

COMPATIBILIZER FOR BLENDS

Kraton Polymers as Compatibilizers for Plastic Blends

Blends of different plastics usually do not show very interesting properties because of incompatibility and lack of interfacial adhesion between components, which leads to segregation between phases. They have low impact, tensile strength and elongation at break.

The most common compatibilizers are block copolymers. Their inherent structure allows compatibility with more than one polymer at a time. Block copolymers can give blends a stable morphology, resulting in systems having reduced brittleness, improved impact strength and properties, which are a combination of those of the blends components. The block copolymer used should have affinity with each of the blend components. This way, adhesion between both phases is increased and dispersion size of the polymers within each other reduced.

Kraton™ D and Kraton™ G block copolymers are commonly used as interfacial agents. They have found application in compatibilizing styrenics with polyolefins.

The functionalized Kraton G products are used to compatibilize more polar plastics, e.g. including polyamide, ABS, polyesters with polyolefins. In waste management and reprocessing of production scrap, this technology will offer solutions to the industry and allow them to produce recycled products with good levels of properties. A few examples of the use of Kraton compatibilizer for mixed plastic blends/ternary blends - are given Tables 1-4.

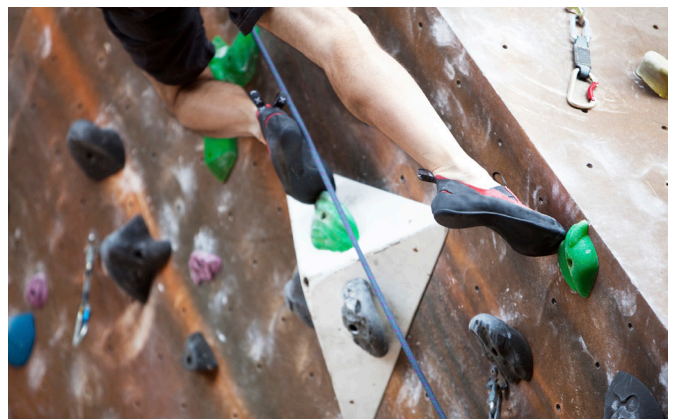


Table 1: Ternary Blends of Crystal PS, LDPE and Kraton™ D1152

Composition, %w			
Crystal PS	50	47.5	45
LDPE	50	47.5	45
Kraton D1152	-	5	10
Properties			
Izod Properties			
Notched Izod Impact, kJ/m ²	2.5	2.2	3.8
Unnotched Izod Impact, kJ/m ²	5.4	13.0	10.1
Failure Mode ¹	B	D	D
Flexural Properties			
Flexural Modulus, MPa	1110	1195	940
Flexural Strength, MPa	41	35	31

Table 2: Ternary Blends of PA-6, PP with Kraton™ FG1901

Composition, %w			
PA - 6	50	47.5	45
PP Copolymer	50	47.5	45
Kraton FG1901	-	5	10
Properties			
Izod Properties			
Notched Izod Impact, kJ/m ²	4	27	87
Unnotched Izod Impact, kJ/m ²	12	158	144
Failure Mode ¹	B	D	D
Flexural Properties			
Flexural Modulus, MPa	1015	1205	1075
Flexural Strength, MPa	28	39	36

Table 3: Ternary Blends of Polyesters, Polyolefins with Kraton FG1901

Composition, %w				
PP Copolymer	50	47.5	-	-
LDPE	-	-	50	47.5
PET	50	47.5	50	47.5
Kraton FG1901	-	5	-	5
Properties				
Izod Properties				
Notched Izod Impact, kJ/m ²	2.2	3.5	2.4	3.7
Unnotched Izod Impact, kJ/m ²	7.9	11.7	7.5	16.7
Failure Mode ¹	B	D	B	D
Flexural Properties				
Flexural Modulus, MPa	1455	1265	940	780
Flexural Strength, MPa	42	41	33	28

Table 4: Ternary Blends of ABS, Polyolefins and Kraton FG1901

Composition, %w				
ABS	50	45	50	45
PP Copolymer	50	45	-	-
HDPE	-	-	50	45
Kraton FG 1901	-	10	-	10
Properties				
Impact Properties ²				
Notched Izod Impact, J/m	64	251	53	112
Instrumented Impact, J ³	1.2	6.7	2.7	5.1
Stress-Strain Properties ⁴				
Tensile Yield Stress, MPa	24.5	23.4	27.6	25.6
Tensile Break Strength, MPa	23.7	19.9	27.6	19.8
Tensile Elongation, %	3	75	2	53

1. B - Brittle failure; D - Ductile failure
2. Izod Impact acc. to ASTM D256, J/m
3. Instrumented Impact acc. to ASTM D3763, J
4. Acc. to ASTM 638

Kraton Corporation (NYSE: KRA)**LOCATIONS**

U.S.A. HEADQUARTERS
Houston, Texas

EUROPE, MIDDLE EAST, AFRICA
Almere, The Netherlands

ASIA PACIFIC
Shanghai, China

SOUTH AMERICA
Paulinia, Brazil

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