

# NANOCOMPOSITE COMPOUNDS

Polymer Nanocomposites from RTP Company

## Quick Information

- ▶ **Improved Gas Barrier Properties**
- ▶ **Improved Mechanical and Thermal Properties Compared to Neat Resin**
- ▶ **Low Loading Levels (2-8%) for Increased Stiffness with Minimal Impact on Specific Gravity**

Imagine a thermoplastic compound that incorporates organoclay hybrids into nylon and other resins via the melt compounding process. One that features a mere 2-8% loading, producing lightweight parts with improved properties such as barrier, strength, and stiffness. At RTP Company, we've done more than imagined it, we've made it a reality.

RTP Company provides nanocomposite compounds that are ideal for use in blow molding, injection molding and blown film applications. Nanocomposite compounds contain organically-treated clay that separates into nanometer-sized platelets and disperses evenly throughout the resin. The additive has a large aspect ratio, which is key to the compound's unique properties, particularly barrier enhancement.

One of the most impressive attributes of nanocomposites is their extraordinary barrier properties. Use of these materials in film and sheet applica-

tions yields a four to five-fold improvement in oxygen transmission rate (OTR) over unfilled nylon 6. This makes them especially attractive for packaging applications in the food industry. They are also an ideal choice for packaging in the cosmetic and medical industries.

Other industries that are looking to nanocomposites are the manufacturers of fuel tanks, primarily because of their excellent barrier properties. New standards for permeation rates in fuel tanks for the lawn/garden and recreational vehicle industries have spurred demands for compounds with improved barrier properties. The nanocomposites perform exceptionally well in these applications due to large aspect ratio layers creating an extremely tortuous path for diffusion.

Nanocomposite Compounds from RTP Company... another innovation from the leader in specialty compounding.

NANOCOMPOSITE

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**The Leader in Specialty Compounding**

### Manufacturing Facilities:



Winona, MN  
South Boston, VA  
Fort Worth, TX  
Indianapolis, IN  
Beaune, France  
Singapore  
Suzhou, China

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## Compare Mechanical and Thermal Properties for Nylon 6

RTP Company's nylon 6 nanocomposite compounds show a substantial increase in heat deflection temperature (HDT) over unfilled nylon 6, with very little change in specific gravity. Achieving a similar HDT using a 30% mineral-filled compound results in a 22% increase in specific gravity over unfilled resin. Stiffness is also improved significantly.

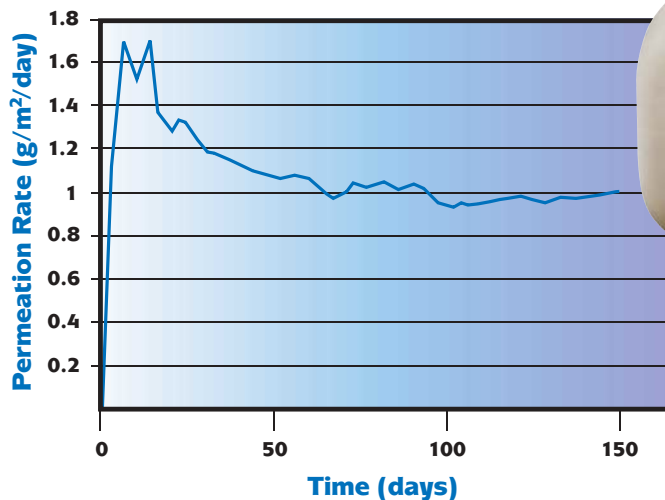
		Nylon 6 Unfilled	Nylon 6 Nanocomposite	Nylon 6 30% Mineral	Nylon 6 10% Glass
Tensile Strength	PSI-	10,000	<b>13,500</b>	9,500	14,000
	MPa-	69	<b>92</b>	65	96
Flexural Modulus	PSI-	420,000	<b>625,000</b>	700,000	600,000
	MPa-	2,900	<b>4,300</b>	4,800	4,100
HDT	@ 264 PSI-	150 °F	<b>215 °F</b>	193 °F	370 °F
	@ 1820 kPa-	65 °C	<b>102 °C</b>	92 °C	190 °C
OTR		1.5 - 6.5	<b>.5 - 1.0</b>		
Specific Gravity		1.13	<b>1.14</b>	1.38	1.21



Nanoclay compounds reduce the amount of oxygen permeating the plastic packaging material used for foods while simultaneously providing greater strength.

## Fuel Permeation Rate of a Blow Molded Tank Using Nylon 6 Nanocomposite Compound

After reaching equilibrium, the nylon 6 nanocomposite shows a dramatic 10 to 20 fold reduction in fuel permeation over standard high density polyethylene.



A comprehensive technical paper titled "Polymer-Silicate Nanocomposites: Commercial Opportunities Via Melt Processing" by Dr. Sam J. Dahman, RTP Company, is also available. Contact Marketing by phone or fax, or visit our website to request a copy.