Mitsui Chemicals

Hi-WAX™

We respond to needs in all fields
with a broad range of brands.

Hi-WAX™

This document was prepared based on materials, information, and data available at the present time. We make no guarantees whatsoever about the presented data or evaluations. Precautions apply under ordinary handling conditions, so if the product will be handled in a special way, first take safety measures suited to the application or usage.

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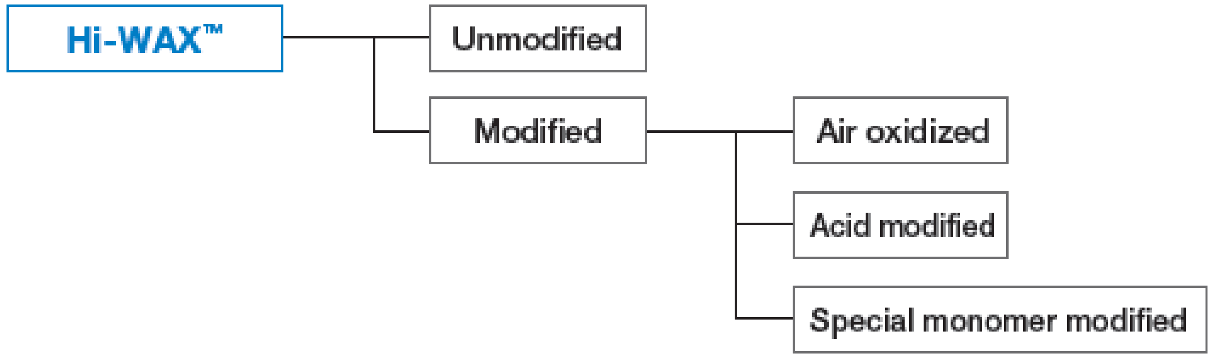
Features of Hi-WAX™ and EXCEREX™

Hi-WAX™ is a brand of polyethylene wax made by direct polymerization of ethylene, developed by Mitsui Chemicals based on its unique Ziegler catalyst polymerization technology.
It is used in a broad range of applications, including pigment dispersants, slip agents and mold release agents for molding resins, modifiers for ink and paints, and aids for textile treatment.



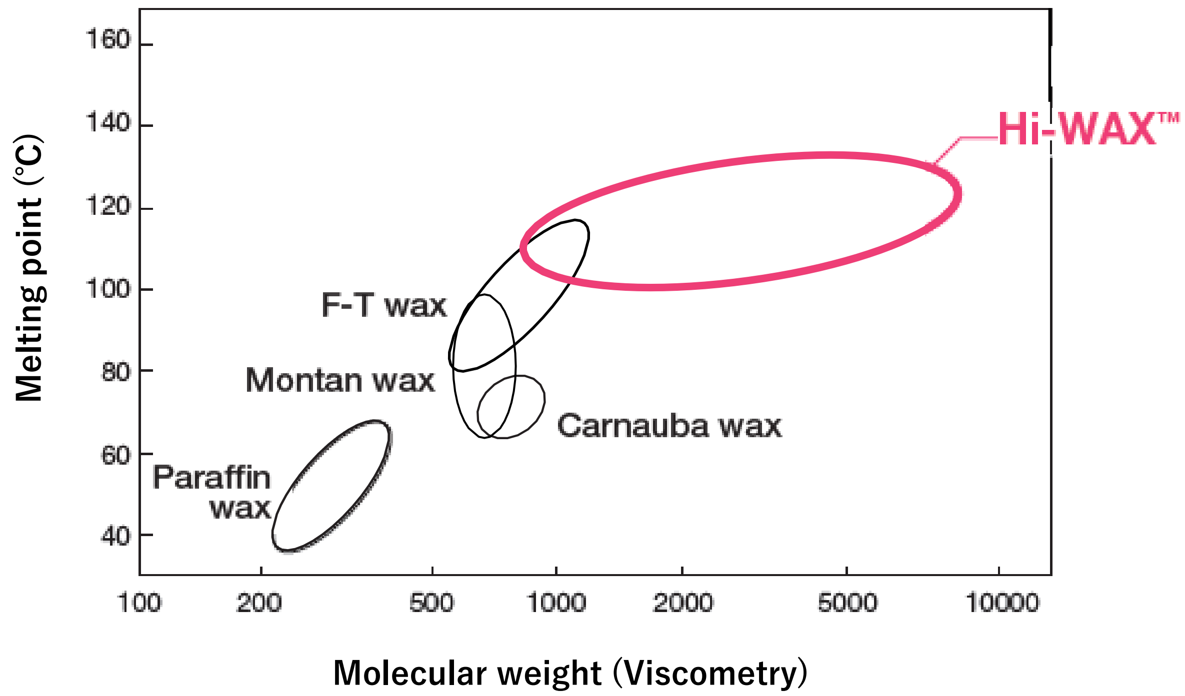
Shape of our company's products

Particle size varies depending on the grades

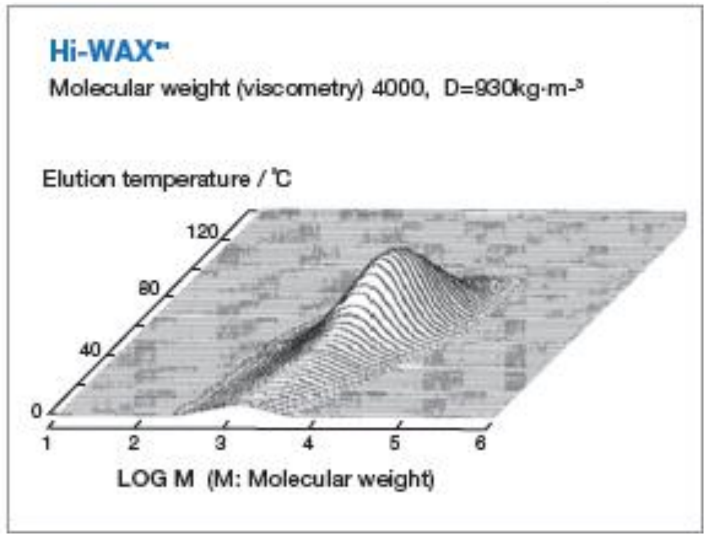
Our product categories

They cover a wide range from the polymerization method to thermal cracking and various modications

■Range of wax properties (Molecular weight – Melting point)



Correlation between composition distribution and molecular weight distribution



※Cross-fractionation chromatograph measurement results
※O-dichlorobenzene is used as the catalyst
※The horizontal axis indicates the molecular weight distribution, and the vertical axis indicates the composition distribution

Hi-WAX™

Table of brands and correspondences with applications

Note) Numeric values in the table are typical values not standard values.

Classification			General polymeric type								
			High-density type				Low-density type				
Basic properties	Property	Units	100P* HP10A	200P* 200PF	400P* 400PF	800P* 800PF	110P	220P	320P	420P	720P
	Molecular weight	–	900	2000	4000	8000	1000	2000	3000	4000	7200
	Density	kg/m³	950	970	980	970	920	920	930	930	920
	Acid value	mgKOH/g	–	–	–	–	–	–	–	–	–
	Crystallinity	%	90	87	85	84	80	70	65	70	60
	Melting point	℃	116	122	126	127	109	110	109	113	113
	Softening poin	℃	121	130	136	140	113	113	114	118	118
	Hardness (Penetration)	10-1mm	2	1	<1	<1	25	13	7	3	3
	Melt viscosity (140℃)	mPa・s	15	80	600	8000	20	80	250	650	6000
	Features		Has high crystallinity and high density, and thus hardness and the softening point are high.				Has low crystallinity and density, and thus hardness and the softening point are low.				
Sample applications	Resin additive		○	○	○	○	○	○	○	○	○
	Mold auxiliary										
	Pigment dispersant			○		○	○			○	○
	Chlorinated vinyl lubricant			○	○	○				○	
	Ink abrasion resistance agent		○	○	○	○		○	○	○	
	Textile processing auxiliary										
	Paint additive			○	○	○	○	○		○	
	Release agent			○	○	○					○
	Rubber processing auxiliary						○	○	○		
	Paper quality improvement agent										
	Hot melt			○	○		○	○			

※ HP10A and Brands with a F suffix have a small grain size.

Classification			Modified type						
			Oxidized type (Low acid value)			Oxidized type (High acid value)		Acid modified type	
Basic properties	Property	Units	220MP	320MP	405MP* 405MPF	4052E	4202E	1105A	2203A
	Molecular weight	–	2000	3000	4000	3000	2600	1500	2700
	Density	kg/m³	920	930	960	970	950	940	930
	Acid value	mgKOH/g	1	1	1	20	17	60	30
	Crystallinity	%	65	70	80	75	62	60	65
	Melting point	℃	107	107	121	110	100	104	107
	Softening point	℃	113	114	128	115	107	108	111
	Hardness (Penetration)	10-1mm	14	7	1	4	5	6	3
	Melt viscosity (140℃)	mPa・s	80	250	650	440	300	150	300
	Features		Has afnity with polar polymers, inorganic compounds and metals etc. Products with high acid value can be emulsied. Acid modied products have reactivity with oligomers having alcohol, amine, isocyanate, and epoxy groups.						
Sample applications	Resin additive		○	○	○	○		○	○
	Mold auxiliary								
	Pigment dispersant			○			○	○	○
	Chlorinated vinyl lubricant		○		○	○	○	○	○
	Ink abrasion resistance agent		○	○	○	○	○	○	○
	Textile processing auxiliary					○	○	○	○
	Paint additive		○		○	○	○	○	○
	Release agent				○		○		
	Rubber processing auxiliary		○						
	Paper quality improvement agent						○		
	Hot melt								

The compliance of our company's products with laws, regulations and standards varies depending on the brand, so please inquire before use.

Hi-WAX™

Data (solubility, compatibility, heat resistance)

Solubility

S: Soluble PS: Partially soluble I: Insoluble
Blend: Wax/Solvent = 1/4
Measurement temperature: 120℃

	General type			High acid value type
	High-density type		Low-density type	
	100P	400P	220P	4202E
(Hydrocarbons)				
Hexane	PS	I	PS	S
Heptane	PS	PS	S	S
Benzene	S	PS	S	S
Toluene	S	S	S	S
Xylene	S	S	S	S
Kerosene	S	S	S	S
Liquid paraffin	S	S	S	S
(Alcohols)				
Methanol	I	I	I	I
Ethanol	I	I	I	I
1-propanol	I	I	I	PS
1-butanol	I	I	I	PS
Diethylene glycol	I	I	I	I
Glycerine	I	I	I	I

	General type			High acid value type
	High-density type		Low-density type	
	100P	400P	220P	4202E
(Ketones)				
Methyl ethyl ketone	I	I	PS	PS
Diethyl ketone	PS	PS	S	S
MIBK	PS	PS	PS	S
(Chlorinated hydrocarbons)				
Dichloroethane	PS	PS	S	S
Trichloroethylene	S	PS	S	S
Carbon tetrachloride	PS	PS	S	S
Chlorobenzene	S	S	S	S
(Other)				
Ethyl acetate	I	I	I	I
Anisole	S	S	S	S
Oleic acid	S	S	S	S
Flaxseed oil	S	S	S	S

Hi-WAX™ dissolves completely when heated in aromatic hydrocarbon solvents such as toluene and xylene.
The general low-density type dissolves more easily than the high-density type, and it dissolves in heptane, diethyl ketone, dichloroethane, trichloroethane, and carbon tetrachloride, but the high-density type only dissolves in some of these solvents.
The high acid value type dissolves easily in polar solvents such as MIBK.

Compatibility

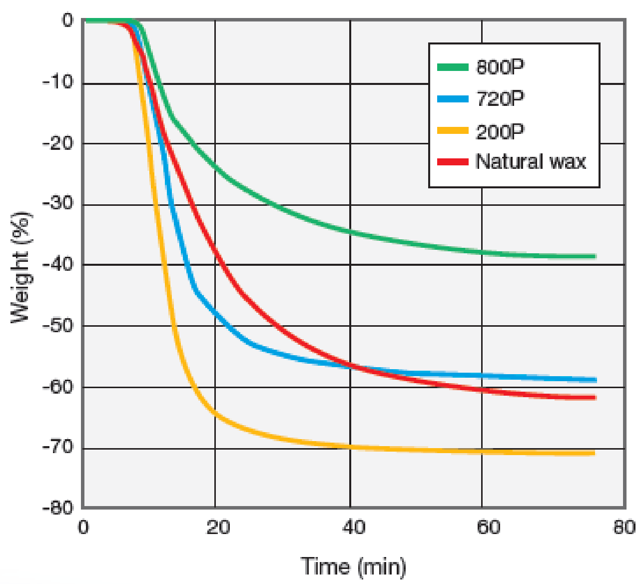
C: Compatible I: Incompatible
Blend: Wax/Material = 1/2
Measurement temperature: 160℃
Heating time: 1 hour

	General type			High acid value type
	High-density type		Low-density type	
	100P	400P	220P	4202E
High-density polyethylene	C	C	C	C
Low-density polyethylene	C	C	C	C
Ethylene vinyl acetate	C	C	C	C
Polybutene	C	C	C	C
Carnauba wax	C	C	C	C
Paraffin wax	C	C	C	C
Micro wax	C	C	C	C
Aliphatic hydrocarbon resin	C	C	C	C
Dioctyl phthalate	C	C	C	C
Flaxseed oil	C	C	C	C
Mineral oil	C	C	C	C
Oleic acid	C	C	C	C
Stearic acid	C	C	C	C

Olefin-based, natural wax and fatty acids all exhibit outstanding miscibility.

Heat-resistance

Weight reduction rate
(maintain temperature of 320℃ for 60 mins.)

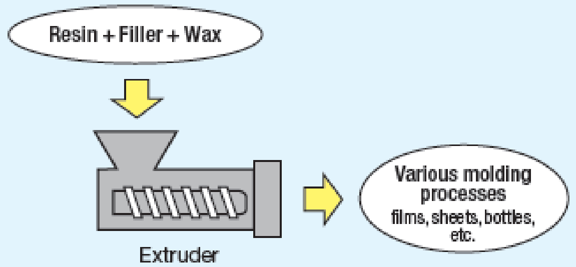


The high molecular weight brand has outstanding heat resistance.

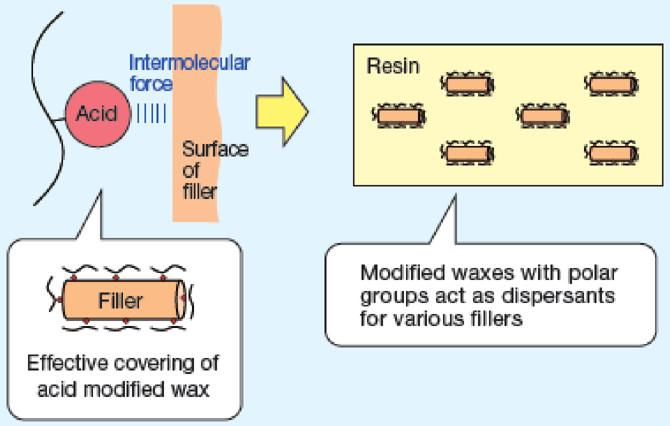
Examples of product use (mold auxiliary, release agent, chlorinated vinyl lubricant, pigment dispersant)

[Filler dispersant (inorganic fibers, natural fibers, nanofillers, etc.)]

Example of use



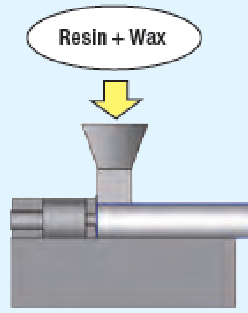
Filler dispersion mechanism by our modified wax



Effects Improves the dispersibility of various fillers

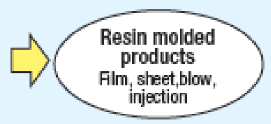
[Mold auxiliary]

Example of use



Effects

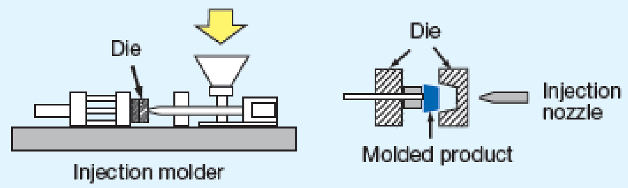
- **Extrusion molding (film, sheet)**
  Reduces resin pressure and torque
  Increases extrusion rate,
  and reduces extrusion temperature
- **Blow molding**
  Reduces mold temperature,
  and shortens cooling cycle
- **Injection molding**
  Improves fluidity, and reduces molding temperature and shorter cooling cycle



[Application as a mold release agent for injection molding]

Example of use

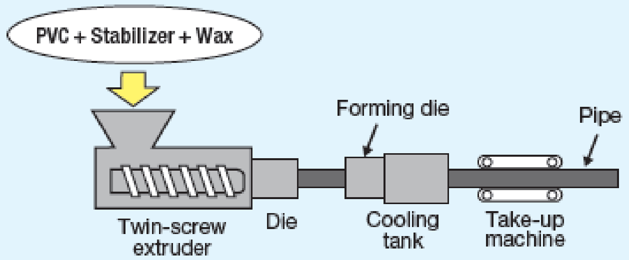
PS, ABS resin (Resin/Wax = 100/0.5)



Effects Enables shortening of molding cycle

[PVC lubricant]

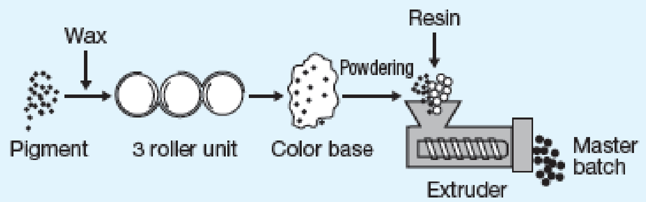
Example of use PVC/Stabilizer/Calcium carbonate/Ca-St/Wax
= 100/0.7/3.0/0.5/0.5



Effects Enables superior appearance of molded products

[Pigment dispersant]

Example of use



Pigment/Wax = 50/50
Color base/Resin = 40/60

Effects Enables increased concentration of master batch