TECHNICAL UPDATE

CRAY VALLEY
Hydrocarbon Specialty Chemicals

Utilize the Compatibility of Wingtack® 10 Liquid Aliphatic Resin

Benefits

- Compatible with a variety of common polymers
- Low molecular weight
- Low viscosity
- Excellent process aid, tackifier, diluent, compatibilizer
- Low color
- Intermediate glass transition temperature (Tg)
- Non-reactive, hydrophobic character

Target Markets/Applications

- Rubber compounds
- Adhesives
- Sealants
- Coatings
- Thermoplastics

Additional Information

MSDS/TDS: Wingtack® 10

Description

Cray Valley HSC offers a unique liquid resin that enjoys compatibility with many high molecular weight polymers employed in a diverse set of end-use applications. Compatibility is important for an additive to bring maximum benefit when compounded with a chosen polymer system. Wingtack® 10 is highly aliphatic and of very low molecular weight, both critical parameters that promote compatibility with a wide variety of polymers. Typical properties of Wingtack 10 are provided in the table below.

Table 1: Typical properties of Wingtack 10.

Product	Type	Mn (g/mol)	Tg (°C)	Viscocity (cps at 25 °C)	Color (Gardner)
Wingtack 10	Aliphatic Resin	500	-30	30,000	1.5

TECHNICAL UPDATE

Utilize the Compatibility of Wingtack® 10 Liquid Aliphatic Resin

CRAY VALLEY
Hydrocarbon Specialty Chemicals

Background

Traditionally used as a tackifying resin in hot melt and pressure sensitive adhesive applications, Wingtack 10 has more recently been adopted for use in other applications. An inventory of structure-property relationships provides a foundation for understanding the value of the resin. Wingtack 10 has a higher molecular weight than traditional oils, but still displays a relatively low viscosity. The result is a resin that can be used as a process oil or plasticizer that, once compounded into a compatible system, will not migrate between components or bleed to the surface. Wingtack 10 has an intermediate Tg that can help differentiate products when compared to traditional tackifier or plasticizer choices. For adhesives and sealants, the Tg is significantly lower than standard high softening point hydrocarbon resins; therefore incorporation of Wingtack 10 into styrene block copolymers can maintain flexibility and surface tack in low-temperature applications. Compared to aromatic or naphthenic oils, when used with compatible elastomers as a processing aid, the resin can also improve performance properties through changes in the viscoelastic spectrum. Wingtack 10 can also impart hydrophobicity when formulated as a binder or carrier in coatings applications. When blended into thermoplastic polymers, Wingtack 10 can reduce the melt viscosity of the system.

Results

As compatibility is the key parameter when identifying useful additives in formulations based on polymer systems, the compatibility of Wingtack 10 was measured in a diverse set of commercial polymers. The polymers selected are widely used in adhesive, sealant, and rubber applications. The selected materials span a range of polarity, from highly non-polar metallocene polyolefins to mixed-polarity styrene block copolymers (SBC) to ethylene-vinyl acetate copolymers (EVA). Rotational viscometry was used to measure the compatibility of the resin with polymers by comparing the viscoelastic profile of the parent polymer and an 80/20 polymer/resin (wt/wt) binary blend with Wingtack 10.

Figures 1, 2 and 3 provide examples of the changes to the viscoelastic spectrum that can be expected based on the addition of a resin to a parent polymer. Compatibility between the polymer and Wingtack 10 resin will result in changes to the dynamic modulus (G') and tangent delta (tan δ) curves when compared to the virgin polymer. Figures 1 and 2 show the characteristic behavior of compatible polymer-resin blends, using a styrene-butadiene-styrene (SBS) and a metallocene polyolefin (mPO) as examples. The G' transition shifts and the plateau modulus decreases due to the plasticization of the compatible blend. Looking at tan δ, a shift of the peak to higher temperature (since the Tg of Wingtack 10 is higher) and the accompanying increase in peak height indicate a compatible blend. In comparison, the profile of a natural rubber (NR) blend indicated only partial compatibility (Figure 3). While the tan δ peak shifted slightly, there was little peak height change and minimal differences in the G' curves.

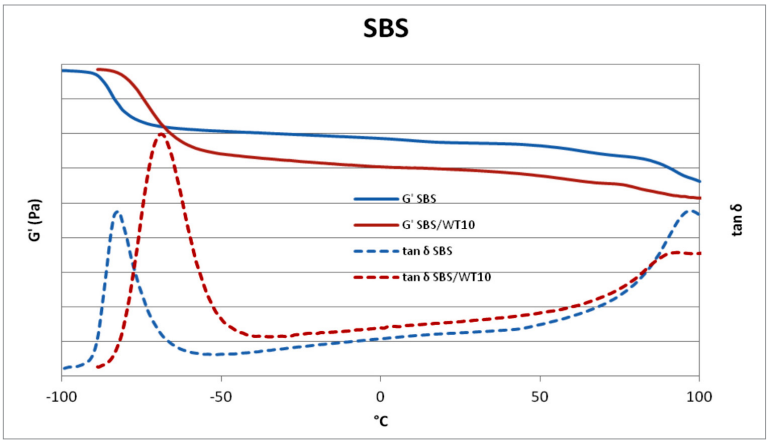

Figure 1: Blend of SBS/WT10 compared to virgin SBS.

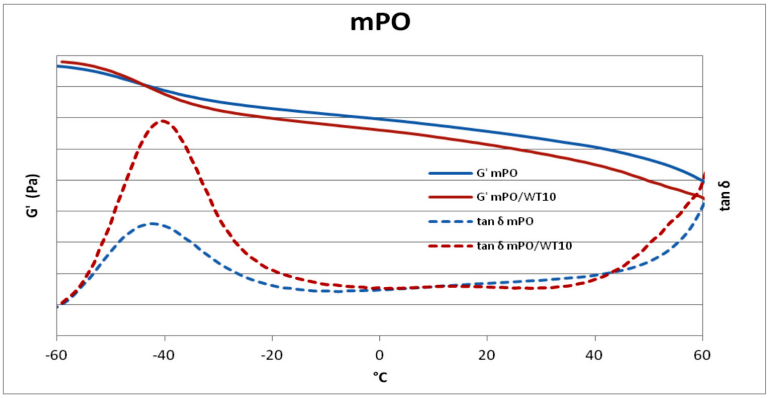

Figure 2: Blend of mPO/WT10 compared to virgin mPO.

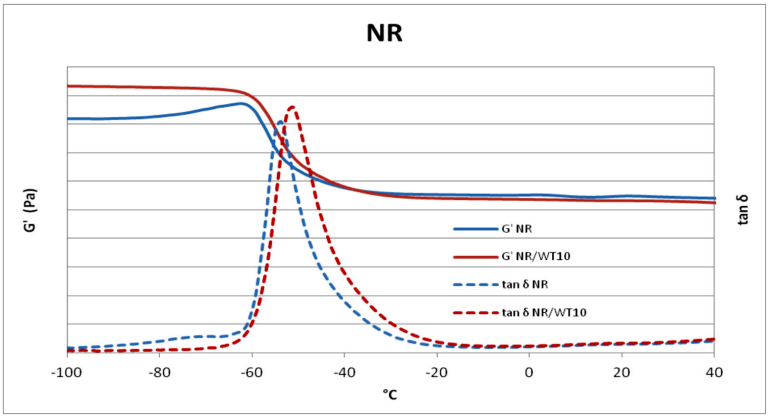

Figure 3: Blend of NR/WT10 compared to virgin NR.

CRAY VALLEY
Hydrocarbon Specialty Chemicals

Based on the principles outlined above, Table 2 provides a useful guide for determining the extent of compatibility when blending Wingtack 10 with a given polymer type. Compatibility of resins in polymers is determined primarily by two factors: composition and molecular weight. Compositional parameters such as polarity, microstructure, and other features can be compared. In general, the lower the molecular weight of the resin component, the larger the window of compatibility. For petroleum-based HCRs, composition is primarily measured on a scale of aliphatic to aromatic content. As a highly aliphatic resin, Wingtack 10 is most compatible with polymers having higher aliphatic character.

Table 2: Compatibility of Wingtack 10 with a variety of polymers, based on key changes in the viscoelastic spectrum.

Polymer Type	Polymer Grade	Compatible	Partially Compatible
mPO	Affinity™ GA1900	✓	
TPO	Engage™ 7387	✓	
EPDM	Nordel™ 4640	✓	
SBS	Kraton® D1118	✓	
SIS	Kraton® D1161	✓	
ESBR	Plioflex® 1502	✓	
SSBR	Buna® VSL VP4041	✓	
PI	Natsyn® 2200		✓
NR	SMR CV60		✓
EVA*	Elvax® 410W		✓

*Lowering the vinyl acetate level in EVAs will increase compatibility.

Conclusions

Wingtack 10 is a versatile resin that can be successfully blended with a wide variety of elastomeric and thermoplastic polymers to enhance the rheology, improve the physical properties, and potentially decrease the cost of a compound. Wingtack 10 can be used in a range of applications, including hot melt and pressure sensitive adhesives, flexible sealants, tires and other engineered rubber articles, thermoplastic compounds, paints and coatings, and those in specialty markets. By virtue of the resin's low molecular weight and high aliphatic content, Wingtack 10 is compatible with many polymer types.

For more information, please contact **TechSupport@CrayValleyUS.com** or visit **www.crayvalley.com**.

TECHNICAL UPDATE

Utilize the Compatibility of Wingtack® 10 Liquid Aliphatic Resin

CRAY VALLEY
Hydrocarbon Specialty Chemicals

About Cray Valley HSC Division

Cray Valley USA, LLC, is the premier global supplier of specialty chemical additives, hydrocarbon specialty chemicals, and liquid and powder tackifying resins used as ingredients in adhesives, rubbers, polymers, coatings and other materials. Cray Valley has pioneered the development of these advanced technologies, introducing hundreds of products that enhance the performance of products in energy, printing, packaging, construction, tire manufacture, electronics and other demanding applications.

* The listed properties are illustrative only, and not product specifications. Cray Valley disclaims any liability in connection with the use of the information, and does not warrant against infringement by reason of the use of its products in connection with other materials or in any process.

TOTAL