

NIKANOL



FUDOW COMPANY, LTD.

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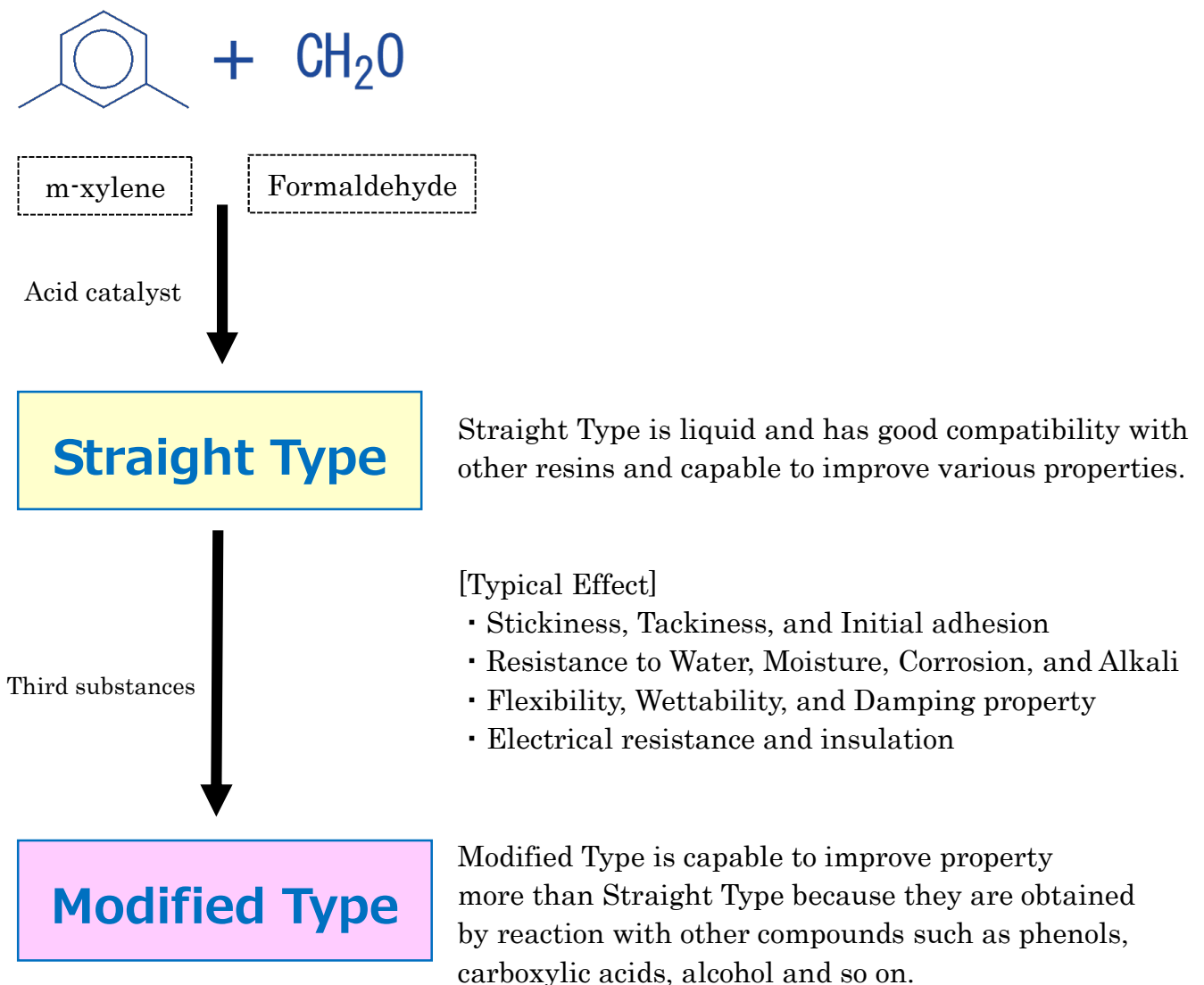
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1. What is NIKANOL ?

◇ NIKANOL® is registered trade name of Fudow.

◇ NIKANOL® is divided into two types.

- One is **Straight Type** and the other one is **Modified Type**.
- **Straight type** is an oligomer which is provided by m-xylene and formaldehyde.
- **Modified type** is derived from straight type and third substances.



2. Straight Type

2-1. Grade and properties

Grade	Average molecular weight (M _w)	Specific gravity (20°C)	Viscosity (mPa·s)			OH value (mgKOH/g)	Flash point (°C) (Open cup)
			25°C	75°C	*Indirect (20°C)		
Y-50	250	1.019	50	—	—	20	116
Y-100	270	1.029	100	—	—	25	149
Y-300	310	1.024	300	—	—	20	190
Y-1000	470	1.045	1000	—	—	21	164
LLL	500	1.023	2500	43	40	36	163
LL	580	1.055	4700	60	60	40	154
L	720	1.059	12600	98	100	32	169
H	980	1.074	—	630	300	33	
G	1200	1.107	—	993	450	36	

*The above are not product specifications

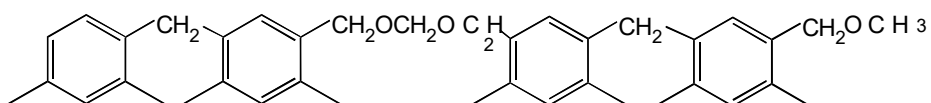
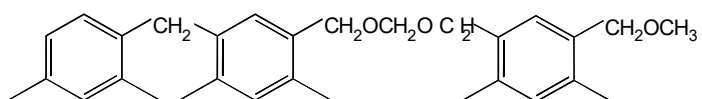
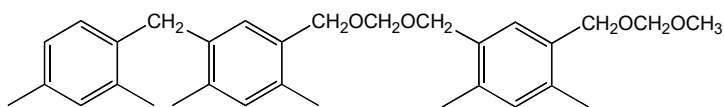
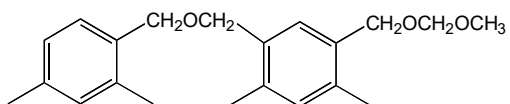
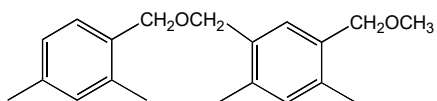
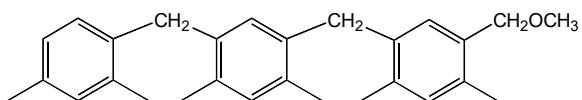
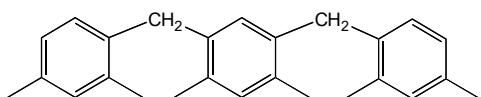
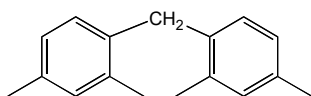
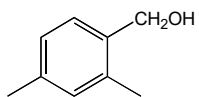
*Indirect viscosity measured at 20°C. Resin 80% toluene solution

Grade	Specific heat (cal/deg·g)	Refractive index (25°C)	Tan δ		Dielectric constant		Volume resistivity (Ω·cm 30°C)
			110Hz 23°C	1Mz 23°C	110Hz 23°C	1Mz 23°C	
L	0.42	1.57	2.0×10^{-3}	4.8×10^{-3}	3.53	3.27	1.1×10^{14}
H	0.47	1.58	1.5×10^{-3}	3.3×10^{-3}	3.50	3.07	2.1×10^{14}
G	0.48	1.57	2.8×10^{-3}	3.3×10^{-3}	3.93	3.49	2.1×10^{14}

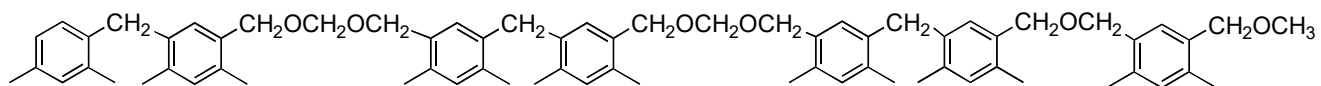
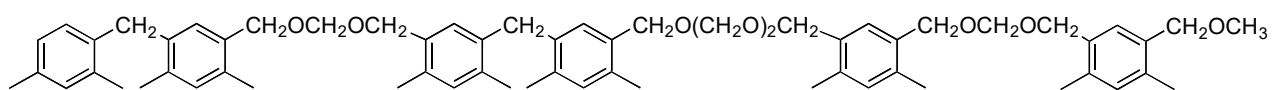
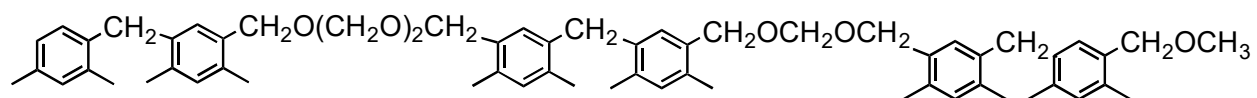
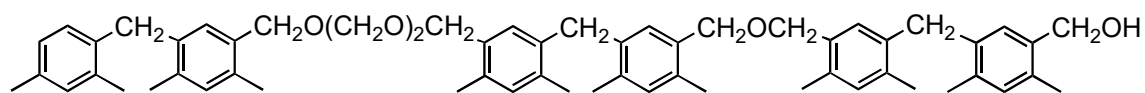
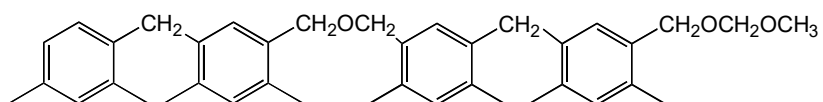
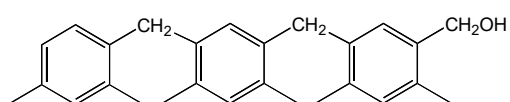
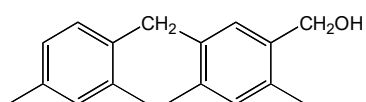
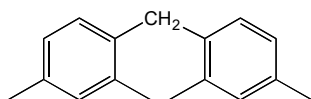
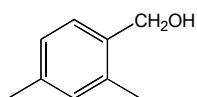
*The above are not product specifications

2-2. Molecular structure

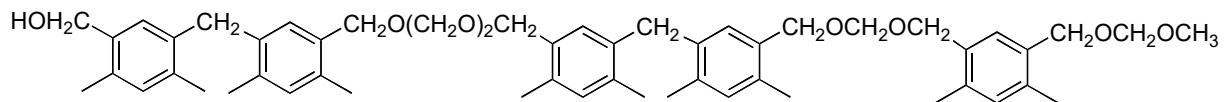
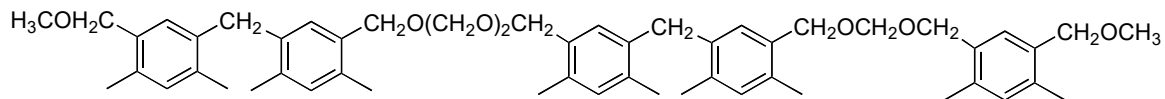
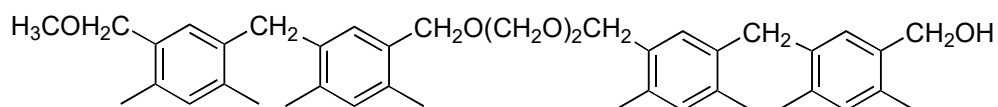
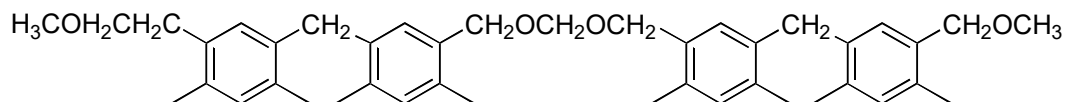
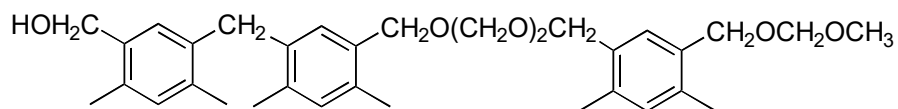
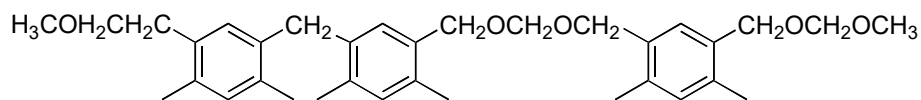
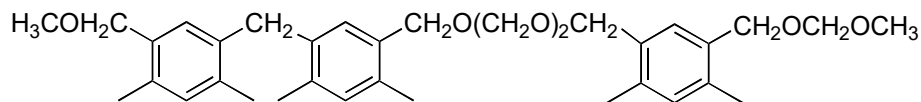
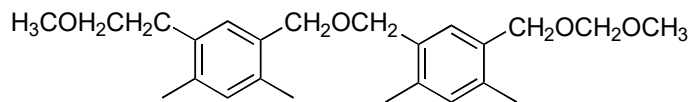
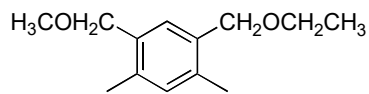
< NIKANOL Y-50 >



< NIKANOL H >





< NIKANOL G >



2-3. Application of straight type

Application		← Low Viscosity high →						
		Y-300	Y-1000	LLL	LL	LL	H	G
epoxy resin	Ambient cure type							
	Heat cure type							
Acrylic resin pressure sensitive adhesive								
UV Adhesive								
Urethane resin adhesive								
Rubber PSA Rubber adhesive								
Rubber compound								
Unsaturated polyester resin								
Phenol resin	Paper laminated print circuit board							
	Binder for Friction material							

 Most optimum grade

 Optimum grade

2-4. Additional feature of straight type

【 Epoxy resin 】

- Ambient cure type paint Corrosion resistance, Adhesion, Leveling
- Heat cure type paint Adhesion, Leveling
- Ambient cure adhesive Moisture and Alkali resistance, Initial tackiness, Damping

【 Acrylic resin 】

- Pressure sensitive adhesive Tackiness, Initial adhesion
- UV adhesive Compatibility, Flexibility, Wettability, Moisture resistance, High refractive index

【 Urethane resin 】

- Ambient cure type adhesive Initial adhesion, Tackiness

【 Rubber 】

- Adhesive Tackiness, Initial adhesion
- Pressure sensitive adhesive Tackiness, Initial adhesion
- Rubber compound Flexibility, Plasticity, Damping

【 Unsaturated polyester resins 】

- Potting Flexibility, Adhesion, Damping

【 Phenol resin 】

- Paper laminated print circuit board Heat resistance, Preventing warpage, Electrical insulation, moisture resistance
- Binder for friction material Heat resistance, Flexibility, Moisture resistance

2-5. Compatibility of Straight Type

Alkyd resins	○	Terpene resins	○
Oil modified alkyd resin	○	Polybutene	△
Asphalt, coal tar	○	Liquid NBR	○
Chlorinated rubber	○	Waxes	△
Cyclized rubber	△	Polystyrene	○
Chlorinated polypropylene	○	Styrenic co-polymers	○
Chlorinated polyethylene	○	Epoxy resins	○
Rosin	○	Polyamide resins	△
Modified rosins	○	Polyurethane	○
Vegetable oils	○	Polyvinyl chloride	○
Petroleum resins	○	PVC plasticizers	○
Polyethylene	×	Acrylic polymers	○
Polypropylene	×	Acrylic co-polymers	○
Phenolic resin	○	Nitro cellulose	○
Modified phenolic resins	○	Benzyl cellulose	○
Polyvinyl acetate	△	Ethyl cellulose	×

○ : Compatible △ : Partially compatible × : Incompatible

2-6. Solubility of Straight Type

Solvents \ Grade	Y-300, Y-1000	LLL, LL, L	H	G
n-hexane	S	S	S	I
Cyclohexane	S	S	S	S
Benzene	S	S	S	S
Toluene	S	S	S	S
Xylene	S	S	S	S
Styrene	S	S	S	S
Mineral terpene	S	S	S	S
Chloroform	S	S	S	S
Carbon tetrachloride	S	S	S	S
Monochloro benzene	S	S	S	S
Ethyl ether	S	S	S	S
Dioxane	S	S	S	S
THF	S	S	S	S
Acetone	S	S	S	S
MEK	S	S	S	S
MIBK	S	S	S	S
Ethyl formate	S	S	S	S
Methyl acetate	S	S	S	S
Ethyl acetate	S	S	S	S
DOP·DBP	S	S	S	S
Methanol	I	I	I	I
Isopropanol	S	I	I	I
n-propanol	S	I	I	I
Isobutanol	S	S	S	S
n-butanol	S	S	S	S
Ethylene glycol	I	I	I	I
Phenol	S	S	S	S
Acetic acid	S	S	S	S
Formic acid	I	I	I	I
DMF	S	S	S	S
Pyridine	S	S	S	S
Aniline	S	S	S	S

S : Soluble I : Insoluble

Test method : NIKANOL 1g and solvent 1g are putted into the test tube and solved.

Then this solution is stayed one night.

We judged by appearance soluble or insoluble.

2-7. Correlation Diagram (Viscosity and Temperature)

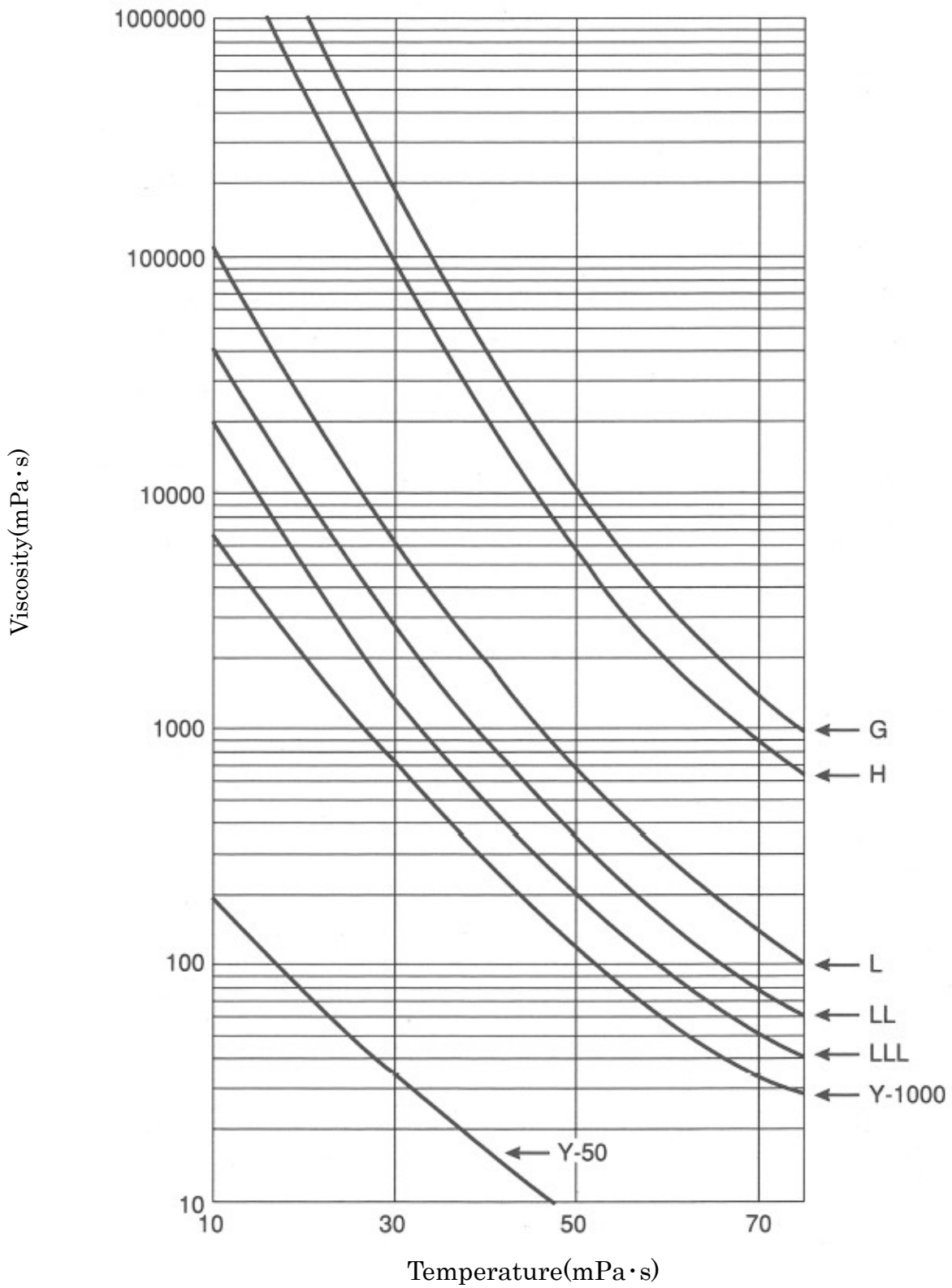
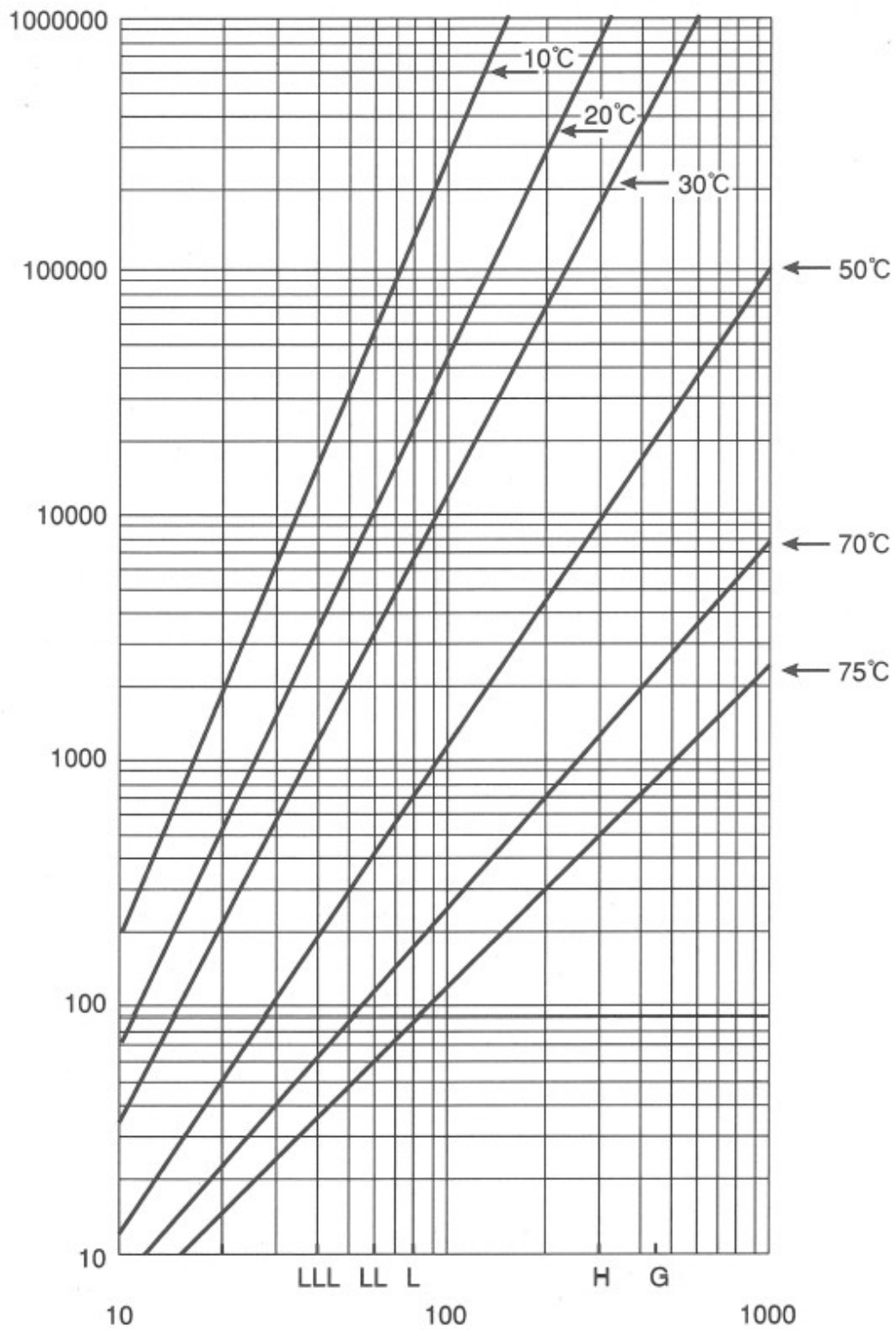


Fig. Relationship between viscosity and temperature of straight type



80%resin Temperature in toluene (mPa·s)
 Fig. Relationship between viscosity of 100% resin
 and 80% resin solution in toluene viscosity at 20°C

3. Modified Type

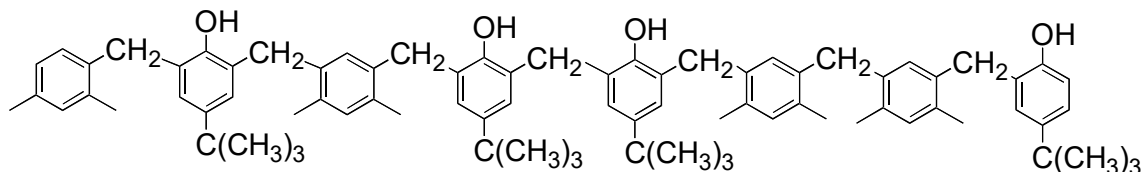
3-1. Properties and Molecular structure

Alkyl phenol modified Type

HP-Series	Average molecular weight	Appearance	Gardner color	OH Value (mgKOH/g)	Softening point (°C)
GHP-150	1,900	Light brown flake	<10	215	150~160
HP-120	1,300		<10	165	125~135
HP-100	1,200		<8	140	105~125
HP-70	1,000		<8	115	70~90

*The above are not product specifications

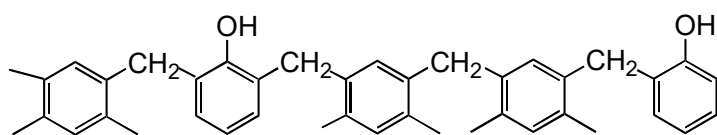
<HP100>



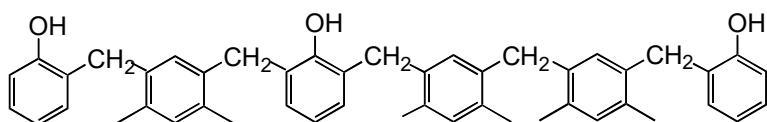
Novolak Type	Hexamine (phr)	Appearance	Melting point (°C)	Gelation Time (sec. /150°C)
P-100	—	Light brown flake	70	—
GP-200	—		70	—

*The above are not product specifications

<P-100>



<GP-200>



3-2. Application and additional features

Grade	Application	Additional features
Alkyl phenol Type (HP - Series)	Metallic ink Paint Tackifier to urethane and rubber Adhesion Tackifier to acrylic pressure sensitive adhesive	Metal dispersion, Leafing property, Gloss Corrosion resistance Heat, Moisture and Alkali resistance, Flexibility Initial adhesion, Moisture resistance, Plasticity, Flexibility
Novolak Type (P-100, GP-200)	Binder for friction material Binder for carbon resistant membrane Reinforcement of rubber PVC sol sealant Molding compounds	Heat, Water and Abrasion resistance, Flexibility Moisture resistance Moisture and Oil resistance Heat and Moisture resistance, Adhesion Heat and Moisture resistance Electrical insulation

3-3. Solubility of Modified Type

Solvents \ Grade	HP-series	P-100, GP-200
n-hexane	S	I
Cyclohexane	S	S
Benzene	S	I
Toluene	S	I
Xylene	S	I
Styrene	S	H
Mineral terpene	S	—
Chloroform	S	S
Carbon tetrachloride	S	I
Monochloro benzene	S	I
Ethyl formate	S	S
Dioxane	S	S
THF	S	S
Acetone	S	S
MEK	S	S
MIBK	S	S
Ethyl formate	S	S
Methyl acetate	S	S
Ethyl acetate	S	S
DOP·DBP	S	S
Methanol	I	S
Isopropanol	I	S
n-propanol	S	S
Isobutanol	I	S
n-butanol	S	S
Ethylene glycol	I	S
Phenol	S	S
Acetic acid	I	S
Formic acid	I	I
DMF	S	S
Pyridine	S	S
Aniline	S	S

S : Soluble I : Insoluble H : Soluble but become clouded — : No data

Test method : NIKANOL 1g and solvent 1g are putted into the test tube and solved.

Then this solution is stayed one night.

We judged by appearance soluble or insoluble.

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