A B S T R A C T

Polymer blends comprising a polysulfone and a modified polyolefin, and methods for their preparation.

Polymer blend consisting of :

- a polysulfone (P1),

- a polyolefin (P2) grafted with a polar molecule,

- optionally in addition, a non-grafted polyolefin (P3), and

- optionally in addition, one or more ingredients other than the polysulfone (P1), the polyolefin (P2) grafted with a polar molecule and the non-grafted polyolefin (P3).

No figure.

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CLAIMS

1 – Polymer blend consisting of :

- a polysulfone (P1),

- a polyolefin (P2) grafted with a polar molecule,

- optionally in addition, a non-grafted polyolefin (P3), and

- optionally in addition, one or more ingredients other than the polysulfone (P1), the polyolefin (P2) grafted with a polar molecule and the non-grafted polyolefin (P3).

2 – Polymer blend as claimed in claim 1, wherein the polysulfone (P1) is selected from the group consisting of bisphenol A polysulfone, polyethersulfone and polyphenylsulfone.

3 – Polymer blend as claimed in claim 1 or 2, wherein the polyolefin (P2) grafted with a polar molecule is a polyolefin grafted with maleic anhydride.

4 – Polymer blend as claimed in any one of claims 1 to 3, wherein polyolefin (P2) grafted with a polar molecule is selected from the group consisting of low LDPE, LLDPE, HDPE, PP, EPR and EPDM, and polybutylene, all of them being grafted with a polar molecule.

5 – Polymer blend in any one of claims 1 to 3, wherein the polyolefin (P2) grafted with a polar molecule is maleic anhydride-grafted HDPE or maleic anhydride-grafted PP.

6 – Polymer blend as claimed in any one of claims 1 to 5, wherein it consists of the polysulfone (P1) and the polyolefin (P2) grafted with a polar molecule.

7 – Polymer blend as claimed in claim 6, wherein it comprises the polysulfone (P1) in a weight amount of from 98 % to 48 %, based on the weight of the polymer blend.

8 – Polymer blend as claimed in any one of claims 1 to 5, wherein it consists of :

- the polysulfone (P1),

- the polyolefin (P2) grafted with a polar molecule, and

- one more ingredients other than the polysulfone (P1), the polyolefin (P2) grafted with a polar molecule and the non-grafted polyolefin (P3).

9 – Polymer blend as claimed in claim 8, wherein the ingredient(s) other than the polysulfone (P1), the polyolefin (P2) grafted with a polar molecule and the non-grafted polyolefin (P3) is (are) selected from the group consisting of phosphate heat stabilizers, lubricants and colorants.

10 – Polymer blend as claimed in any one of claims 1 to 5, wherein it consists of the polysulfone (P1), the polyolefin (P2) grafted with a polar molecule and the non-grafted polyolefin (P3).

11 – Polymer blend as claimed in any one of claims 1 to 5, wherein it consists of :

- the polysulfone (P1),

- the polyolefin (P2) grafted with a polar molecule,

- the non-grafted polyolefin (P3), and

- one more ingredients other than the polysulfone (P1), the polyolefin (P2) grafted with a polar molecule and the non-grafted polyolefin (P3).

12 – Use of the polyolefin (P2) grafted with a polar molecule as compatibilizer between the polysulfone (P1) and the non-grafted polyolefin (P3) in the polymer blend as claimed in claim 10 or 11.

13 – Method for increasing the impact strength of a polysulfone (P1), which comprises blending the polysulfone (P1) with a polyolefin (P2) grafted with a polar molecule.

14 – Method as claimed in claim 13, wherein the polyolefin (P2) grafted with a polar molecule is a polyolefin grafted with maleic anhydride.

15 – Method as claimed in claim 13 or 14, wherein the polyolefin (P2) grafted with a polar molecule is selected from the group consisting of low LDPE,

LLDPE, HDPE, PP, EPR and EPDM, and polybutylene, all of them being grafted with a polar molecule.

16 – Method for preparing the polymer blend as claimed in any one of claims 1 to 11, which comprises :

- grafting the polar molecule to a non-grafted polyolefin, so as to obtain the grafted polyolefin (P2), then,

- blending the grafted polyolefin (P2) with the polysulfone (P1) using an extrusion process.

17 – Method for preparing the polymer blend as claimed in claim 16, wherein a free radical initiator is used to achieve the grafting.

18 – Method for preparing the polymer blend as claimed in any one of claims 1 to 17, which comprises extruding the polysulfone (P1), the polar molecule, a non-grafted polyolefin and a free radical initiator in an extruder in a single pass, during which (i) the grafted polyolefin (P2) is formed, and (ii) it is simultaneously blended with the polysulfone (P1).

Dated this 3rd day of May, 2007

Rahul M. Kadam

Applicant's Patent Agent

TO
The Controller of Patents
The PATENT OFFICE,
MUMBAI 400037

FORM 2

THE PATENTS ACT 1970
(39 of 1970)
&
THE PATENT RULES, 2003

PROVISIONAL SPECIFICATION

(SECTION-10; RULE 13)

"BLEND COMPOSITIONS OF POLYSULFONES AND POLYOLEFINES AND THE METHOD OF PREPARATION THEREOF"

GHARDA CHEMICALS LTD., AN INDIAN COMPANY INCORPORATED UNDER THE COMPANIES ACT, 1956, HAVING ITS REGISTERED OFFICE AT 5/6, JER MANSION, 10, W.P. VARDE MARG, OFF TURNER ROAD, BANDRA (W), MUMBAI-400 050, MAHARASHTRA, INDIA.

THE FOLLOWING SPECIFICATION DESCRIBES THE NATURE OF THIS INVENTION:

TECHNICAL FIELD

The present invention relates to blend compositions of polysulphones and polyolefines and the method of preparations thereof.

BACKGROUND OF THE INVENTION

Blending is now well known in polymer technology to modify different polymer properties. Blending of specialty polymers, like polysulfones, polyethers, polyketones, though studied academically, is not commercially extensively exploited due to difficulty in preparation of suitable blends. This is particularly true of commercially available Polyether sulfone (PES) and Polyphenylene sulfone (PPSU).

A Polysulfone is characterized by the presence of the sulfone group as part of its repeating unit. It also has an ether group and aromatic rings, beside some specific groups like isopropyledine, in the unit chain structure as shown below.

PSU: $--C_6H_4—SO_2—C_6H_4—O—C_6H_4—C(CH_3)_2— C_6H_4—O—$

PES: --C6H4--SO2—C6H4—O--

PPSU: --C6H4—SO2—C6H4—O--C6H4—C6H4—O—

The Polysulfone PSU was discovered in early 1960 at Union Carbide (U.S. Patent No. 4,108,837, 1978). Since then, commercialization of many Polysulfones has taken place and some have also been discontinued from production. The activity in improving the quality of Polysulfones has remained strong and improvements are

sought continuously over the years in color, thermal stability, molecular weights, processibility, impact strength and cost.

The commercially available Polysulfones have good high temperature resistance and generally do not degrade or discolor at their processing temperatures of 320° to 380° C. Additionally, they are transparent, light amber colored amorphous plastics with excellent mechanical and electrical properties, and good chemical and flame resistance. They are processible using common plastics processing techniques such as injection molding, compression molding, blow molding and extrusion. This makes them very versatile and useful plastics, having a myriad of applications in Medical, Electrical, Electronics, Food Processing, etc.

High-density polyethylene (HDPE) and Polypropylene (PP) are commodity plastics belonging to the class of Polyolefins.

High-density polyethylene has density of greater or equal to 0.940 g/cc. HDPE has a low degree of branching and thus stronger intermolecular forces. This absence of branching results in a more closely packed structure with a higher density.

The blending of two or more polymers to achieve unique property combinations of the parent polymers continues to be an attractive way to tailor existing commercial polymers to specific end use requirements. The blending of polysulfones with other polymers presents opportunities, but at the same time poses some significant technical challenges because of miscibility problems of polar Polysulfones with any non-polar polymers like Polyolefins.

In many cases, the main aim of blending polymers is to improve impact strength of the engineering thermoplastics so that the additive absorbs enhanced energy before fracture, hence broadening the scope of applications. Work has been carried out for blending of polysulfones with polar polymers like ABS, PET, PC and Polyamides, etc. However, hardly any report is available on the blending of Polysulfones with semi-crystalline commodity plastics such as HDPE or PP with attractive features such as high impact strength, good chemical resistance and easy processibilty.

Some recent patents give indications of blending of Polysulfone (PSU) family of blends, whereby PSU/ABS, PSU/PC, PSU/PET, PSU/PA, PSU/PEI, PSU/PPSU, PSU/PEEK, etc., are prepared and some of these are now commercially available.

Thus, Utracki (Commercial Polymer Blends, Chapman & Hall, 1998) has surveyed many blends prepared with one component as PSU and second as an engineering plastic like ABS, various Polystyrenics, PC, PET. The role of PSU here is to improve high temperature resistance, while the second component was used to improve a specific property like impact strength or flow and of course to help reduce the overall cost as compared to PSU itself. A compatibilizer like *phenoxy,* SMA copolymer or EVA-GMA copolymer was used to obtain useful blends.

US patent 3 472 810 (1969) teaches us preparation of blends using PSU and Polyethylene (PE) or Polypropylene (PP) with additional mineral oil for preventing delamination at PE or PP above 3-5% by weight. It shows improvement of impact properties when PE is added up to 10%.

While this patent teaches us compositions of PSU and PE or PP with mineral oil added, there are severe limitations to this method. First, it is possible to add only 10% maximum PE or PP to PSU using this art. Second, when more than 3% PE or PP is used, adding mineral oil becomes mandatory to prevent delamination and improve product properties. This, addition of mineral oil is not preferred as PSU is a high temperature resistant polymer and mineral oil, which does not mix with it, migrates out at higher temperatures. Third, even after adding mineral oil in PSU/PE or PP blend, the increase in impact strength is only about 30 – 55% of PSU.

This problem has been partially resolved by adding or grafting polar groups onto Polyolefines. Thus, T. Hyen and N. Lee have reported (Bull. Korean Chem. Soc. 2003, Vol. 24, No.12 melt grafting of hindered phenol group on Polypropylene. This paper teaches us, how the reactive antioxidants are grafted onto polypropylene (PP) by melt processing with free radical initiators in a mini-max moulder.

T.Nunes Pires et.al. (J. Braz. Chem. Soc., Vol.10, No. 1, 31-34, 1999.) have studied solution grafting of maleic anhydride onto ethylene-propylene-diene (EPDM) rubber by using dibenzoyl peroxide as peroxy initiator.

Synthesis of PP-g-MA and its effects on the properties of glass fiber reinforced nylon 6/polypropylene blends was studied by S. Fellahi and N. Abacha (Polymer International, Vol.54, No. 6, 2005, 909). In this study, PP was first functionalized by maleic anhydride in presence of dicumyl peroxide and then used as a compatibilizer in nylon6/pp

blend. Impact strength increased from 22 to 26 kJ/m^2 at 5 weight % loading of the PP-g-MA.

OBJECT OF THE INVENTION

The present invention obviates the aforesaid drawbacks by providing a blend composition of Polysulfones (PSU, PES, PPSU, etc.) with varying weight fractions of Polyethylene (PE) or Polypropylene (PP) or Polybutylene, without addition of mineral oil, to obtain impact strength more than that of respective Polysulfone. The compatibilization is achieved by grafting MA on to the Polyolefin used.

SUMMARY

The present invention relates to a blend composition of 98 % to 48% Polysulphones and the remaining Polyolefin grafted with polar molecules.

The invention describes, without limiting its scope, the preparation and novel compositions of blends of Polysulfones with Polyolefins, which may be grafted with MA or blends of Polysulfones with Polyolefins with additionally polyolefin grafted with MA used as a compatibilizer.

DETAILED DESCRIPTION OF THE INVENTION

The present invention relates to proper blending of two distinctly different polymers, such as Polysulfones and Polyolefins, which results in a polymer blend possessing impact strength quite superior to that of Polysulfones.

The Polysulfones used in the present invention are commercially available products from Gharda Chemicals Ltd., India.

Polyolefins are of course well known in the art and are produced in millions of Mts every year. Particularly of interests are HDPE and PP, which show very high impact resistance. These grades are readily available for myriad usage including for improving impact properties of different polymers.

However, due to highly polar nature of Polysulfones and highly non-polar nature of Polyolefins, mixing them together leads to phase separation and property devaluation. Therefore, compatibilization is needed to improve the interfacial adhesion between the two classes of materials.

It is found that grafting of Maleic Anhydride and similar materials onto Polyolefins surprisingly acts as an adhesion improver and promotes the desired interfacial adhesion between a Polysulfone and Polyolefin. HDPE or PP grafted with Maleic Anhydride (MA) by reactive extrusion, thus, serve as potential compatibilizer.

Maleic anhydride is a colorless to white solid that can get grafted onto Polyolefin under specific extrusion conditions to attach some polar groups onto that non-polar Polyolefin.

Such grafted Polyolefin is used for the compatibilization with a Polysulfone either as such or with additional non-grafted Polyolefin. By proper choice of Polyolefin, quantity of MA and processing conditions

under which to graft Maleic anhydride and finally processing conditions under which to blend such grafted Polyolefin with a given Polysulfone, we have been able to prepare novel blend compositions, which show outstanding impact resistance as compared to that of Polysulfone alone.

The preparation of grafted Polyolefin is illustrated as follows:

Polysulfone powder (or granules) is mixed with MA, a free radical initiator, a desired polyolefin and optionally a phosphate heat stabilizer and a lubricant, colorant, etc. in a high-speed mixer for a given time. The powdered mixture is then extruded using a compounding extruder and the material is allowed to melt and react and finally it is pelletized. Testing of the blend so prepared is carried out by injection molding the specimen and following ASTM or ISO method for Izod impact tests.

Therefore, an objective of this invention is to prepare novel blends of a given polymer from the class of Polysulfones and Polyolefin grafted with polar molecules to give composition having higher impact resistance than the Polysulfone used for blending.

Another objective of this invention is to develop a process of blending such a Polysulfone with grafted Polyolefin to prepare blend of interest having higher impact resistance than the given Polysulfone.

Another objective of this invention is to graft a desired Polyolefin with polar compounds such as Maleic Anhydride, Acrylic monomers, etc. to provide sufficient polarity on Polyolefin for compatibilization with Polysulfone.

Another objective of this invention is to prepare such grafted Polyolefin using free radical initiators.

Another objective of this invention is to develop an in-situ process of grafting Maleic Anhydride (MA) onto a Polyolefin using either extrusion or solution process.

Another objective of this invention is to carry out the blending process of separately grafted Polyolefin with Polysulfone using an extrusion process.

Yet another objective of this invention is to prepare MA grafted Polyolefin in the extruder by passing Polyolefin, MA and a free radical initiator and simultaneously blending the grafted Polyolefin with Polysulfone during the same extrusion in a single pass.

Another objective of this invention is to blend Polysulfones, where Polysulfone is PSU or PES or PPSU or any other member of Polysulfone family with grafted Polyolefin to improve impact properties of Polysulfone.

A yet another objective of this invention is to use Polyolefins, where a given Polyolefin is LDPE, LLDPE, HDPE or PP or EPR or EPDM or Polybutylene for grafting MA for blending with Polysulfone.

A yet another objective of this invention is to use a peroxy compound for grafting MA onto a given Polyolefin.

A yet another objective of this invention is to use t-Butyl Peroxy Benzoate as free radical initiator for grafting MA onto Polyolefin.

An important objective of this invention is to use MA grafted Polyolefin as a compatibilizer to blend given Polyolefin with Polysulfone.

Materials used for blending experiments are as follows:

PSU (GAFONE-S 1500)
PSU (GAFONE-S 1500P)
PES (GAFONE 3300)
PES (GAFONE 3300P)
PPSU (GAFONE-P 4300)
PPSU (GAFONE-P 4300P) all from Gharda Chemicals Ltd. India.

HDPE-g-MA (OPTIM – TP004/2E) and PP-g-MA (OPTIM p-405) from Pluss Polymer, India.

HDPE (HALENE P 5600) from HALDIA CHEMICALS, (G-Lex B55HM0003) from Gas Authority of India Ltd. & (RELENE F 56003) from Reliance Ind. India.

PP (REPOL H0202EG) from Reliance Industries Ltd., India.

Maleic anhydride and t-butyl peroxybenzoate (peroxide initiator) from S.D. Fine Chemicals limited, Bombay.

Following Examples give illustration of the invention without limiting scope of the invention in anyway thereof.

- **Example 1:**

PSU (GAFONE-S 1500), HDPE (G-Lex B55HM0003) and HDPE-g-MA (Optim TP004/2E) were taken in proportion of 95:3.75:1.25 for blend preparation. PSU and HDPE were pre-dried in oven at 130^0C and 100^0C for 3 hours respectively.

The melt blending of the sample prepared was carried out in a Berstorff ZE-25, a co-rotating twin screw extruder. The temperature of barrel was kept about 270^0C to 305^0C and screw rpm was 220. The strands coming out of the extruder were passed through a cooling water trough and pelletized. The pellets were dried at 120 ^{0}C in hot air oven for 3 hours before injection molding.

The blend granules were injection molded using LTM Demag (DC-60 NC4K) injection molding machine. A screw rpm of 30, injection pressure of about 38 bars and cycle time of about 200 seconds was applied for the same. The barrel temperature was varied from about 270^0C to 305^0C. The mold temperature was maintained at about 120^0C.

Notched Izod impact strength was measured using impact tester (Ceast Resil 25) according to ISO 180/1a standard. The specimens had a notch angle of 45^0 and a notch depth of 2mm. The samples were conditioned at relative humidity of 65(+/- 2%) at a temperature of 25(+/- 2 ^{0}C) for 48 hours before testing.

The Izod impact strength of this composition was 16.5 kJ/m^2 as compared to 5.0 kJ/m^2 of PSU itself.

Example 2 - 6:

Further PSU: HDPE: HDPE-g-MA blend compositions were prepared and tested according to Example 1 but in varying proportion as given in Table 1. PSU was used from 95 to 50% loading. Following Table 1 gives the proportion of the polymers and the impact resistant values these blends compositions.

TABLE 1

Examples #	COMPOSITION PSU: HDPE: HDPE-g-MA %Wt	IMPACT STRENGTH kJ/m^2
1	95 : 3.75 : 1.25	16.5
2	90 : 7.5 : 2.5	19.6
3	80 : 15 : 5	13.6
4	70 : 22.5 : 7.5	13.3
5	65 : 26.25 : 6.75	9.1
6	50 : 37.5 : 12.5	8.0

Example 7:

HDPE-g-MA was separately prepared using following during extrusion. HDPE (HALENE P 5600) granules 95 % (weight basis); Maleic anhydride 5% (weight basis); and t-butyl peroxybenzoate 0.5 phr (per hundred ratio) basis were taken and MA and t-butyl peroxybenzoate were dissolved in 100 gm of acetone. The HDPE granules were wetted with this solution properly. Then, the acetone was evaporated by putting the granules in tray dryer at 60 °C for 3 hours.

The grafting of HDPE with MA was carried out in a Berstoff ZE-25, a co-rotating twin screw extruder. The temperature was varied from 160 ^{0}C in barrel to 180 ^{0}C in die zone with an ascent of about 5 ^{0}C in zones from barrel to die. The screw rpm of 150 were maintained to give residence time of 90-120 seconds to the batch. The strands coming out of the extruder were passed through a cooling water bath and pelletized.

The HDPE-g-MA containing 5% MA was further used as such preparing blends with Polysulfones or as a compatibilizer for Polysulfone & Polyolefin blend compositions.

Example 8:

PSU (GAFONE-S 1500) granules, HDPE (HALENE P 5600) and HDPE-g-MA prepared as per Example 7 in 85:10:5 weight proportion were taken for the blend composition preparation. The same procedure as in example 1 was followed excepting it being blend of three materials.

Impact strength of this blend was found to be 9.4 kJ/m^2.

Example 9:

PSU (GAFONE-S 1500P) powder, HDPE (HALENE P 5600) granules and HDPE-g-MA granules, prepared as per Example 8 in same proportion except using PSU powder instead of granules were taken for blend preparation. The same procedure for blend composition preparation as in example 8 was followed.

Impact strength of this blend was found to be 11kJ/m^2, which is higher as compared to same formulation carried out using granules. This shows better dispersion of grafted HDPE in case of PSU powder as compared to PSU granules.

Example 10-12:

PSU (GAFONE-S 1500) granules and HDPE-g-MA prepared as per Example 7 were chosen for the preparation of these blend compositions. The same procedure as in example 1 was followed, excepting it being blend of two materials with PSU 85 - 95% and graft 15 -5% by weight were taken.

Impact strength of these blend compositions are given in Table 2.

TABLE 2

Examples #	**COMPOSITION PSU : HDPE-g-MA %Wt**	**IMPACT STRENGTH kJ/m^2**
10	95:05	9.4
11	90:10	12.0
12	85:15	8.8

Example 13:

The following procedure was used to prepare the HDPE-g-MA graft while also simultaneously preparing blend composition with PSU using extrusion procedure. PSU (1500P grade) 90% weight, HDPE (HALENE P-5600) granules 10% weight, Maleic anhydride 5 phr (per hundred

part of total resin); and t-butyl peroxybenzoate 0.4 phr were taken in a high-speed mixture and mixed for 3 minutes.

The melt blending of the sample prepared was carried out using procedure as given in Example 1.

Impact strength of this blend is found to be 12 kJ/m^2 as compared to 5.0kJ/m^2 of virgin PSU.

Example 14:

PSU (GAFONE-S 1400) 95% weight and HDPE (G-Lex B55HM0003) 5% weight blend composition was prepared, without addition of a Compatibilizer, using extrusion and test sample preparation process same as that mentioned in example 1.

Impact strength of 8.7kJ/m^2 this blend composition was found to be higher as compared to 5.0kJ/m^2 of PSU itself.

Example 15 - 19:

Further PSU: HDPE blend compositions were prepared and tested according to Example 14 except that HDPE (G-Lex B55HM0003) was used from 5 to 50% loading. HDPE was used as such without grafting MA onto it. Following Table 3 gives the proportion of two polymers and the impact resistant values these blends registered:

TABLE 3

Example	PSU:HDPE % W t.	IMPACT STRENGTH kJ/m^2
--	100 : 0	5

14	**95 : 5**	**8.7**
15	**90 : 10**	**9.2.**
16	**80 : 20**	**9.4**
17	**70 : 30**	**11.0**
18	**65 : 35**	**8.1**
19	**50 :50**	**7.7**

Example 20:

PES (GAFONE 3300) 95% weight and HDPE (G-Lex B55HM0003) 5% weight were chosen as materials and novel blend compositions were prepared using process as given in Example 1 except that PES substituted PSU.

Impact strength of this blend was found to be 7.7 kJ/m^2 as compared to 5.0 kJ/m^2 of PES.

Example 21 – 23:

The PES:HDPE blend was prepared and tested according to Example 20 except that HDPE (B55HM0003), was used from 5 to 50% level. Following Table 4 gives the proportion of two polymers and the impact resistant values these blends gave.

TABLE 4

EXAMPLE #	COMPOSITION PES : HDPE %Wt	IMPACT STRENGTH kJ/m^2
--	100 : 0	5.0
20	95 : 5	7.7
21	75 : 25	8.1
22	60 : 40	7.5
23	50 : 50	4.1

In all compositions, except 50:50, the impact strength was significantly higher than impact strength of PES itself suggesting very good compositions for all except 50:50.

Example 24 - 27 :

The PES:HDPE blend compositions along with compatibilizer HDPE-g-MA were prepared and tested according to Example 20. HDPE (B55HM0003) 3.75 to 30% level and HDPE-g-MA 1.25 to 10% were further used with in various proportions. Following Table 5 gives the proportion of three polymers and the impact resistant values these blends gave.

TABLE 5

EXAMPLES #	COMPOSITION PES : HDPE : HDPE-g-MA %Wt	IMPACT STRENGTH kJ/m^2
--	100 : 0 : 0	5.0
24	95 : 3.75 : 1.25	8.4
25	80 : 15 : 5	8.0
26	75 : 18.75 : 6.25	9.8
27	60 : 30 : 10	7.7

Again impact strength of all blend compositions shows higher values than that of neat PES.

Example 28:

The following procedure was used to prepare the PES:HDPE blend using extrusion procedure. PES (GAFONE 3300P) 90% weight, HDPE (HALENE P-5600) 10 % weight; Maleic anhydride 5 phr; and t-butyl peroxybenzoate 0.4 phr were taken in a high-speed mixture and mixed for 3 minutes.

The melt blending of the materials was carried out as done in Example 13, except that PES here substituted PSU

Impact strength of this blend is found to be 7.3 kJ/m^2 as compared to that of virgin PES, which is 5.0kJ/m^2.

Example 29:

The following procedure was used to prepare the PPSU: HDPE blend using extrusion procedure. PPSU (GAFONE-P 4300P) 90% weight, HDPE (HALENE P-5600) 10 % weight; Maleic anhydride 5 phr and t-butyl peroxybenzoate 0.4 phr were taken in a high-speed mixture and mixed for 3 minutes. Rest of the procedure is same as mentioned in example 13.

Impact strength of this blend is found to be 18.4 kJ/m^2, as compared to 12.0 kJ/m^2 of virgin PPSU.

Example 30:

PSU granules (GAFONE S 1400) 95% weight and PP granules (REPOL H0202EG) 5% weight were chosen as parent materials for blending. The rest of the procedure was similar to that of Example 14 except that PP was chosen in place of HDPE.

Impact strength of this blend was found to be 16.6 kJ/m^2 as compared to that of virgin PSU of 5.0kJ/m^2

Example 31:

Another PSU:PP blend composition 90:10 weight % was prepared, as in Example 30, without Compatibilizer addition.

Impact strength of this blend was found to be 14.4 kJ/m^2 as compared to impact strength of virgin PSU of 5.0kJ/m^2

Example 32:

PSU (GAFONE-S 1400) 95%, PP (REPOL H0202EG) 3.75% and PP-g-MA (OPTIM P-405) 1.25% weight were taken as parent materials and a blend composition was prepared and evaluated using procedure of Example 1.

Impact strength of this blend was found to be 19.6 kJ/m^2 as compared to that of virgin PSU having 5.0kJ/m^2

Example 33:

The new blend composition was prepared using procedure of Example 32 except taking PSU 90: PP 7.5: PP-g-MA % by weight.

Impact strength of this blend was found to be 14.0 kJ/m^2 as compared to that of virgin PSU of 5.0kJ/m^2

Example 34:

PES (GAFONE 3300) 95 % and PP (Reliance H100EY) 5% weight were chosen as parent materials and blending was carried out as in Example 20, excepting for PP substituting HDPE.

Impact strength of this blend was found to be 7.3 kJ/m^2 as compared to that of virgin PES having 5 kJ/m^2

Dated this 8th day of May 2006.

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