Hi-WAX™ EXCEREX™

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Mitsui Chemicals

Functional polyolefin with low molecular weight

Hi-WAX™ EXCEREX™

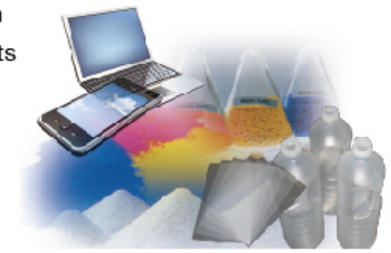
We respond to needs in all fields with a broad range of brands, from polymeric to cracked types.

Hi-WAX™
EXCEREX™

Features of Hi-WAX™ and EXCEREX™

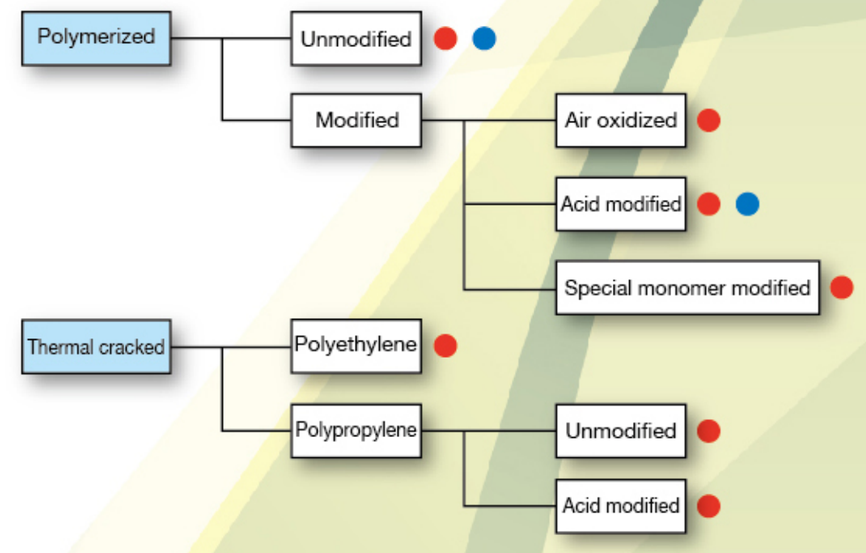
- Hi-WAX™ is a brand of polyethylene wax made by direct polymerization of ethylene, and polyolefin wax made by a thermal cracking method, both developed by Mitsui Chemicals based on its unique Ziegler catalyst polymerization technology.
  It is used in a broad range of applications, including pigment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

- EXCEREX™ is a metallocene catalyst based polyethylene wax, marketed for the first time in the world in 2004. Precise molecular design technology has enabled melting point reduction, lower molecular weight, greater hardness, and provision of reactive groups.
  This wax achieves results that are impossible with conventional catalysts—cutting low softening point components which cause stickiness in resin molding applications, and low molecular weight components which bleed out onto the molded product surface and affect appearance and adhesion. Thus the product can be used worry-free.



Our product categories

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

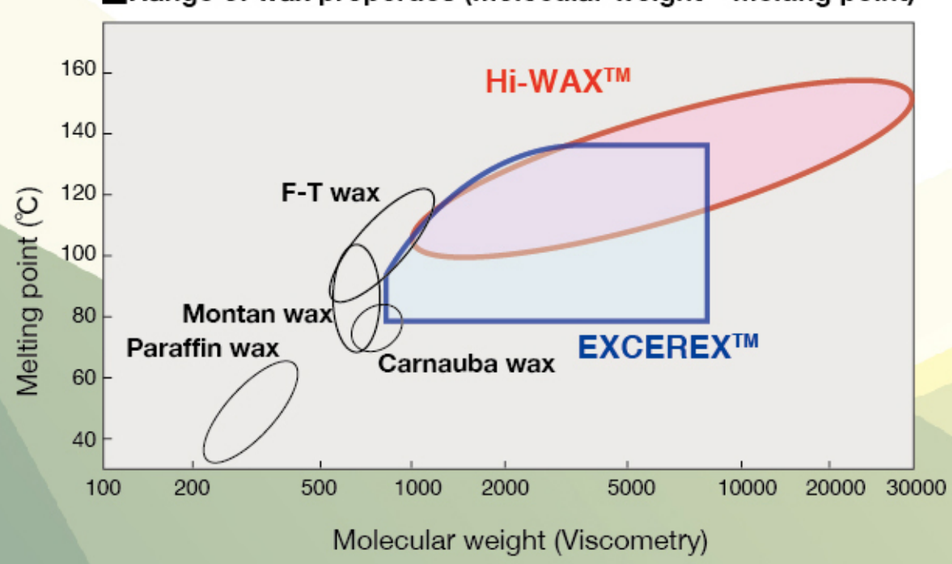


● Hi-WAX™
● EXCEREX™ (Uses metallocene catalyst)

Positioning of our company's products

Broad property control is made possible by exploiting Mitsui Chemicals' unique manufacturing methods

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



Molecular weight-density distribution of our products

We have brands with a wide range of molecular weights and densities

■Molecular weight -Density of polyolefin wax

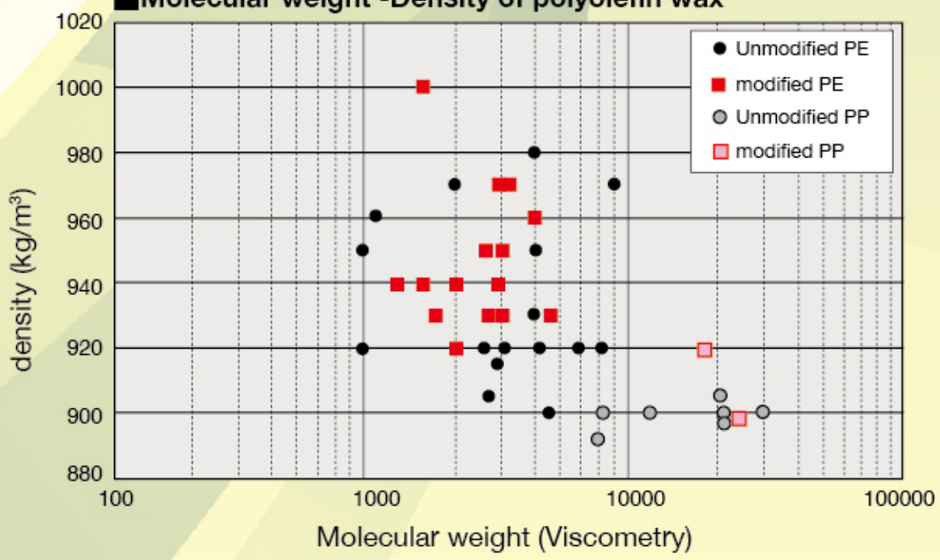


Table of brands and correspondences with applications

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

【EXCEREX™】 General polymeric/modified type (Metallocene catalyst)※1

Property	Units	Test method	07500	10500	20700	40800 40800T ※2	30200B 30200BT ※2	30050B	15341PA
Classification			High-density type				Low-density type		Acid modified type
Molecular weight	-	Viscometry	700	1000	2000	4000	2900	2700	1700
Density	kg/m³	JIS K7112	950	960	970	980	915	905	930
Acid value	mgKOH/g	JIS K0070	-	-	-	-	-	-	14
Crystallinity	%	X-ray diffractometry	91	91	92	87	57	48	72
Melting point	℃	DSC method	115	119	124	128	102	91	89
Softening point	℃	JIS K2207	120	124	129	135	105	99	109
Hardness (Penetration)	10^{-1}mm	JIS K2207	1	<1	<1	<1	6	7	3
Melt viscosity (140°C)	mPa・s	B type viscometer	10	20	80	750	270	260	70
Features			Narrow molecular weight distribution and composition distribution. Can be designed as a low melting point and low density.						
Sample applications									
Resin additive									○
Mold auxiliary						○	○	○	
Pigment dispersant					○		○	○	
Chlorinated vinyl lubricant									
Ink abrasion resistance agent			○	○	○	○			
Textile processing auxiliary									
Toner release agent									
Paint additive				○	○				○
Glazing agent									
Release agent									
Rubber processing auxiliary									
Paper quality improvement agent									
Hot melt			○						
Electrical insulation agent									
Natural wax compounding agent									

【Hi-WAX™】 General polymeric type

Property	100P HP10A ※3	200P 200PF ※3	400P 400PF ※3	800P 800PF ※3	110P	210P	220P	320P	410P	420P	720P
Classification	High-density type				Low-density type						
Molecular weight	900	2000	4000	8000	1000	2000	2000	3000	4000	4000	7200
Density	950	970	980	970	920	940	920	930	950	930	920
Acid value	-	-	-	-	-	-	-	-	-	-	-
Crystallinity	90	87	85	84	80	75	70	65	80	70	60
Melting point	116	122	126	127	109	114	110	109	118	113	113
Softening point	121	130	136	140	113	120	113	114	122	118	118
Hardness (Penetration)	2	1	<1	<1	25	4	13	7	2	3	3
Melt viscosity (140°C)	15	80	600	8000	20	80	80	250	650	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											
Toner release agent				○							
Paint additive		○	○	○	○		○		○	○	
Glazing agent									○		
Release agent		○	○	○							○
Rubber processing auxiliary					○	○	○	○			
Paper quality improvement agent											
Hot melt		○	○		○		○				
Electrical insulation agent		○									
Natural wax compounding agent					○						

【Hi-WAX™】 Modified type

Property	210MP	220MP	310MP	320MP	405MP 405MPF ※3	4051E	4052E	4202E	4252E	1105A	2203A	1120H	1160H
Classification	Oxidized type (Low acid value)					Oxidized type (High acid value)				Acid modified type		Special monomer modified type	
Molecular weight	2000	2000	3000	3000	4000	3200	3000	2600	2900	1500	2700	1200	1500
Density	940	920	950	930	960	970	970	950	940	940	930	940	1000
Acid value	1	1	1	1	1	12	20	17	17	60	30	-	-
Crystallinity	75	65	80	70	80	74	75	62	47	60	65	58	30
Melting point	112	107	114	107	121	115	110	100	94	104	107	107	104
Softening point	118	113	122	114	128	120	115	107	98	108	111	108	105
Hardness (Penetration)	3	14	3	7	1	1	4	5	5	6	3	7	1
Melt viscosity (140°C)	80	80	250	250	650	500	440	300	480	150	300	40	1100
Features	Has affinity with polar polymers, inorganic compounds and metals etc. Products with high acid value can be emulsified. Acid modified products have reactivity with oligomers having alcohol, amine, isocyanate, and epoxy groups.											Has good compatibility with aromatic resins such as PS, ABS, and PES.	
Sample applications													
Resin additive	○	○	○	○	○	○	○		○	○	○	○	
Mold auxiliary													
Pigment dispersant				○		○		○		○	○	○	○
Chlorinated vinyl lubricant	○	○			○		○	○		○	○		
Ink abrasion resistance agent		○	○	○	○	○	○	○		○	○	○	
Textile processing auxiliary						○	○	○	○	○	○		
Toner release agent							○					○	○
Paint additive		○	○		○	○	○	○	○	○	○		
Glazing agent												○	
Release agent					○			○	○				
Rubber processing auxiliary	○	○											
Paper quality improvement agent								○					
Hot melt													
Electrical insulation agent													
Natural wax compounding agent													

【Hi-WAX™】 Thermal cracked type (Polyethylene) / Thermal cracked type (Polypropylene)

Property	NL100	NL200	NL500	NL800	NL900	NP055	NP105	NP505	NP805	NP056	NP506	NP500	NP0555A	NP50605A
Classification	Thermal cracked type (Polyethylene): General type					Thermal cracked type (Polypropylene): General type				Low softening point		High softening point	Acid modified type	
Molecular weight	2600	3100	4200	5900	7200	7300	11000	21000	30000	7000	21400	20600	18000	24000
Density	920	920	920	920	920	900	900	900	900	892	897	905	919	898
Acid value	-	-	-	-	-	-	-	-	-	-	-	-	45	11
Crystallinity	54	54	54	52	59	60	64	60	60	65	62	70	61	58
Melting point	103	103	103	103	103	138/145	140/148	143/150	145/152	124/134	128/138	153/161	129/138	126/135
Softening point	110	110	110	111	112	150	153	156	158	131	137	165	143	135
Hardness (Penetration)	3	3	3	3	2	1	<1	<1	<1	2	<1	<1	<1	<1
Melt viscosity (140°C)	200	300	1000	3700	7400	50 (180℃)	140 (180℃)	710 (180℃)	2000 (180℃)	60 (180℃)	770 (180℃)	710 (180℃)	500 (180℃)	1100 (180℃)
Features	Crystallinity is markedly low, so dispersion is high.					Has a high softening point, and the highest hardness and melting point. Has high affinity with polar polymers, inorganic compounds and metals etc. The acid modified type can be emulsified and has high affinity with inorganic materials.								
Sample applications														
Resin additive	○	○	○	○		○			○				○	
Mold auxiliary														
Pigment dispersant	○	○	○	○	○				○					○
Chlorinated vinyl lubricant	○					○	○							
Ink abrasion resistance agent														
Textile processing auxiliary														
Toner release agent				○	○	○	○	○	○	○		○		
Paint additive									○		○			
Glazing agent														
Release agent				○										
Rubber processing auxiliary														
Paper quality improvement agent												○		
Hot melt						○	○	○						
Electrical insulation agent														
Natural wax compounding agent														

※1 Other IPA dispersion types are also available.
※2 Brands with a T suffix have a tablet form.
※3 HP10A and Brands with a F suffix have a small grain size.

The compliance of our company's products with laws, regulations and standards (Japan Hygienic Olefin and Styrene Plastics Association, Japan Hygienic PVC Association, US FDA etc.) varies depending on the brand, so please inquire before use.

Hi-WAX™ EXCEREX™

Data (solubility, compatibility, heat resistance, molecular weight distribution and composition distribution)

Solubility

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

	General type			High acid value type
	High-density type		Low-density type	
	100P	400P	220P	4202E
(Hydrocarbons)				
Heptane	PS	PS	S	S
Hexane	PS	I	PS	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-butanol	I	I	I	PS
1-propanol	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.

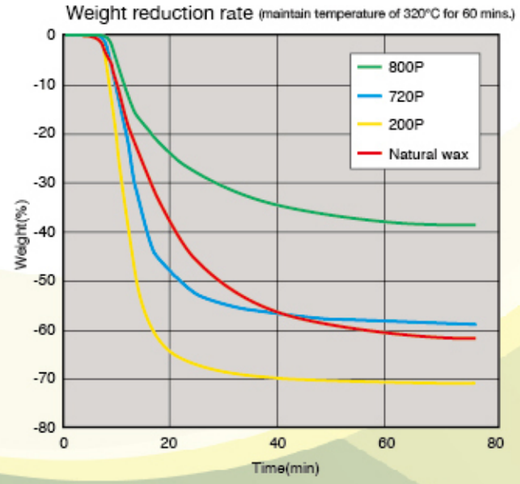
Compatibility

C: Compatible PC: Partly compatible
I: Incompatible
Blend: Wax/Material = 1/2
Measurement temperature: 160°C
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.

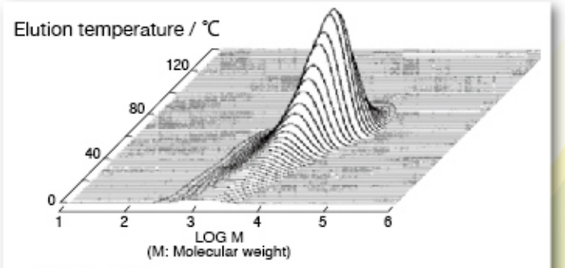
Heat-resistance



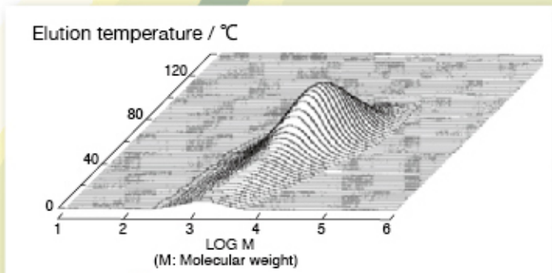
The high molecular weight brand has outstanding heat resistance.

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



EXCEREX™
(Molecular weight (viscometry) 4000, D=930kg·m-3)

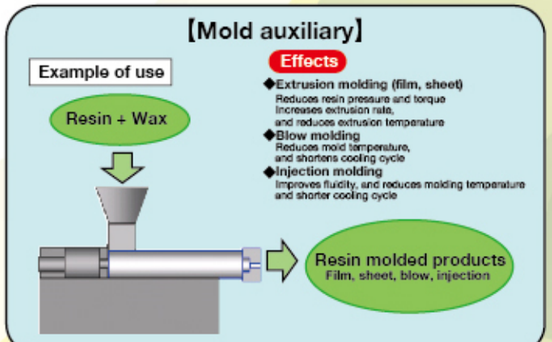


Hi-WAX™
(Molecular weight (viscometry) 4000, D=930kg·m-3)

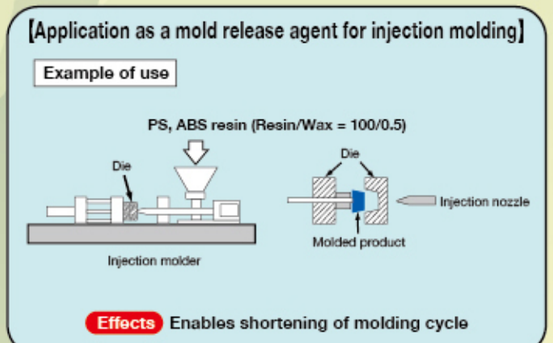
EXCEREX™ is a product using metallocene catalyst.
It is designed with a narrow molecular weight distribution and composition distribution, and little stickiness or bleed out.

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

【Mold auxiliary】

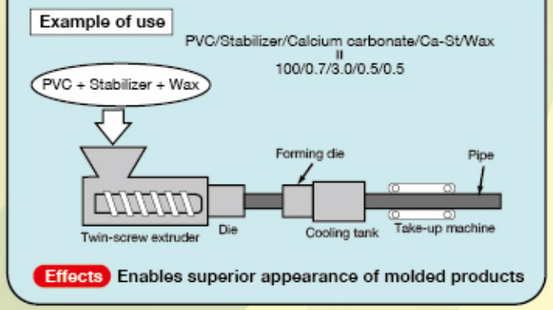


【Application as a mold release agent for injection molding】



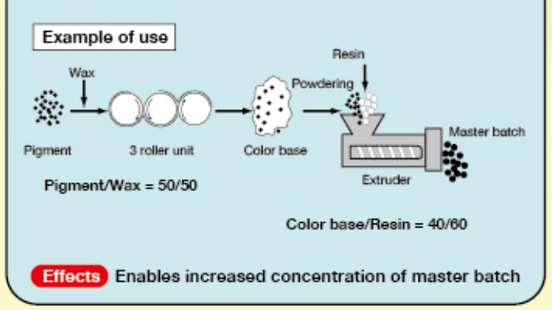
Effects Enables shortening of molding cycle

【PVC lubricant】



Effects Enables superior appearance of molded products

【Pigment dispersant】



Effects Enables increased concentration of master batch