

Adding New Functions to Resins with Excellent Dispersing and Compatibilizing Effects

Polyolefin-based Resin Modifier 'UMEX' Series



On the bumper of a car

Polyolefins, including polyethylene (PE) and polypropylene (PP), the highest-volume resins in the world, are used in a wide range of applications in our daily life. However, polyolefins also have some problems, such as compatibility with other resins, dispersibility of pigments, adhesion to paints, etc. This article introduces the 'UMEX' Series, which addresses these problems.

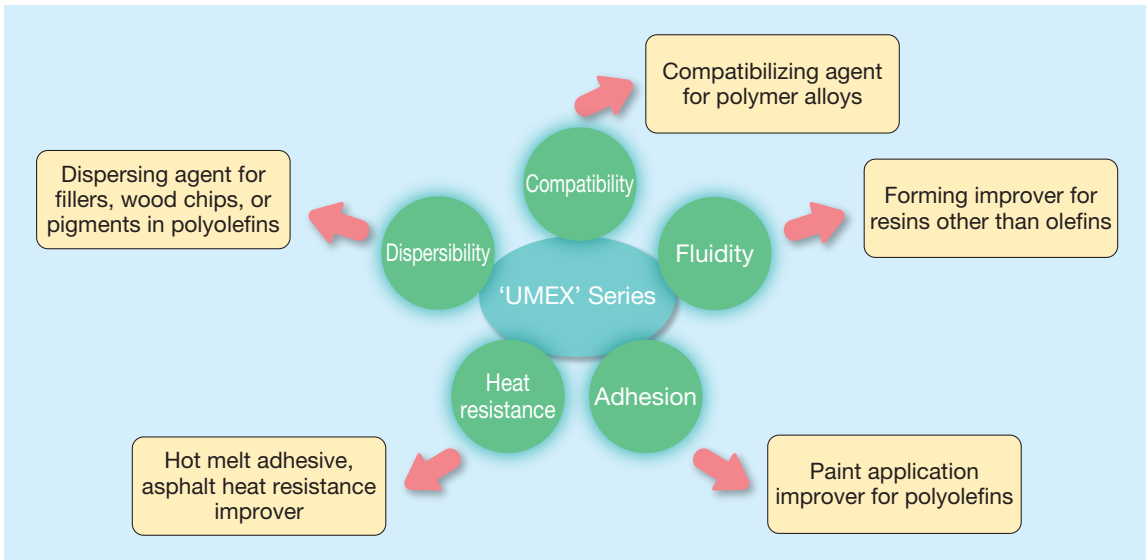
Surfactant-like functions

'UMEX' was developed as a compatibilizing agent to facilitate the blending of different resins. It acts as a surfactant, combining a hydrophobic polyolefin component with a hydrophilic anhydrous carboxylic acid

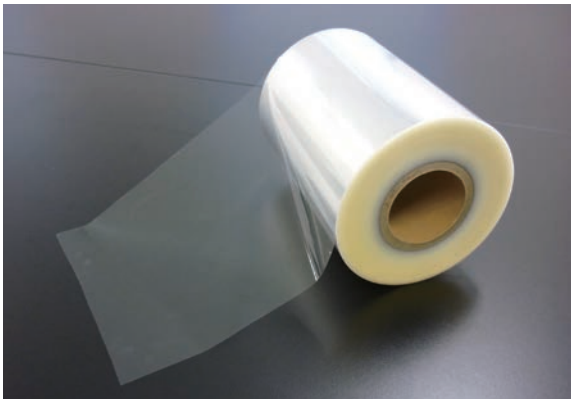
component. It is based on maleated low molecular weight polyolefin resin, developed with the proprietary technology of Sanyo Chemicals. It exhibits both low melt viscosity and high maleic acid content. 'UMEX' is active at the interface between dissimilar materials. It's a unique product, unlike any other on the market, effective for the improvement of dispersion, adhesion or surface modification, depending on the application.

An important application of 'UMEX' is the modification of thermoplastic polyolefin car bumpers to improve paint adhesion to the bumper. 'UMEX' outstanding performance explains why it's widely used in this application.

Major applications of 'UMEX' Series



On wood decks and PP films



The second-most popular application its use as a dispersant for mixing various inorganic and organic fillers in resins. Various fillers are used in PP film-based packaging films.

Furthermore, fiber reinforced plastics combine thermoplastic resins and fibers in order to increase strength, with glass fiber being the main reinforcing fiber in use today. However, glass fiber is not compatible with thermoplastic resins. Simply mixing these components will not result in reinforcement, since the resin does not naturally “wet” or bond to the surface the fiber. However, the addition of 'UMEX' to the resin allows excellent bonding to the glass fiber and results in reinforcement and improved composite strength.

Next are wood fiber reinforced plastics. These materials are based on pulverized waste wood chips mixed with thermoplastic resin. They answer the need for sustainable environmentally sensitive materials. These materials are used widely as in decks and outdoor furniture.

'UMEX' is also used as a process aid in thermoplastic molding compounds for resins such as polypropylene.

Further expanding applications

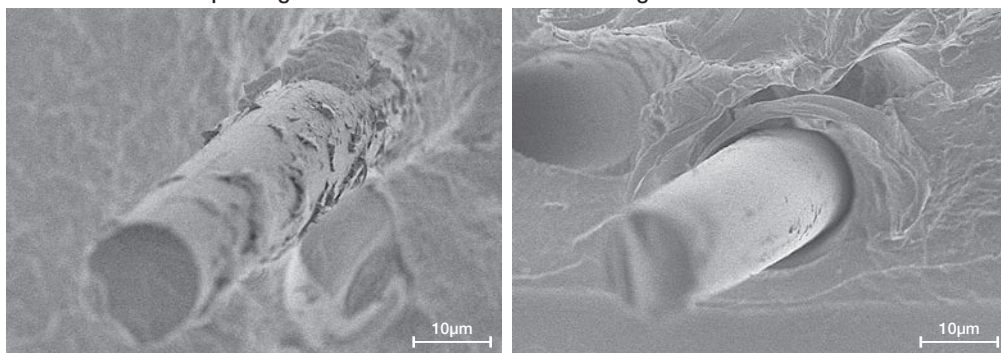
An important Ecoplastic is made by mixing kenaf, a natural fiber similar to bamboo, with polypropylene. Kenaf is a very environmentally

■ Typical properties of 'UMEX' Series

Product name	UMEX 1001	UMEX 1010	UMEX 100TS	UMEX 5202 (developed product, low melting point type)
Appearance	Yellow granule	Yellow granule	Pale yellow powder	Yellow granule
Density (g/cm ³)	0.95	0.95	0.89	0.90
Melt viscosity (mPa·s)	15,000	6,000	120	20,000
Melting point (°C)	142	135	136	115
Acid value (mgKOH/g)	26	52	3.5	11
Molecular weight (Mw)	45,000	30,000	9,000	70,000

<Measurement conditions> Density: In conformance with ASTM D792, melt viscosity: Measured at 160°C (200°C for UMEX CA620 only), melting point: DSC method, acid value: In conformance with JIS K0070, molecular weight: High-temperature GPC method

■ Electron microscope images of interface conditions between glass fiber and PP



UMEX 5202 (1% by mass) added

No UMEX addition

(Adhesion between glass fiber and PP on the interface is improved by addition of UMEX)

friendly material due to its high rate of absorption of carbon dioxide during its growth. Another promising field is the polymer alloy field, where two or more different polymers are combined as an alloy so that a new material, such as a biodegradable plastic, can be created incorporating the advantages of each component resin.

In addition, there is a fiber-reinforced plastic that is generating great expectations: it is a composite material of thermoplastic resin and carbon fiber. As it is praised for being “stronger than steel and lighter than aluminum,” it is an extremely light material with high strength and elasticity. While it is being adopted in high performance aerospace applications, it is expected that it will also gain acceptance in the automotive field in the future, where weight reduction is an important goal due to

the need to improve fuel efficiency due to the threat of global warming.

Sanyo Chemical is currently developing new 'UMEX' grades with lower melting points. This will expand its application to resins with lower melting points where it could not have been used before. It will not only improve work and production efficiency with favorable handling properties, but also contribute greatly to energy saving as processing temperatures can be reduced. In the future, there is also high potential for the expansion of 'UMEX' as overseas molding manufacturers improve molding technology.

Sanyo Chemical will continue to devote our efforts to development of resin-related products that are friendly to the global environment.