Bulletin No. ES20000010A
Date issued: Nov. 29, 2023

Low-Molecular-Weight Polyolefin

Polyethylene Wax

SANWAX Products

Polypropylene Wax

VISCOL Products

Preface

SANWAX (polyethylene wax) and VISCOL (polypropylene wax) are widely used in various industries by taking advantage of each feature.
For example, these products are used as pigment dispersants for color masterbatches (colorant for molding resins) because they have high dispersibility of pigment. They are also used as scratch inhibitors and anti-blocking agents for printing ink because they have moderate hardness.
UMEX products are also offered. They are modified low-molecular-weight polyolefins that have carboxylic anhydride groups as functional groups.

Features

SANWAX and VISCOL have following features:

· Have low melt viscosities approximately equal to those of paraffin wax.
· Have high softening point equivalent to that of polyethylene and polypropylene.
· Have hardness equivalent to that of polyethylene and polypropylene.
· Have high dispersibility of pigment.
· Generally not compatible with other resins except polyolefin.

Sanyo Chemical

Applications

Table 1 shows the relationship between various applications and the suitable SANWAX and VISCOL.

Table 1. Relationship between various applications and the suitable SANWAX and VISCOL

Applications	SANWAX	VISCOL
Pigment Dispersants for Polyolefin	A	A
Filler Dispersants for Polyolefin	A	A
Flowability Improvers for Polyolefin	A	A
Flowability Improvers for Filler Reinforced Polyolefin	A	A
Flowability Improvers for Recycle Polyolefin	A	A
Releasing Agents & Flowability Improvers for Rubber & Resins other than Polyolefin	A	A
Abrasion Resistance Improvers for Paint & Ink	A	B
Delustering Agents for Paint	A	B
Abrasion Resistance Improvers for Thermal Transfer Ink	B	-
Softening Point Enhancers for EVA	B	B
Lubricants for PVC	B	A
Releasing Agents for Polyurethane Molding	A	B
Ingredients for Shoe Polish	A	-
Gelling Agents for Oil	A	B
Softening Point Improver of Asphalt	-	A
Durability Improver of Asphalt	-	A
Binders for Ceramics	B	B

Value of Symbols A: Excellent suitability, B: Good suitability, − : Unsuitable

Note: This list is based on past results and experimental data.
Please judge and test the qualification for each application

Sanyo Chemical

Typical Properties

Tables 2 and 3 exhibit the properties of SANWAX and VISCOL products. The values are representative.

Table 2. Typical Properties of SANWAX.

	Appearance	Color Number	Molecular Weight	Viscosity (140°C) mPa·s	Melting Point °C	Penetration Hardness dmm
SANWAX 161-P	White Powder	30	27,000	3,400	103	2.0
SANWAX 131-P		30	20,000	900	102	3.5
SANWAX 151-P		30	13,000	250	102	4.0
SANWAX 171-P		30	10,000	160	102	4.5

Table 3. Typical Properties of VISCOL.

	Appearance	Color Number	Molecular Weight	Viscosity (160°C) mPa·s	Melting Point °C	Penetration Hardness dmm
VISCOL 330-P	White Powder	50	40,000	4,000	145	< 1.0
VISCOL 440-P		50	27,000	1,800	144	< 1.0
VISCOL 550-P		50	13,000	160	139	< 1.0
VISCOL 660-P		1 *1	10,000	60	136	1.5
VISCOL LM500	Pale Yellow Powder	1 *1	30,000	1,400	125	< 1.0

Color; Hazen (*1 Gardner), Mw; GPC Method, Viscosity; Brookfield type viscometer.
Melting Point; DSC Method, Penetration Hardness; ASTM D 1321-61T.

Compared with polyethylene, polypropylene, and waxes such as paraffin wax, carnauba wax and montan wax, SANWAX and VISCOL products have the following features:

1. Viscosity

SANWAX and VISCOL products have low melt viscosities approximately equal to those of paraffin wax.

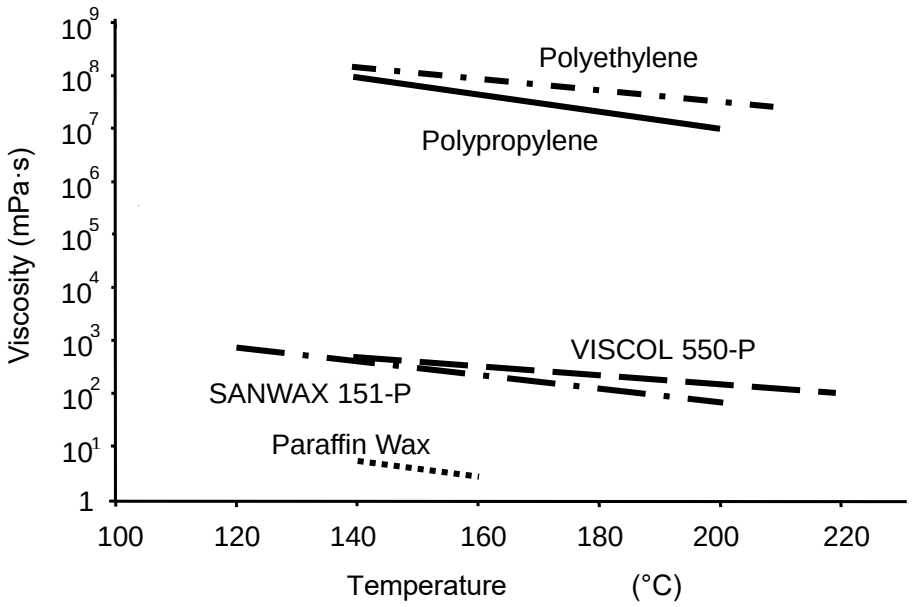

Figure 1. Relation of Viscosity and temperature

2. Softening Point

SANWAX and VISCOL products have high softening point equivalent to that of polyethylene and polypropylene.

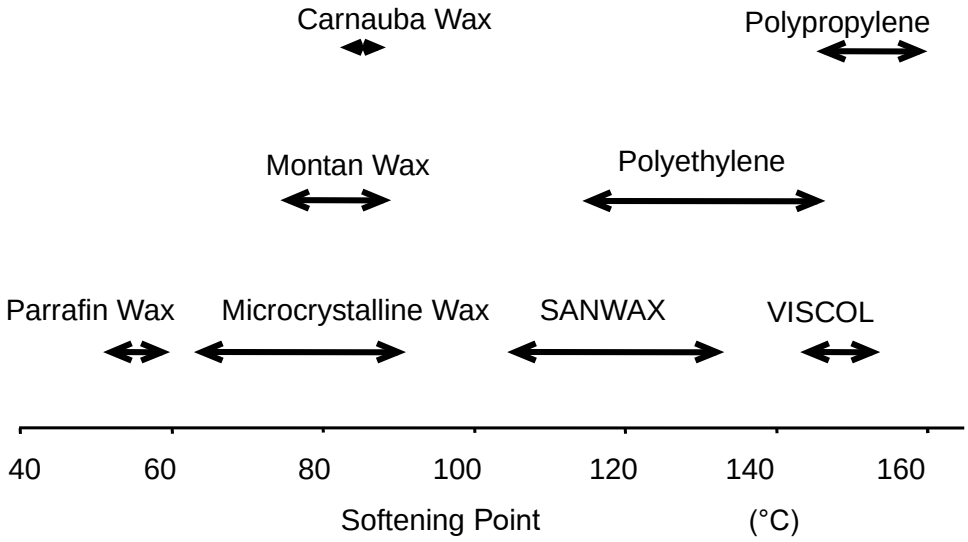

Figure 2. Softening Point

Sanyo Chemical

3. Penetration Hardness

SANWAX and VISCOL products have hardness approximately equal to that of polyethylene and polypropylene.

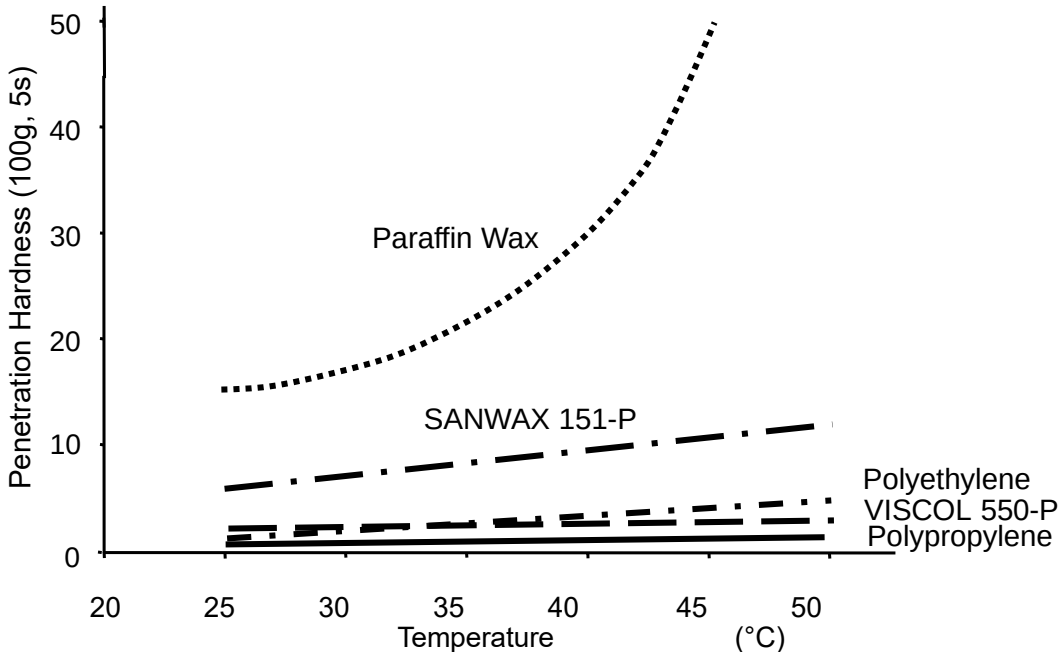

Figure 3. Penetration Hardness

Sanyo Chemical

2. Thermal Stability

Figure 4 and Figure 5 show thermal stabilities of the SANWAX products.

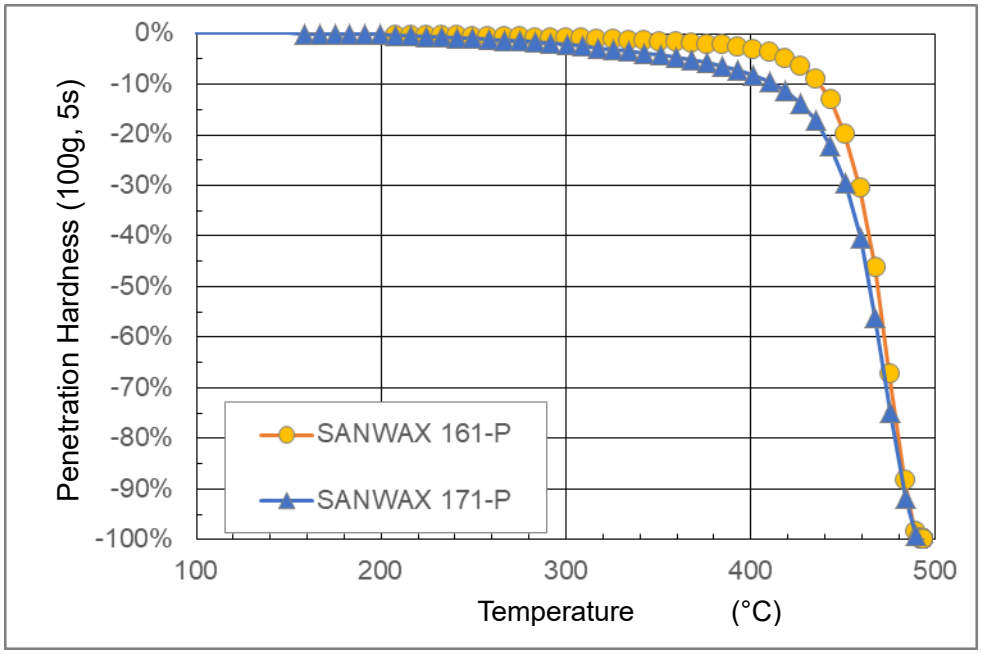

Figure 4. Weight-decreasing Curve in Relation to Temperature Rise (Ambience: Nitrogen)

Method: Apparatus: Apparatus for thermogravimetry. Heating rate: 10 °C/min

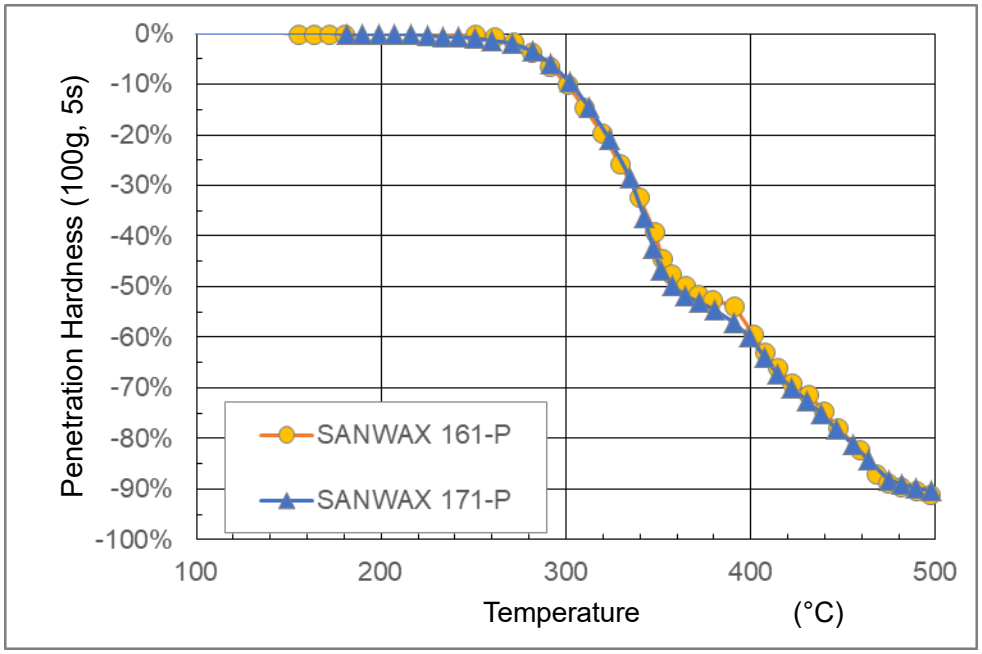

Figure 5. Weight-decreasing Curve in Relation to Temperature Rise (Ambience: Air)

Method: Apparatus: Apparatus for thermogravimetry. Heating rate: 10 °C/min

Sanyo Chemical

Figure 6 and Figure 7 show thermal stabilities of the VISCOL products

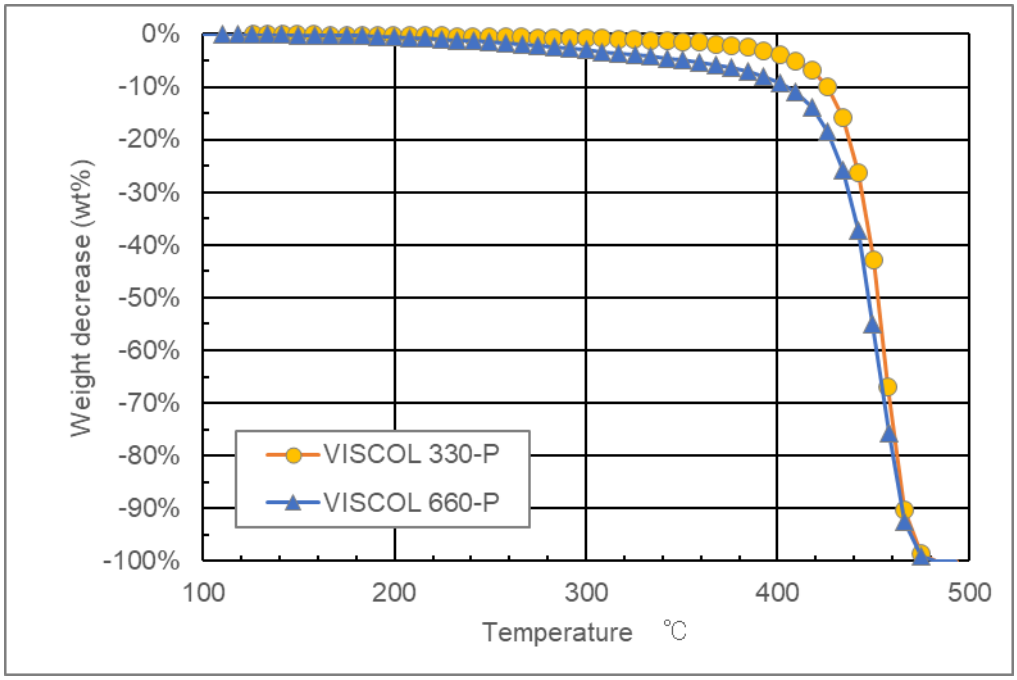

Figure 6. Weight-decreasing Curve in Relation to Temperature Rise (Ambience: Nitrogen)

Method: Apparatus: Apparatus for thermogravimetry. Heating rate: 10 °C/min

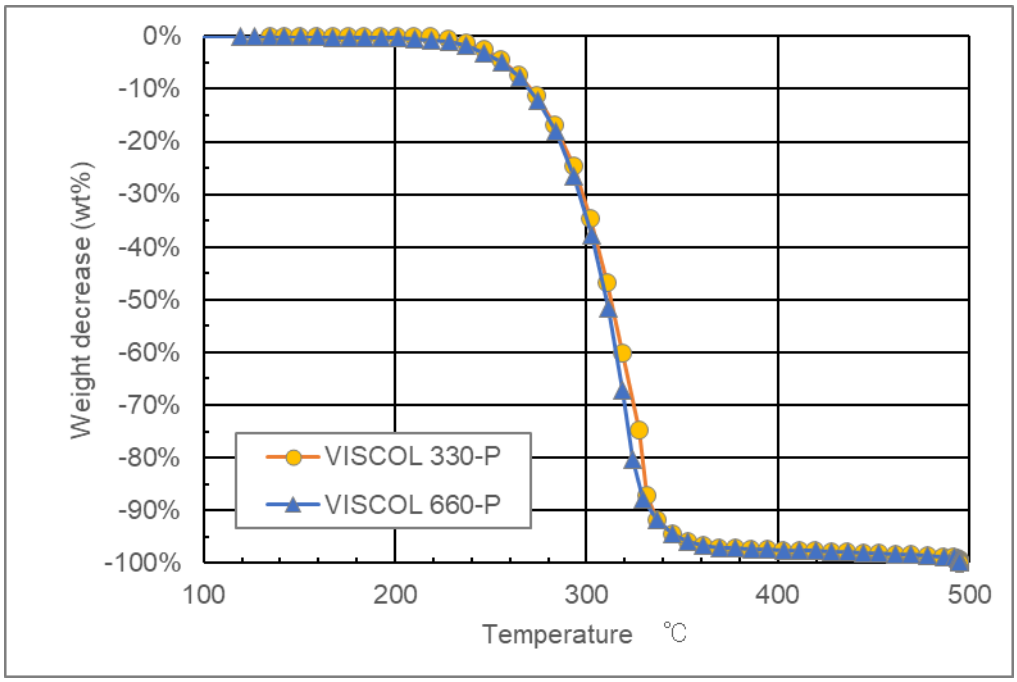

Figure 7. Weight-decreasing Curve in Relation to Temperature Rise (Ambience: Air)

Method: Apparatus: Apparatus for thermogravimetry. Heating rate: 10 °C/min

Sanyo Chemical

Performance

1. Flowability improvers for polyolefin

The MFR of polypropylene is increased by adding SANWAX.

Table 4. Flowability Improvement Effect of Polyolefin

			SANWAX 171-P 1wt% Added	SANWAX 171-P 2wt% Added	Additive Free
Formula	Polypropylene *1	Mass ratio	100	100	100
	SANWAX 171-P	Mass ratio	1	2	
Flowability (MFR)		g/10min	41	48	30
Flexural strength		MPa	47	46	48
Flexural modulus		GPa	1.4	1.4	1.5
Charpy impact strength (Notched)		J/m	27	26	27

Materials

According to Formulas in Table 4, each of the compounds was kneaded using a twin-screw extruder 230 °C, and then molded using an injection molding machine. (nozzle temperature: 230 °C).

Methods

Flowability (MFR) : Measured according to JIS K7210 (230℃, 2.16kgf),

Flexural strength, modulus : Measured according to ASTM D 790

Charpy impact strength : Measured with a notch according to ASTM D 256.

2. Flowability improvers for other than polyolefin

The MFR of resin is increased by adding SANWAX.

Table 5. Flowability Improvement Effect of PBT

			SANWAX 161-P 1wt% added	Additive Free
Formula	PBT *1	Mass ratio	100	100
	SANWAX 161-P	Mass ratio	1	
Flowability (MFR)		g/10min	31	25
Flexural strength		MPa	78	82
Flexural modulus		GPa	2.2	2.3
Tensile strength		MPa	53	55

*1 Melring point; 220°C、Intrinsic viscosity : 1.2

Materials

According to Formulas in Table 5, each of the compounds was kneaded using a twin-screw extruder at 250 °C, and then molded using an injection molding machine. (nozzle temperature: 250 °C).

Methods

Flowability (MFR) : Measured according to JIS K7210 (250°C), 2.16kgf),

Flexural strength, modulus : Measured according to ASTM D 790

Tensile strength : Measured according to ASTM D 683

3. Flowability improvers for filler reinforced resin

The Flowability of filler reinforced resin (ex. GFPP, CFPP) is increased by adding VISCOL.

Table 5. Flowability Improvement effect of GFRP

			VISCOL 660-P 1wt% added	VISCOL 660-P 2wt% added	Additive Free
Formula	GFRP (Glass fiber reinforced PP) *1	Mass ratio	100	100	100
	VISCOL 660-P	Mass ratio	1	2	
Flowability (Spiral flow)		mm	1,360	1,390	1,260
Flexural strength		MPa	167	166	171
Flexural modulus		GPa	7.2	7.2	7.2
Tensile strength		MPa	118	115	118

*1 Long fiber pellet (GF contents; 40wt%)

Materials

According to Formulas in Table 6, each of the compounds was kneaded using a twin-screw extruder at 230 °C, and then molded using an injection molding machine. (nozzle temperature: 230 °C).

Methods

Flowability (Spiral flow) : Injection molded for Archimedes type spiral mold at 230°C.

Flexural strength, modulus : Measured according to ASTM D 790

Tensile strength : Measured according to ASTM D 683

4. Asphalt Modification

The durability of asphalt is increased by adding VISCOL.

Table 8. Durability improvement effect of asphalt

			VISCOL LM500 0.8wt% added	Additive Free
Formula	Modified Asphalt (Type II)	Mass ratio	5.2	5.2
	Aggregate	Mass ratio	94.0	94.8
	VISCOL LM500	Mass ratio	0.8	
Wheel tracking test		times/mm	17,500	12,000
Marshall stability test (Oil immersion)		%	73	55

Materials

Modified Asphalt, Aggregate and VISCOL LM500 were mixed at 173°C, and then pressed at 160°C.

Methods

Wheel tracking test : Crank type (Load 690.7N、Temperature 60°C, 2520 times)

Marshall stability test (Oil immersion) : Measured at 60°C

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

Precaution Against Mishandling

- When the SANWAX/BISCOL products are excessively added to the resin, these products may have Negative effects on resin's physical properties. Test the effects on each of the physical properties beforehand to ensure that there are no problems.

- As shown in Table 1 on page 1, the compatibility with certain molding resins is insufficient, therefore the transparency may be affected. Before using the SANWAX/BISCOL products, confirm the compatibility with resins

For detailed information, please contact below.
Head Office & Research Laboratory of Sanyo Chemical Industries, Ltd.
Address: 11-1, Ikkyo Nomoto-cho, Higashiyama-ku, Kyoto 605-0995, Japan
Tel: +81-75-541-4311 Fax: +81-75-551-2557

Tokyo Branch Office of Sanyo Chemical Industries, Ltd.
E-mail: sanyoproduct@sanyo-chemical.group
Address: 24th Fl., Hibiya Fort Tower, 1-1-1, Nishi-shimbashi, Minato-ku, Tokyo 105-0003, Japan
Tel: +81-3-3500-3411 Fax: +81-3-3500-3412
URL https://www.sanyo-chemical.co.jp/eng

B022304

Sanyo Chemical