Stabilization Technologies LLC

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The Effect of UVITA SME-3811 on Hydroxy Substituted Triazine Ultraviolet Absorbers

In the last twenty years the introduction of hydroxy-substituted triazine ultraviolet absorbers were introduced initially into the coating market to resolve problems with OEM coating delamination problems which were related to E Coat protection that hydroxy substituted benzotriazoles were not capable of providing due to volatility and wavelength related limiations. Today their introduction beyond coatings into plastics has been problematic due in part to increase cost and wavelengths beyond the limits of the chemistry. Other factors include limited synergisms and rates of conversion in-situ.

In-situ conversion rates of all organic ultraviolet absorbers differ significantly depending on the polymer matrix, system environment and exposure conditions.

In this study we looked at one of the very first chemistries from this class to be introduced into the market called Cyasorb 1164.

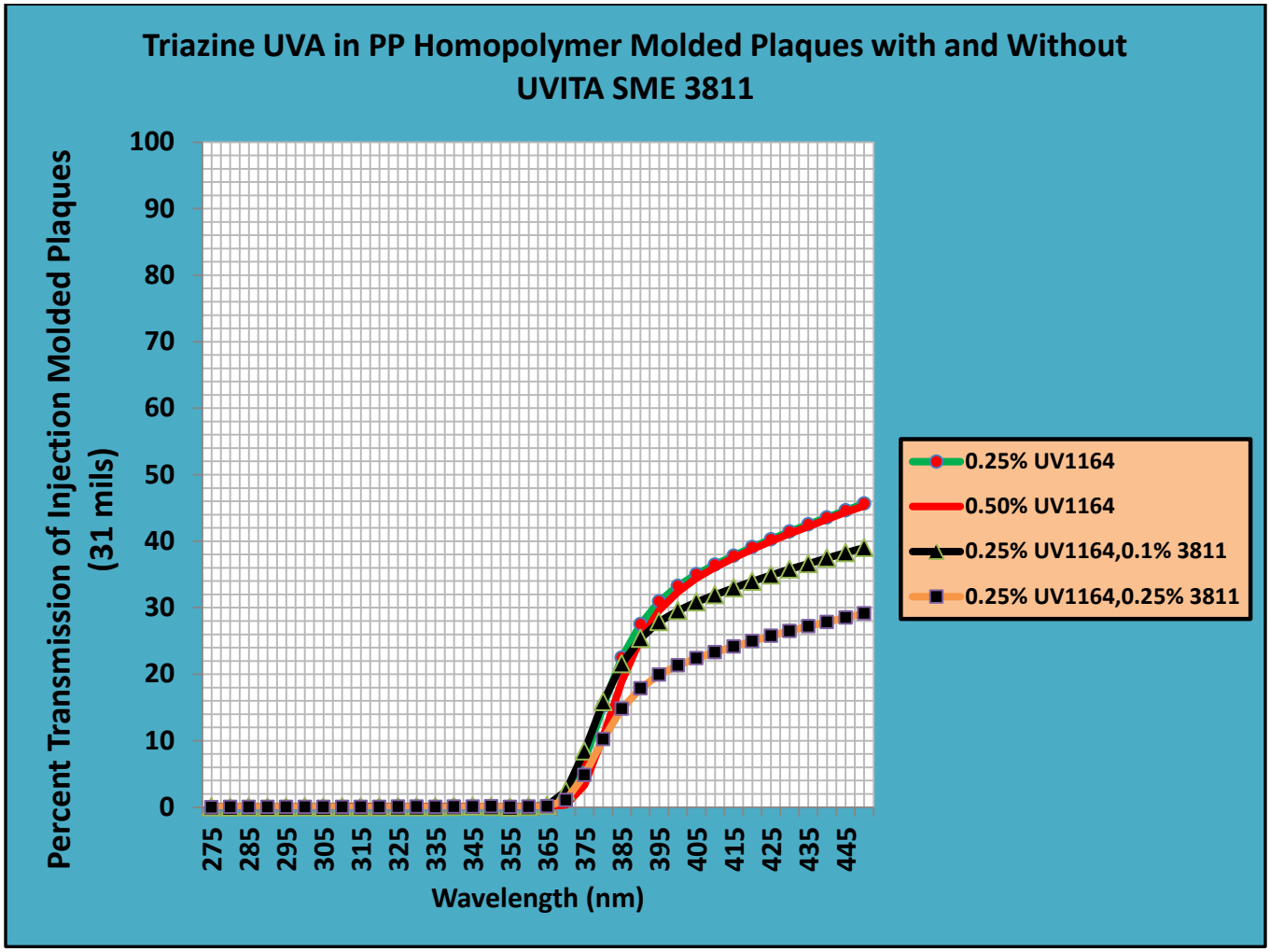
Cyasorb UV1164 chemically is Phenol,2-(4,6-di-2,4-xylyl-s-triazin-2-yl)-5-(octyloxy)- (7CI,8CI);Phenol, 2-4,6-bis(2,4-dimethylphenyl)-1,3,5-triazin-2-yl-5-(octyloxy)-;2-(4,6-bis(2,4-dimethyl-phenyl)-1,3,5-triazine-2-yl)-5-Octyloxy phenol;2-(4,6-Bis-(2,4-dimethylphenyl)-1,3,5-triazin-2-yl)-5-(octyloxy)-phenol.

The powder has a melting point of 88-91C and a molecular weight of 510 as reported in the open literature.

In this study we produced polypropylene compounds containing Cyasorb UV1164 with and without UVITA SME-3811. UVITA SME-3811 is a spectral enhancer already reported to have significant positive benefits on hydroxy-substituted benzophenones and other classes of organic ultraviolet absorbers.

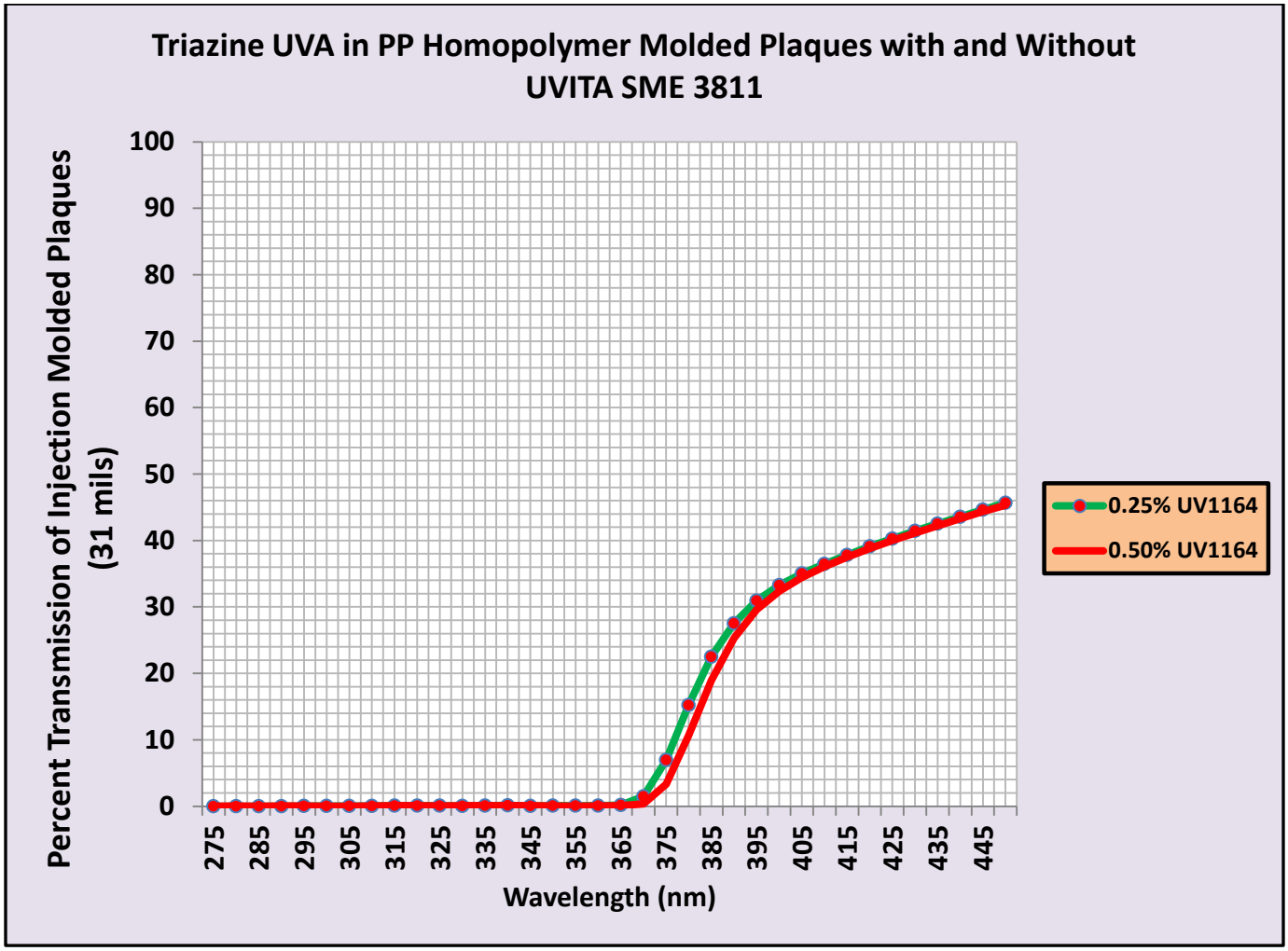
The mechanism of spectral enhancers is plasmonic. Light absorbance by the spectral enhancer is synergistically coupled with the electronic state of the absorbance of the organic Ultraviolet absorber causing hyperchromic increases in absorbance and in most cases a bathochromic red shift to higher wavelengths. Today more than one spectral enhancer has been discovered that provides this extraordinary enhancement in absorbance/absorptivity of the organic ultraviolet absorber. This effect in many cases decreases in-situ conversion of the organic UVA.

Figure 1: UVA with and without UVITA SME-3811 in Injection Molded Polypropylene 30 mil plaques



Addition of UVITA SME 3811 lowers percent transmission beyond 365 nm cut-off by the organic UVA. A slight bathochromic shift occurs at a 1:1 ratio of spectral enhancer with the organic UVA indicating that a specific ratio between the organic UVA and UVITA SME-3811 is important. This has been seen with other organic UVA with UVITA.

Figure 2: Cyasorb UV1164 without Spectral Enhancer



Very little benefit in doubling the concentration of the UVA.

Overall, addition of UVITA SME-3811 with this class of organic UVA shows benefits based on the ratio of each additive in polypropylene.

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