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PE-g-MA, PP-g-MA and SEBS-g-MA compatibilizers used in material blends

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Abstract

This paper attempts to identify and classify the main uses of three compatibilizers used in polymer blends with extended applicability, such as PE-g-MA (Polyethylene-graft-maleic anhydride), PP-g-MA (Polypropylene-graft-maleic anhydride) and SEBS-g-MA (Styrene-Ethylene / Butylene-Styrene-maleic anhydride-graft), mainly used in three fields of application: improving properties of the base compound, as compatibilizer in the blend of two materials and as an additional component in the mixture of various materials.

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Keywords: PE-g-MA, PP-g-MA, SEBS-g-MA, compatibilizers, blends

1. Introduction

The development of new materials is critical in providing value to the industry. These new materials are part of the objectives of materials science and its foundation is based on obtaining a new material that combines the best features of the starting materials [1]. This combination of materials is aimed at achieving the combination of properties cannot be achieved in the original materials and these compounds may be selected to achieve unusual combinations of stiffness, strength, weight, high temperature performance, corrosion resistance, hardness or conductivity.

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Nomenclature

SEBS	styrene-ethylene/butylene-styrene
PP	polypropylene

The materials are composite when they meet the following characteristics: [2]:

- They consist of two or more physically distinct and mechanically separable components.
- have several chemically distinct phases, completely insoluble to each other and separated by an interface.
- Its mechanical properties are superior to the sum of the properties of its components (synergy).
- Do not belong to composite materials, those polyphase materials; as metal alloys, in which by a heat treatment is changed the composition of the phases.

Although there are a variety of composite materials, structural level can be distinguished in all the following parts:

- Reinforcing agent: is a phase of discrete nature and geometry is critical to defining the mechanical properties of the material.
- Matrix phase or simply matrix: a continuing character and is responsible for the physical and chemical properties. Transmits efforts to reinforcing agent. It also protects and gives cohesion to the material.

In this paper has been analyzed the main applications of three compatibilizers used in the mixture of materials, which are commonly used for compounds based on polymers.

2. Experimental Procedure

The search for references is focused on the WOS (Web of Science) [3], trying to catalog the applications of these compatibilizers in the major uses for which they are intended.

2.1. Materials

PE-g-MA (Polyethylene-graft-maleic anhydride) is a compatibilizer for polymer blends which serves as support for polar to nonpolar substances.

Respect to its features and benefits, it contributes to abrasion resistance, lubricity, antiblocking, and surface glass, and allows chemical bonding via anhydride group [4].

Table I shows main properties of Polyethylene-graft-maleic anhydride (PE-g-MA).

Table I. Properties of PE-g-MA.

composition	maleic anhydride, ~0.5 wt. %
viscosity	500 cP(140 °C)(lit.)
saponification value	6 mg KOH/g
transition temp	T _m (DSC) 107 °C (at peak)
solubility	H ₂ O: insoluble toluene and xylene: soluble
density	0.92 g/mL at 25 °C

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