-2500 ※Small-lot production	White~Light Yellow Flake			2,500	Approx.53
UNIOX <sup>®</sup> M-3000 ※Manufactured-by-Order	White~Light Yellow Solid			3,000	Approx.55
UNIOX <sup>®</sup> M-4000	White~Light Yellow Solid			4,000	Approx.55
UNIOX <sup>®</sup> MM-400	Clear~Light Yellow Liquid	Polyethyleneglycol -dimethyl ether	$\text{CH}_3\text{-O-(C}_2\text{H}_4\text{O)}_n\text{-CH}_3$	400	Approx.5

## 16.3 GLYCERYL POLYETHYLENE GLYCOL

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

## 16.4 POLYPROPYLENE GLYCOL

Product Name	Appearance	Chemical Name	Structural Formula	Solubility in water	Average Molecular Weight	Pour Point (°C)
UNIOL <sup>®</sup> D-200 ※	Clear~Light Yellow Liquid	Polypropyleneglycol (Diol type)	HO-(C <sub>3</sub> H <sub>6</sub> O) <sub>n</sub> -H	⊙	200	-30 ↓
UNIOL <sup>®</sup> D-250				⊙	250	-30 ↓
UNIOL <sup>®</sup> D-400				⊙	400	-30 ↓
UNIOL <sup>®</sup> D-700				○	700	-40
UNIOL <sup>®</sup> D-1000				×	1,000	-30 ↓
UNIOL <sup>®</sup> D-1200				×	1,200	-30 ↓
UNIOL <sup>®</sup> D-2000				×	2,000	-30 ↓
UNIOL <sup>®</sup> D-4000				×	4,000	-20 ↓

※Manufactured-by-Order

## 16.5 GLYCERYL POLYPROPYLENE GLYCOL

Product Name	Appearance	Chemical Name	Structural Formula	Solubility in water	Average Molecular Weight	Pour Point (°C)
UNIOL <sup>®</sup> TG-330	Clear~Light Yellow Liquid	Polypropyleneglycol -glyceryl ether (Triol type)	$\begin{array}{c} \text{H}_2\text{C}-\text{O}-(\text{C}_3\text{H}_6\text{O})_l-\text{H} \\   \\ \text{HC}-\text{O}-(\text{C}_3\text{H}_6\text{O})_m-\text{H} \\   \\ \text{H}_2\text{C}-\text{O}-(\text{C}_3\text{H}_6\text{O})_n-\text{H} \end{array}$	⊙	330	-25 ↓
UNIOL <sup>®</sup> TG-1000				×	1,000	-25 ↓
UNIOL <sup>®</sup> TG-3000				×	3,000	-30 ↓
UNIOL <sup>®</sup> TG-4000				×	4,000	-25 ↓

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## 16.6 DIGLYCERYL POLYPROPYLENE GLYCOL

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

## 16.7 SORBITOL POLYPROPYLENE GLYCOL

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

## 16.8 POLYBUTYLENE GLYCOL

Product Name	Appearance	Chemical Name	Structural Formula	Average Molecular Weight	Pour Point (°C)
UNIOL <sup>®</sup> PB-500	Clear~Light Yellow Liquid	Polybutyleneglycol	HO-(C <sub>4</sub> H <sub>8</sub> O) <sub>n</sub> -H	500	0 ↓ (Freezing Point)
UNIOL <sup>®</sup> PB-700				700	-40 ↓
UNIOL <sup>®</sup> PB-1000 ※Under development				1,000	-40 ↓
UNIOL <sup>®</sup> PB-2000 ※Under development				2,000	-20 ↓
UNIOL <sup>®</sup> PB-4800 ※Under development				4,800	-20 ↓

## 16. 9 POLYETHYLENE POLYPROPYLENE GLYCOL

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

## 16. 10 TETRAMETHYLENE GLYCOL DERIVATIVES

Product Name	Appearance	Chemical Name/Structural Formula	THF (wt%)	Average Molecular Weight	Freezing Point (°C)
POLYGERIN® DC-1100	Clear~Light Yellow Liquid	Polyoxytetramethylen-polyoxyethyleneglycol  HO-[ (C <sub>4</sub> H <sub>8</sub> O) <sub>m</sub> -(C <sub>2</sub> H <sub>4</sub> O) <sub>n</sub> ]-H  * [ ]:Random addition	35	1,000	0 ↓
POLYGERIN® DC-1800E			50	1,800	-10 ↓
POLYGERIN® 60DC-1800E ※Small-lot production			40	1,800	-10 ↓
POLYGERIN® DC-3000E			50	3,000	-10 ↓
POLYGERIN® DCB-1000	Clear~Light Yellow Liquid	Polyoxytetramethylen-polyoxypropyleneglycol  HO-[ (C <sub>4</sub> H <sub>8</sub> O) <sub>m</sub> -(C <sub>3</sub> H <sub>6</sub> O) <sub>n</sub> ]-H  * [ ]:Random addition	45	1,000	0 ↓
POLYGERIN® DCB-2000			60	2,000	0 ↓
POLYGERIN® DCB-4000 ※Manufactured-by-Order			65	4,000	0 ↓
POLYGERIN® TPBC-3030 ※Small-lot production	Clear~Light Yellow Liquid	Trimethylolpropane tris polyoxytetramethylen -polyoxypropyleneglycol ether  C <sub>2</sub> H <sub>5</sub> C-[ CH <sub>2</sub> O-(C <sub>4</sub> H <sub>8</sub> O) <sub>m</sub> -(C <sub>2</sub> H <sub>4</sub> O) <sub>n</sub> -H ] <sub>3</sub>  * [ ]:Random addition	—	3,000	0 ↓

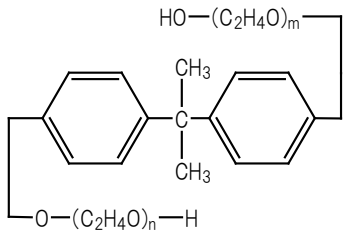
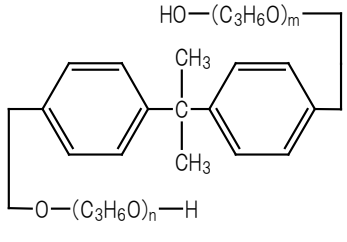
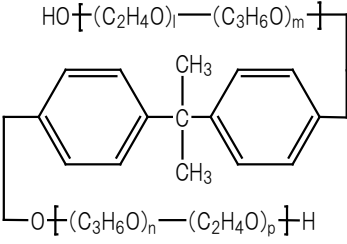
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## 16. 11 BISPHENOL A DERIVATIVES

Product Name	Appearance	Chemical Name	Structural Formula	Average Molecular Weight	Freezing Point (°C)
UNIOL <sup>®</sup> DA-400	Liquid	Polyoxyethylene -bisphenol A ether		400	-10 ↓
UNIOL <sup>®</sup> DA-700				660	0 ↓
UNIOL <sup>®</sup> DB-400	Viscous Liquid	Polyoxypropylene -bisphenol A ether		400	20 (Pour Point)
UNILUBE <sup>®</sup> 50DB-22	Liquid	Polyoxyethylene -polyoxypropylene -bisphenol A ether	 <p style="text-align: center;">* [ ]: Random addition</p>	750	-10 ↓

## 16. 12 POLYALKYLENE GLYCOL DERIVATIVES (water-soluble type) (1)

Product Name	Appearance	Viscosity (mm <sup>2</sup> /s)			Viscosity index	Average Molecular Weight	Pour Point (°C)
		20°C	40°C	100°C			
UNILUBE <sup>®</sup> 50MB-2	Clear~Light Yellow Liquid	15	7.6	2.1	49	200	-65
UNILUBE <sup>®</sup> 50MB-5		40	19.7	4.7	171	500	-52.5
UNILUBE <sup>®</sup> 50MB-11		115	50.7	10.8	211	1,000	-45
UNILUBE <sup>®</sup> 50MB-26		310	134	25.7	228	2,000	-35
UNILUBE <sup>®</sup> 50MB-72		960	397	71.6	258	3,000	-32.5
UNILUBE <sup>®</sup> 50MB-168		2,700	945	160	—	4,000	-30
UNILUBE <sup>®</sup> 60MB-2B ※Manufactured-by-Order	Clear~Light Yellow Liquid	10	—	1.5	—	220	-40 ↓
UNILUBE <sup>®</sup> 60MB-16I		178	78.3	16.1	220	1,300	-40 ↓
UNILUBE <sup>®</sup> 60MB-26I		329	130	25.6	236	1,700	-40 ↓
UNILUBE <sup>®</sup> 25DE-60	Clear~Light Yellow Liquid	910	332	55.3	235	3,500	-40 ↓
UNILUBE <sup>®</sup> 50DE-25	Clear~Light Yellow Liquid	340	129	24.5	224	1,750	-45
UNILUBE <sup>®</sup> 75DE-15	Clear~Light Yellow Liquid	242	90.5	15.7	186	1,100	-5.5
UNILUBE <sup>®</sup> 75DE-25		332	126	22.0	203	1,400	-15
UNILUBE <sup>®</sup> 75DE-60		945	340	59.7	238	3,000	-2.5
UNILUBE <sup>®</sup> 75DE-170		2,850	1,050	160	—	5,000	0
UNILUBE <sup>®</sup> 75DE-250		—	1,421	219	—	6,200	0
UNILUBE <sup>®</sup> 75DE-2620		Light Yellow Viscous Liquid	—	17,300	2,540	—	13,000
UNILUBE <sup>®</sup> 75DE-3800	—		24,940	3,730	—	15,000	5
UNILUBE <sup>®</sup> 75DE-5000	—		—	5,000	—	18,500	Approx.12
UNILUBE <sup>®</sup> 80DE-40U	Clear Liquid	—	213	40.0	241	2,000	20 (Melting Point)

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**16. 12 POLYALKYLENE GLYCOL DERIVATIVES (water-soluble type) (2)**

Product Name	Appearance	Viscosity (mm <sup>2</sup> /s)			Viscosity index	Average Molecular Weight	Pour Point (°C)
		20°C	40°C	100°C			
UNILUBE <sup>®</sup> 15TY-260KB	Clear~Light Yellow Liquid	735	236	33.7	190	3,000	-30
UNILUBE <sup>®</sup> 25TG-55	Clear~Light Yellow Liquid	1,300	350	54.1	218	4,550	-17.5
UNILUBE <sup>®</sup> 50TG-18	Clear~Light Yellow Liquid	348	120	18.7	175	1,500	-40 ↓
UNILUBE <sup>®</sup> 50TG-32		545	178	29.7	209	2,800	-40
UNISAFE AX-22 (Antioxidant type)	Dark Brown~Reddish Dark Brown Liquid	1,640	340	21.7	74	—	-10 ↓

**16. 13 POLYALKYLENE GLYCOL DERIVATIVES (non-water-soluble type)**

Product Name	Appearance	Viscosity (mm <sup>2</sup> /s)			Viscosity index	Average Molecular Weight	Pour Point (°C)
		20°C	40°C	100°C			
UNILUBE <sup>®</sup> MB-7	Clear~Light Yellow Liquid	72.0	32.8	6.8	168	700	-47.5
UNILUBE <sup>®</sup> MB-11		135	56.1	10.8	187	1,000	-42.5
UNILUBE <sup>®</sup> MB-14		173	73.4	13.8	195	1,200	-40
UNILUBE <sup>®</sup> MB-19		236	105	18.9	202	1,300	-35
UNILUBE <sup>®</sup> MB-22		297	125	21.8	203	1,400	-32.5
UNILUBE <sup>®</sup> MB-38		561	227	36.6	212	1,900	-30
UNILUBE <sup>®</sup> MB-370		894	330	53.6	229	2,300	-25
UNILUBE <sup>®</sup> MB-700		1,788	616	96.7	250	3,000	-22.5
UNILUBE <sup>®</sup> MB-7X (Antioxidant type)	Redish Liquid	85.0	34.8	6.8	155	700	-35 ↓
UNILUBE <sup>®</sup> MB-11X (Antioxidant type)		160	60.1	11.0	178	1,000	-40 ↓
UNILUBE <sup>®</sup> 10MB-250KB	Clear~Light Yellow Liquid	604	222	37.8	222	2,000	-40 ↓

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## 16. 14 ALLYLPOLYETHERS

Product Name	Appearance	Chemical Name	Structural Formula	Average Molecular Weight	EO/PO Mol Ratio
UNIOX <sup>®</sup> PKA-5001	Clear~Light Yellow Liquid	Polyethyleneglycol -allylether	$H_2C=CH-CH_2-O-(C_2H_4O)_n-H$	200	100/0
UNIOX <sup>®</sup> PKA-5002✳				400	100/0
UNIOX <sup>®</sup> PKA-5003				450	100/0
UNIOX <sup>®</sup> PKA-5004				750	100/0
UNIOX <sup>®</sup> PKA-5005				1,500	100/0
UNIOX <sup>®</sup> PKA-5006	Clear~Light Yellow Liquid	Methoxy -polyethyleneglycol -allylether	$H_2C=CH-CH_2-O-(C_2H_4O)_n-CH_3$	350	100/0
UNIOX <sup>®</sup> PKA-5007				400	100/0
UNIOX <sup>®</sup> PKA-5008				450	100/0
UNIOX <sup>®</sup> PKA-5009				550	100/0
UNIOX <sup>®</sup> PKA-5010	White~Light Yellow Solid			1,500	100/0
UNISAFE PKA-5011✳	Clear~Light Yellow Liquid	Polyethyleneglycol -polypropylene -glycol allylether	$H_2C=CH-CH_2-O-[(C_2H_4O)_m-(C_3H_6O)_n]-H$ * [ ]:Random addition	750	75/25
UNISAFE PKA-5012✳				2,000	75/25
UNILUBE <sup>®</sup> PKA-5013				2,000	50/50
UNISAFE PKA-5014TF		Plypropyleneglycol -allylether	$H_2C=CH-CH_2-O-(C_3H_6O)_n-H$	1,500	0/100
UNISAFE PKA-5015		Butoxy -polyethyleneglycol -polypropylene -glycol allylether	$H_2C=CH-CH_2-O-[(C_2H_4O)_m-(C_3H_6O)_n]-C_4H_9$ * [ ]:Random addition	1,600	75/25
UNISAFE PKA-5016				1,600	50/50
UNISAFE PKA-5017✳				2,500	50/50
UNISAFE PKA-5018✳		Polypropylene -glycol diallylether	$H_2C=CH-CH_2-O-(C_3H_6O)_n-CH_2-CH=CH_2$	3,000	0/100
UNIOX <sup>®</sup> AA-480R		Polyethyleneglycol -diallylether	$H_2C=CH-CH_2-O-(C_2H_4O)_n-CH_2-CH=CH_2$	500	100/0
UNIOX <sup>®</sup> AA-800				800	100/0

✳Manufactured-by-Order

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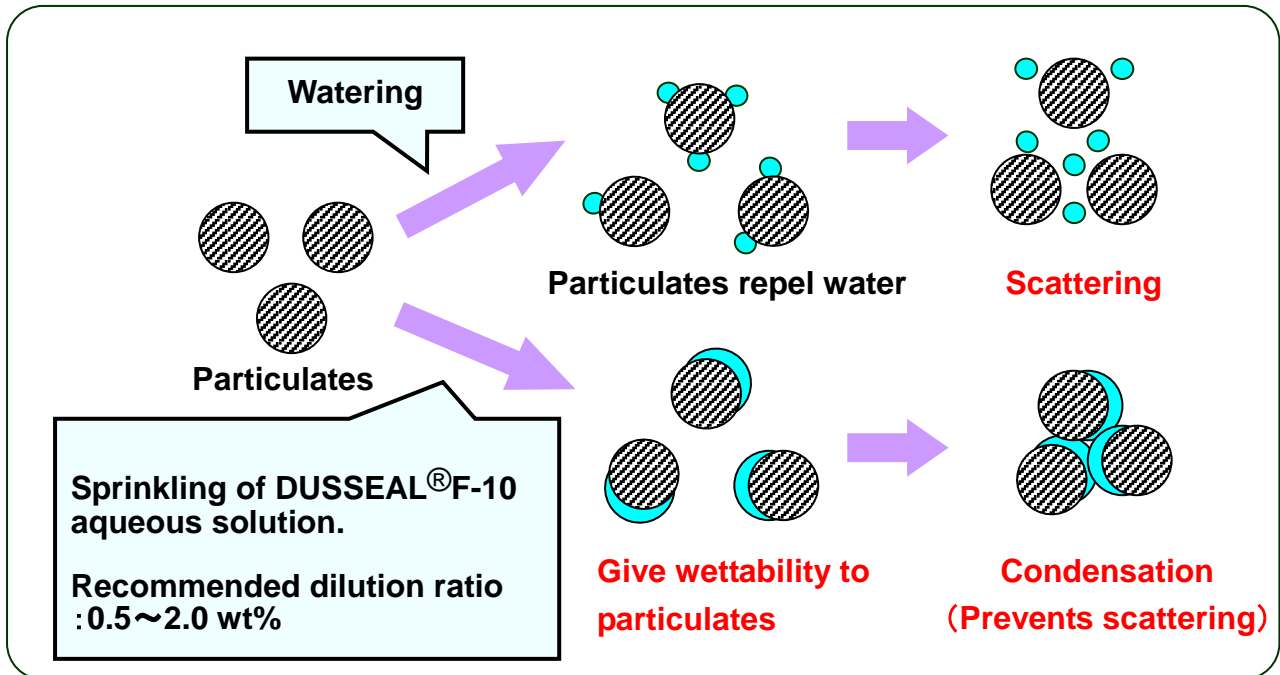
## 17. DUST & COAL DUST CONTROL AGENT

Product Name	Appearance	Viscosity (mPa·s)		pH (1.0wt% aq.)	Specific gravity (25/4°C)	Pour Point (°C)
		0°C	20°C			
DUSSEAL®F-10	Colorless~ LightYellow Clear Viscous Liquid	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.

### Effecting mechanism of DUSSEAL®F-10



## 18. FOR CONSTRUCTION & BUILDING MATERIALS

### 18.1 CONCRETE AGENT

Product Name	Appearance	Chemical Name	Main Application
MALIALIM <sup>®</sup> A-20	Clear~Light Yellow Liquid	Polycarboxylic acid type	Water reducing agent for concrete
MALIALIM <sup>®</sup> CL-100	Yellow~Dark Brown Viscous Liquid		Reduction of methylcellulose
SYUDOX <sup>®</sup> DEF-001	Clear~Light Yellow Liquid	—	Defoaming agent
SYUDOX <sup>®</sup> DSP-2508	Clear~Light Yellow Liquid	Polyoxyalkylene type	Reducing of drying shrinkage
SYUDOX <sup>®</sup> SG-413			

### 18.2 PREMIX MORTAR CONCRETE AGENT

Product Name	Appearance	Chemical Name	Main Application
SYUDOX <sup>®</sup> WR-301CP	Light Yellow Powder	Polycarboxylic acid type	Water reducing agent for concrete
SYUDOX <sup>®</sup> WRP-150A			
SYUDOX <sup>®</sup> DEF-001-CS	White Powder	—	Defoaming agent
SYUDOX <sup>®</sup> PRF-C180	White Fine Powder	Special Metallic soap type	Efflorescence prevention Water & oil repellent agent
SYUDOX <sup>®</sup> PRF-A180			
SYUDOX <sup>®</sup> PR-30RS			
SYUDOX <sup>®</sup> DSP-E40	White Powde	Polyoxyalkylene type	Reducing of drying shrinkage
SYUDOX <sup>®</sup> DSP-E60			
SYUDOX <sup>®</sup> SP-01S			
SYUDOX <sup>®</sup> SP-02SC			
SYUDOX <sup>®</sup> DF-40	White Flake		

### 18.3 ASPHALT EMULSIFIER AGENT

Product Name	Appearance	Chemical Name	Freezing Point (°C)	Main Application
ASPHASOL <sup>®</sup> 10	Dark Brown Flake	Amine type	Approx.40	Asphalt emulsifier
ASPHASOL <sup>®</sup> 20	Yellow & Waxy	Amine type	Approx.30	
ASPHASOL <sup>®</sup> 1100	Beads	Fatty acid type	Approx.60	

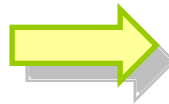
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## 18. 4 ASPHALT RELEASE AGENT

Product Name	Appearance	Chemical Name	Freezing Point (°C)	Dilution degree with water			Flash Point (°C)
				Plant	Dunp truck	Tire roller	
ASPHASOL <sup>®</sup> N-02	Red Clear Viscous Liquid	· Natural fats derivatives · Surfactant etc. (mixture)	-20 ↓	x 7	x 10	x 50	No existence
ASPHASOL <sup>®</sup> N-03	Blue Clear Viscous Liquid		-20 ↓	x 10	x 10	x 30	No existence
ASPHARUB <sup>®</sup> CE-R	Viscous Liquid		-12	x 15	x 15	x 50	No existence

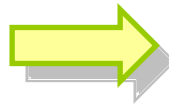
### ① Release ability



### ② Solubility



Light oil    ASPHASOL    10%aq.



(After 2 hours, 110°C)  
Light oil    ASPHASOL    10%aq.

### ③ Stability of water solution

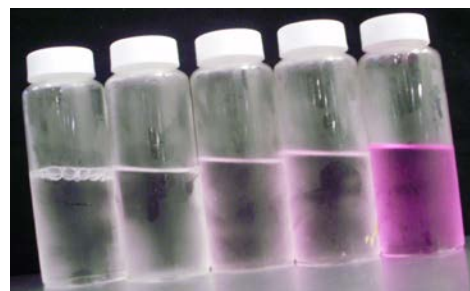
(After 6 months)



ASPHASOL    10%aq.    20%aq.

### ④ Anti freeze

(After 24 hours, -5°C)



5%aq. ← 10%aq. ← ASPHASOL

## 19.DEFOAMING AGENT

Product Name	Appearance	Main Application	Solubility in water	Cloud Point (°C)	Freezing Point (°C)
DISFOAM <sup>®</sup> BF-33	Yellow Viscous Liquid	Aqueous high molecular solution	Dispersion	—	0 ↓ (Pour Point)
DISFOAM <sup>®</sup> BC-51Y	Yellow Liquid	Fermentation			0
DISFOAM <sup>®</sup> CA-104C	Clear~Light Yellow Liquid	PVA, PEO, Acryl	Insoluble	0 ↓	0 ↓
DISFOAM <sup>®</sup> CA-123		Fermentation, Glutamic acid, Antibiotics	Dispersion	9	-20 ↓
DISFOAM <sup>®</sup> CA-220		Fermentation		18	-30 ↓ (Pour Point)
DISFOAM <sup>®</sup> CA-330		Fermentation		12	
DISFOAM <sup>®</sup> CB-442	Clear~Light Yellow Liquid	Fermentation, Aqueous high molecular solution, Antibiotics		15	0 ↓ (Pour Point)
DISFOAM <sup>®</sup> CC-130B	Clear~Light Yellow Liquid	Sewage disposal, Stock breeding, Fermentation (Yeast), Water treatment	Dispersion	5 ↓	-5 ↓
DISFOAM <sup>®</sup> CC-118		Sewage disposal, Stock breeding, Fermentation (Yeast), Water treatment		5	-5 ↓
DISFOAM <sup>®</sup> CC-218		Drain treatment		23	-10 ↓ (Pour Point)
DISFOAM <sup>®</sup> CC-222		Fermentation, Carbonic acid absorbent, Aqueous high molecular solution		20	
DISFOAM <sup>®</sup> CC-438		Fermentation, CO <sub>2</sub> Gas, Aqueous high molecular solution		18	-10 ↓
DISFOAM <sup>®</sup> CD-432		Clear~Light Yellow Liquid		Paper making	Soluble
DISFOAM <sup>®</sup> CE-457	Clear~Light Yellow Liquid	PVA, Starch, HPC, HMPC	Dispersion	15	-10 ↓
DISFOAM <sup>®</sup> CK-140	Clear~Light Yellow Liquid	Latex, CO <sub>2</sub> absorption solution, Aqueous high molecular solution	Soluble	48	0 ↓
DISFOAM <sup>®</sup> EMF-607	Yellow Liquid	Sewage disposal, Stock breeding, Water treatment	Emulsification	0 ↓	-10 ↓
DISFOAM <sup>®</sup> NQH-7403	Clear~Light Yellow Liquid	Medium, Antibiotics	Insoluble	0 ↓	0 ↓ (Pour Point)
DISFOAM <sup>®</sup> FD-2 (Food Additive)	Light Yellow Viscous Liquid	Food product	Dispersion	3	—
DISFOAM <sup>®</sup> FDS-2224	Clear~Light Yellow Liquid	Paper making, Slate, Water treatment, Fermentation	Dispersion	0 ↓	-7 (Pour Point)
DISFOAM <sup>®</sup> NKL-5450					-10

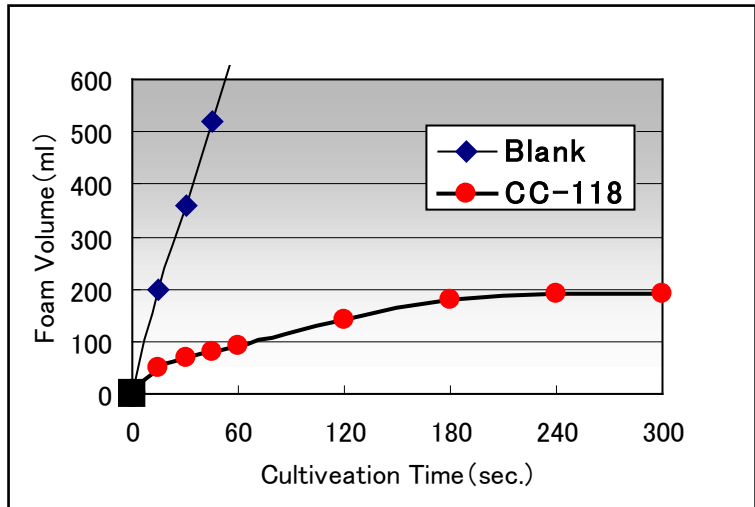
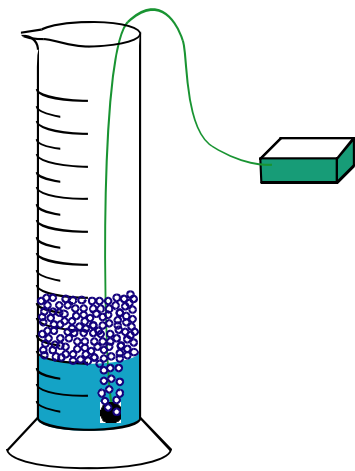
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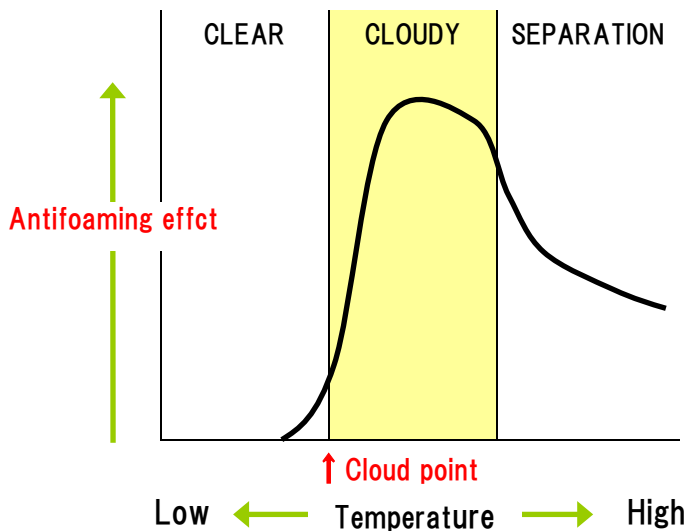


## Test method (Disfoaming agent)



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

## Effect to defoam



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

## 20. ANTISTATIC AGENT

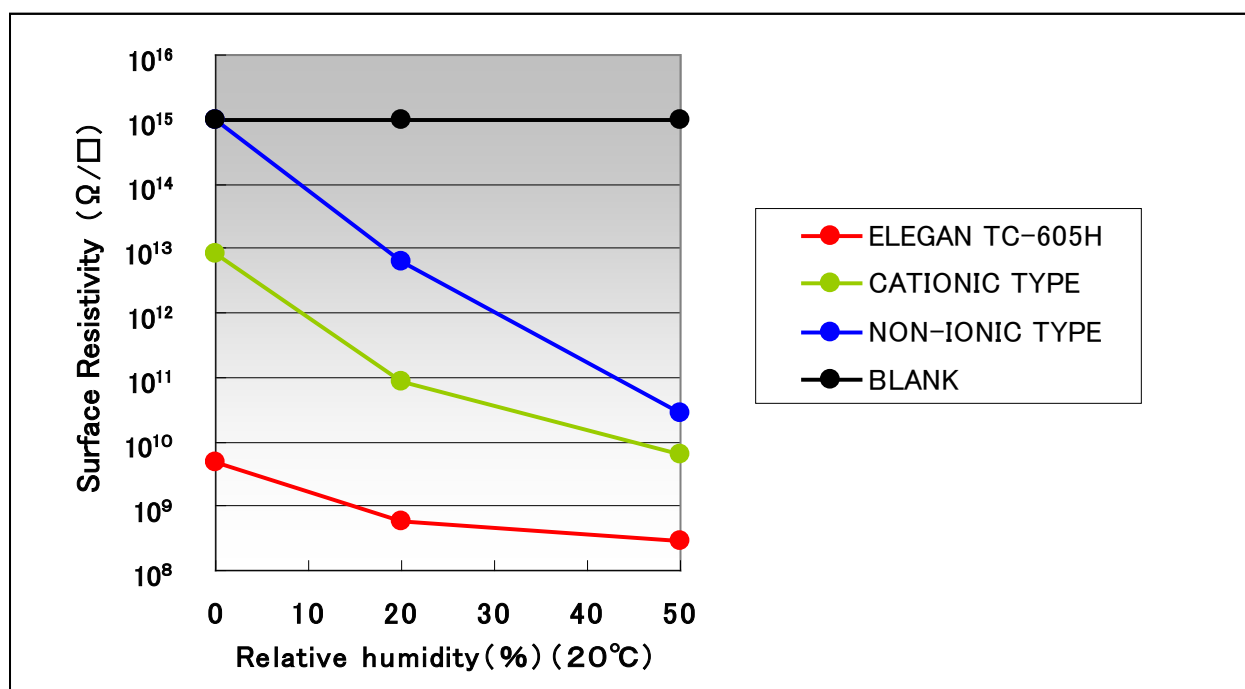
### 20.1 SURFACE COATING TYPE

Product Name	Appearance	Ionicity	Surface Resistivity (Example) ( $\Omega/\square$ ) [20°C, Humidity 50%]	Dilution Agent	Flash Point (°C)
ELEGAN <sup>®</sup> 264-30	Light Yellow Liquid	Cationic (Halogen Free)	$1.6 \times 10^8$ (x 30 Dilution with water)	Water (70%)	No existence
ELEGAN <sup>®</sup> 264WAX	White~Light Yellow Viscous Paste		$1.6 \times 10^8$ (x 100 Dilution with water)	Industrial pure materials	175
ELEGAN <sup>®</sup> TA-100	Light Yellow Liquid	Anionic	$7.4 \times 10^8$ (x 60 Dilution with water)	Water	No existence
ELEGAN <sup>®</sup> T-4530 ※Smol-lot production	Light Yellow Liquid (Turbid in Winter)		$2.5 \times 10^{10}$ (x 30 Dilution with water)	Water (70%)	No existence

### 20.2 SURFACE COATING TYPE

Product Name	Appearance	Ionicity	Surface Resistivity (Example) ( $\Omega/\square$ ) [20°C, Humidity 50%]	Dilution Agent	Flash Point (°C)
ELEGAN <sup>®</sup> TC-605	Light Yellow Liquid	Cationic (Halogen Free)	$4.2 \times 10^8$ (x 20 Dilution with water)	Water	No existence
ELEGAN <sup>®</sup> TC-605H ※Smol-lot production	Light Yellow Liquid		$2.4 \times 10^8$ (x 20 Dilution with water)	Water	No existence

#### Effect to ELEGAN<sup>®</sup>



### 20.3 MASTER BATCH LIQUID TYPE (For Flexible PVC)

Product Name	Appearance	Ionicity	Surface Resistivity (Example) ( $\Omega/\square$ ) [20°C, Humidity 50%]	Dilution Agent	Flash Point (°C)
NEW ELEGAN <sup>®</sup> A	Yellow~Dark Brown Liquid (Solid in Winter)	Cationic	Flexible PVC 0.3% added $3.3 \times 10^{10}$ Flexible PVC 0.6% added $1.8 \times 10^{10}$	IPA (30~40%)	20.5
NEW ELEGAN <sup>®</sup> B					18.0
NEW ELEGAN <sup>®</sup> AI	Yellow~Dark Brown Liquid		Flexible PVC 0.3% added $4.6 \times 10^{10}$ Flexible PVC 0.6% added $2.2 \times 10^{10}$		19.5
NEW ELEGAN <sup>®</sup> C			Flexible PVC 0.6% added $3.0 \times 10^{10}$ Flexible PVC 1.0% added $6.0 \times 10^{11}$	IPA (25%)	18.7
ELEGAN <sup>®</sup> LD-204	Clear~Light Yellow Liquid		Flexible PVC 1.0% added $8.0 \times 10^{11}$	Industrial pure materials	152.0

### 20.4 MASTER BATCH POWDER TYPE (For Flexible PVC)

Product Name	Appearance	Ionicity	Surface Resistivity (Example) ( $\Omega/\square$ ) [20°C, Humidity 50%]	Dilution Agent	Melting Point (°C)
ELEGAN <sup>®</sup> C-709P ※Small-lot production	Light Yellow Powder	Cationic	Flexible PVC 1.0% added $8.0 \times 10^{11}$	PVC (75%)	—
NEW ELEGAN <sup>®</sup> ASK			Flexible PVC 0.3% added $3.2 \times 10^{10}$ Flexible PVC 0.6% added $1.9 \times 10^{10}$	PVC·WAX (60%)	60
FARPACK Z-MK		Anionic	Flexible PVC 1.0% added $4.0 \times 10^{11}$	Industrial pure materials	Approx.70

### 20.5 MASTER BATCH TYPE (For PS, ABS, EVA)

Product Name	Appearance	Ionicity	Surface Resistivity (Example) ( $\Omega/\square$ ) [20°C, Humidity 50%]	Dilution Agent	Melting Point (°C)
FARPACK Z-MK	Light Yellow Powder	Anionic	ABS 1.0% added $5.0 \times 10^{11}$ EVA 0.5% added $2.0 \times 10^{10}$	Industrial pure materials	Approx.70

### 20.6 MASTER BATCH TYPE (For Rubber, Acrylic resin, Polyurethane)

Product Name	Appearance	Ionicity	Main Use	Dilution Agent	Pour Point (°C)
ELEGAN <sup>®</sup> 264WAX	White~Light Yellow Viscous Paste	Cationic (Halogen Free)	For Ink, Polyurethane, Acrylic resin	Industrial pure materials	50~55
ELEGAN <sup>®</sup> C-606 ※Small-lot production	Light Yellow Viscous Liquid	Cationic	For Rubber	Industrial pure materials	—
ELEGAN <sup>®</sup> C-607L ※Small-lot production		Cationic (Halogen Free)	For Acrylic resin	Industrial pure materials	—

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