



PARALOID™ EXL-3361

Acrylic Impact Modifier for Polycarbonate, Polyesters, PC/Polyester Blends, GF Nylons and SAN

PRODUCT DESCRIPTION

PARALOID EXL-3361 modifier is an all-acrylic impact modifier providing excellent thermal stability and superior colorability versus other acrylic impact modifiers in a variety of engineering resins. Because of the core-shell structure and acrylic composition, the improvement in impact is obtained with only minor effect on other mechanical properties, such as modulus and heat resistance, and with no adverse effect on weatherability. Available in pellet form for ease of handling, this modifier is easily processed with the resultant compounds flowing readily in conventional molding equipment.

Improved Impact

Improved impact properties can be expected in the following engineering resins: Polycarbonate (PC), polyesters (PET, PBT, PPT), POM (acetal), styrene-acrylonitrile (SAN) and blends of these thermoplastics. Glass fiber reinforced nylon is another resin system where PARALOID EXL-3361 modifier provides improved toughness. PARALOID EXL-3361 modifier can also be used to upgrade the impact performance of recycled resins.

Excellent Dispersion

PARALOID EXL-3361 modifier has a cross-linked poly(butyl acrylate) core with a grafted polymethyl methacrylate shell. This core-shell structure allows the product to disperse as discrete particles in the matrix. It will not dissolve in solvents or melt.

Conversion Process

PARALOID EXL-3361 modifier finds utility in a variety of conversion processes typically encountered with engineering resins, including extrusion, injection molding, blow molding, and thermoforming.

APPLICATIONS/USES

PARALOID EXL-3361 modifier is especially useful where weatherability, improved thermal stability and colorability is required and low temperature impact strength is not critical. Applications include automotive under-the-hood applications, electric and electronic connectors, and body panels for lawn mowers and tractors.

PHYSICAL CHARACTERISTICS

Chemical Description: Acrylic Polymer

Appearance: Free flowing pellets

Total Volatiles: $\leq 0.5\%$

Tg: $<-45^{\circ}\text{C}$

COMPOUNDING AND INJECTION MOLDING

PARALOID EXL-3361 modifier is particularly easy to disperse into polycarbonate and its blends and can be compounded on either twin-screw or single-screw extruders. It only slightly influences the rheology of these systems. Minor modification may be necessary on injection molding parameters compared to unmodified polycarbonate and its blends with PET.

PRODUCT SPECIFICATIONS

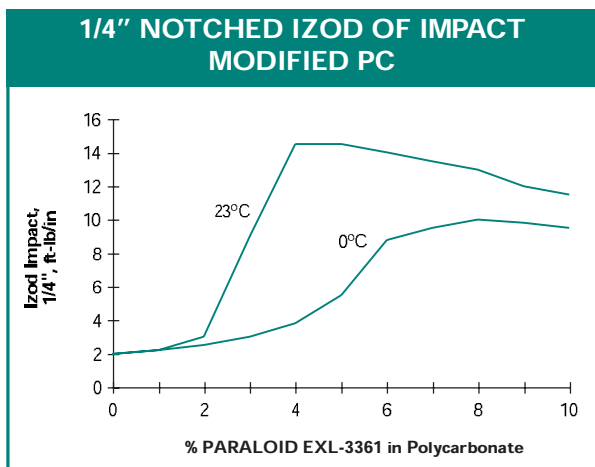
PARALOID EXL-3361 modifier provides the following benefits:

- High impact strength
- Weatherability (high U.V. stability)
- Excellent part surface finish
- Well defined particle size, not influenced by compounding conditions
- High heat stability
- Good retention of part rigidity
- Excellent processability

PARALOID EXL-3361 modifier is manufactured in facilities with ISO9002 quality assurance certifications.

IMPACT PERFORMANCE

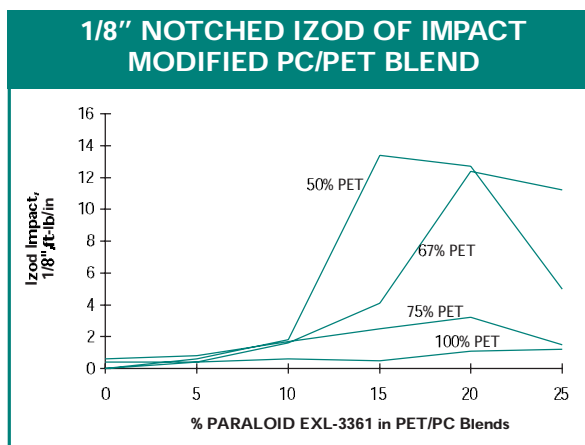
The toughness of polycarbonate even at low temperatures can be significantly improved by the addition of PARALOID EXL-3361 modifier. The effect of the modification is shown in the chart. Recommended use level is 4 to 8% dependent on expected use-temperature requirements.



Toughness of PET/Polycarbonate Blends

While the toughness of polyethylene terephthalate (PET) can be upgraded by modification with PARALOID EXL-3361 modifier, better impact resistance can also be attained by blending the polyester

with polycarbonate in the presence of PARALOID EXL-3361 modifier. With the increasing availability of mixed streams as recycling efforts increase, this becomes an especially attractive option. These recycle blends can also benefit from the improved toughness provided by PARALOID EXL-3361 modifier. While the addition of PARALOID EXL-3361 modifier toughener improves the impact resistance in polyester blends, it has only minor effect on other physical properties as demonstrated in the table below. Typical Izod impact values for 1/8" samples are given in the following chart for blends containing different percentages of PET with polycarbonate.



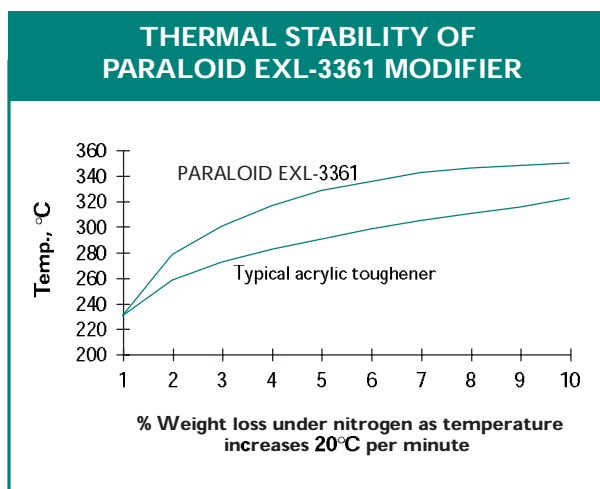
PHYSICAL PROPERTIES OF PET/POLYCARBONATE BLENDS MODIFIED WITH PARALOID EXL-3361 MODIFIER

| PARALOID EXL-3361 Level, % | Elongation % | | Tensile Stress psi | | | Flex Stress @max, psi | Flex Modulus psi x 10 ⁵ | DTFUL @264 psi, °C |
|----------------------------|--------------|-------|--------------------|-------|---------------------------|-----------------------|------------------------------------|--------------------|
| | Yield | Break | Yield | Break | Modulus x 10 ⁵ | | | |
| 100% PET | | | | | | | | |
| 0 | 3.9 | <339 | 8600 | 7890 | 3.42 | 13100 | 3.77 | 65 |
| 10 | 3.7 | <339 | 7150 | 8540 | 2.89 | 10770 | 3.23 | 66 |
| 20 | 3.7 | <340 | 5480 | 6250 | 2.38 | 8010 | 2.55 | 64 |
| 75% PET/25% PC | | | | | | | | |
| 0 | 4.4 | 295 | 7950 | 7300 | 3.03 | 11910 | 3.62 | 62 |
| 10 | 4.2 | 261 | 7340 | 6500 | 2.83 | 10960 | 3.49 | 62 |
| 20 | 4.2 | 229 | 5990 | 5530 | 2.40 | 8545 | 2.84 | 65 |
| 50% PET/50% PC | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - |
| 10 | 4.6 | 176 | 7550 | 8010 | 3.07 | 11470 | 3.45 | 71 |
| 20 | 4.5 | 177 | 6480 | 7230 | 2.56 | 9650 | 2.93 | 70 |
| 25 | 4.7 | 164 | 5720 | 5860 | 2.16 | 8390 | 2.52 | 65 |

THERMAL STABILITY

PARALOID EXL-3361 modifier possesses excellent thermal stability to withstand degradation during processing. Differential scanning calorimetry measures the time it takes for a sample to degrade. By determining the point where the polymer exotherms while being held at elevated temperature, the stability and thus the processability of an additive can be determined. At 280°C, PARALOID EXL-3361 modifier, resisted exotherming for 15 to 16 minutes while conventional acrylic tougheners last approximately one minute in the test.

Thermal stability can also be determined using thermal gravimetric analysis (TGA) which measures the loss in weight as a function of increasing temperature. As indicated in the chart, PARALOID EXL-3361 modifier can be processed 20 to 30°C higher than other acrylic tougheners.



RECOMMENDED USE LEVELS

The use level will depend on the required performance in a particular matrix. Please refer to charts above for guidance or call your Rohm and Haas technical service contact.

STANDARD PACKAGING

Palletized carton (1000 lb. net)

SAFE HANDLING INFORMATION

Dispose by placing powder or pellets in airtight bags. Incinerate or landfill at a permitted facility in accordance with local, state, and federal regulations.

STORAGE, HANDLING AND DISPOSAL (see MSDS for details)

Standard recommended storage conditions are as follows:

- Store indoors, protected from weather (moisture)
- Temperature should not exceed 140 deg. F.
- Protected from ultraviolet light
- With stretch hood or stretch wrap intact (if applicable)
- Unopened (if material is opened, it should not be left exposed and should be used within one month) ambient temperature preferred.

When stored correctly in the original packaging, the shelf life is:

- 2.5 years from date of manufacture

Material Safety Data Sheets (MSDS)

Material Safety Data Sheets are available outlining hazards and safe handling methods. Contact Rohm and Haas for copies of the MSDS for this product and for other handling information.

ROHM AND HAAS PLASTICS ADDITIVES SOLUTIONS PROVIDER PRODUCT RANGE

| | |
|---------------|---|
| ACRYLIGARD™ | Acrylic Capstock Resins |
| ADVALUBE™ | Specialty Lubricants |
| ADVAPAK™ | Stabilizer/Lubricant One-Packs |
| ADVASTAB™ | Thermal Stabilizers |
| ADVAWAX™ | Specialty Waxes |
| PARALOID™ | Impact Modifiers |
| PARALOID™ | Processing Aids |
| PARALOID™ | Acrylic Multi-functionals and Specialties |
| PARALOID EXL™ | Additives for Engineering Resins |
| VINYZENE™ | Antimicrobials for Plasticized Vinyl, TPU, PU, TPE, Rubbers, Polymeric Alloys |



PLASTICS ADDITIVES

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