

Lit. N-609 (10/04) Nylon Nanocomposites Using Nanomer® I.24TL Nanoclay

General Description:

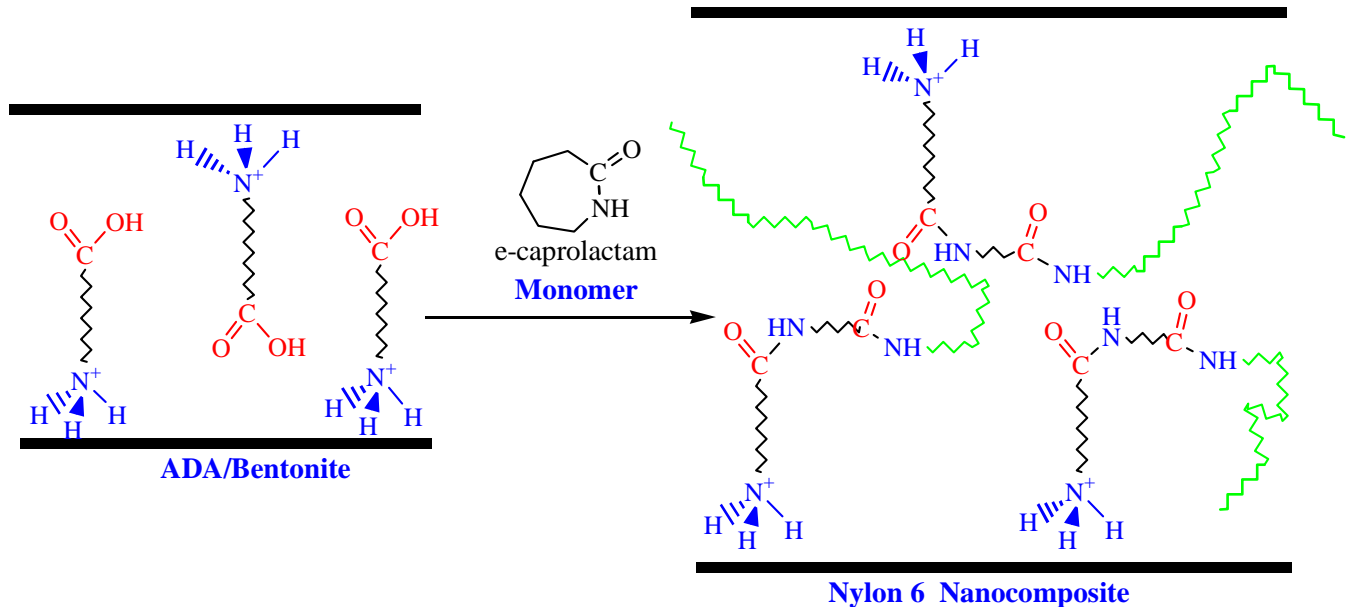
Nanomer® I.24TL nanoclay is a surface modified montmorillonite mineral specifically formulated for use in making nylon 6 nanocomposites via the polymerization method. I.24TL will swell in ϵ -caprolactam and exfoliate completely during condensation polymerization. The process creates a new class of resin materials called nanocomposites, featuring enhanced mechanical and barrier properties. As little as 3% wt./wt. addition will double HDT and reduce gas permeability by 50%.

Tethering Chemistry:

I.24TL contains a unique surface treatment which will participate in polymer chain propagation. Figure 1 illustrates the process. During Nanomer nanoclay production amino ends of the surface treatment are attached strongly to the mineral within the gaps between the platey surfaces (see Tech Data G-100), leaving the carboxylic end-groups available for reaction with amino groups after caprolactam ring-opening. The result is a "tethered" or bound system, in which polymer molecules terminate at the clay surface. Tethered systems show enhanced thermal stability, including greater fire retardancy.

Figure 1

TETHERED SYSTEM

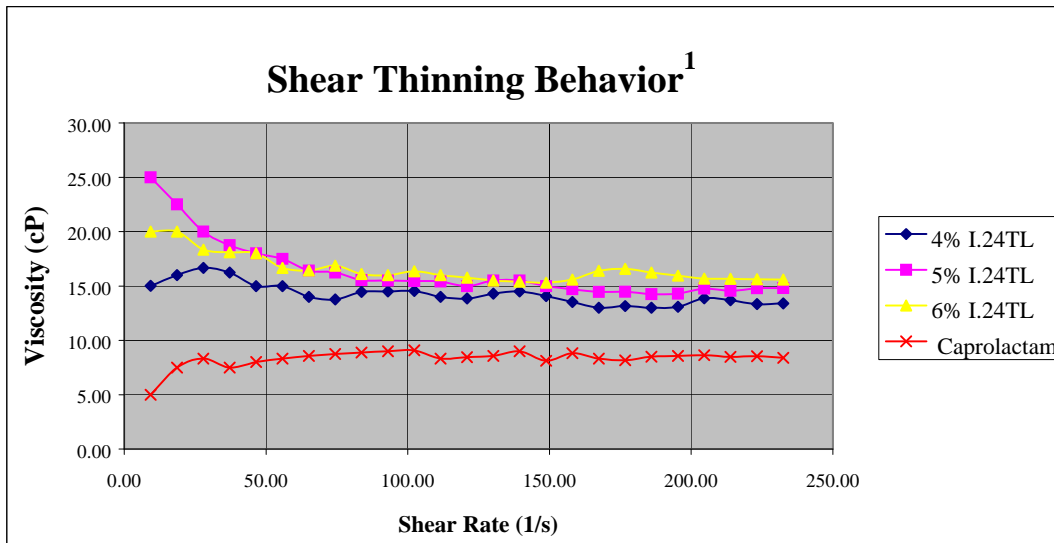


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Viscosity:

When added to a caprolactam melt, I.24TL creates a low viscosity blend with excellent handling characteristics. Polymerization can be carried out smoothly at typical cycle times.

I.24TL blends are shearing thinning. Process equipment can be adapted with minimal modification to handle significantly higher loadings, creating nanocomposites with even greater property enhancements. Loadings of 6-8% wt/wt can be achieved.



¹Melt temperature of 80°C.

Physical Properties

Appearance	White Powder
Mean Dry Particle Size (microns)	16 - 22
+325 Mesh Residue (%)	0.1
Specific Gravity	2.1
Moisture (%)	3.0 max
Bulk Density (pounds/ft ³) (gms/cc)	28 - 32 0.46 - 0.52
Purity (%)	98.5

Regulatory Status:

Polymerized nanocomposites containing I.24TL are regulated for food contact and can be used for all types of packages.

Product Availability:

Available in 20 kg (44 lbs) bags and one short ton bulk bags.

For more information on how Nanomer® nanoclays can work for you, contact Nanocor's Technical Service Group.

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