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Products of Ethylene-Propylene Terpolymer Rubber (EPDM) Obtained by an Environmentally Friendly Process

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Keywords	Accelerated Electron, Compatibility, EPDM, PVC

Abstract	In the research work some thermoplastic elastomers have been obtained by compounding the ethylene-propylene terpolymer (EPDM) rubber with melt platicized PVC. The influence of every constituent level on the polymer compound characteristics was measured. The two polymers are incompatible, for the improvement of the EPDM/ PVC blends two methods of compatibility improvement have been used: 1) using compatibilizing agents (CPE was the selected compatibilizing agent); 2) electron beam irradiation (the optimum irradiation dose determined was 5 Mrad). The resulted products showed specific elastomer characteristics and can be processed by commonly used techniques for thermoplastic materials like as injection and injection molding.

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Products of ethylene-propylene terpolymer rubber (EPDM) obtained by an environmentally friendly process

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Keywords: EPDM, PVC, compatibility, accelerated electrons

Abstract. In the research work some thermoplastic elastomers have been obtained by compounding the ethylene-propylene terpolymer (EPDM) rubber with melt platicized PVC. The influence of every constituent level on the polymer compound characteristics was measured. The two polymers are incompatible, for the improvement of the EPDM/ PVC blends two methods of compatibility improvement have been used: 1) using compatibilizing agents (CPE was the selected compatibilizing agent); 2) electron beam irradiation (the optimum irradiation dose determined was 5 Mrad). The resulted products showed specific elastomer characteristics and can be processed by commonly used techniques for thermoplastic materials like as injection and injection molding.

Introduction

Nowadays the simplest method for the preparation of thermoplastic elastomers (TPE) involves blending an elastomer and a melt plastic resulting in a blend combining the characteristics of the constituent materials. Even though blending is an easy procedure for the preparation of thermoplastic elastomers in the most of blends TPE constituents are immiscible and materials showing low mechanical characteristics were often obtained due to the poor compatibility between the phases. Over time a variety of techniques intended to solve such troubles have been developed [1-7].

This work is aimed at investigating some polymer alloys based on EPDM and plasticized . These two polymers are thermodynamically incompatible, leading to EPDM/PVC blends with poor characteristics; therefore, there are a few specialized studies in this field [8]. In order to obtain blend of the above polymers with improved physical-mechanical characteristics the following procedures were used: (1) adding some graft co-polymers or homo-polymers and (2) accelerated electron irradiation. In the first method an unreactive chemical compatibility between the two phases was created, and in the second procedure both a reactive chemical compatibility between the two phases and a partial or total crosslinking in the elastomer was created.

Experimental

The preparation of blends based on EPDM and plasticized PVC was carried out in two stages: (a) PVC plasticization and (b) preparation of blends based on EPDM and plasticized PVC.

a. PVC plasticization was achieved by plasticizer (DOF) absorption into the PVC by mixing in a Brabender Plasticorder, in a 2 L vessel, at 100 rpm, temperature of about 80°C for 15-20 minutes. In order to achieve a high thermal stability over time some temperature stabilizers and antioxidants were added. The plasticized PVC was then made into a sheet on an electrically heated roller mill at 150°C. The resulted plasticized PVC sheet was used for preparing the blends in the next stage.

b. The blends of EPDM Keltan 8340, plasticized PVC, zinc oxide, stearic acid and polyethylene glycol were prepared in a Brabender blender at 160 – 170°C and 60 rpm. The resulted blend was made into sheets on a laboratory electrical press at 160°C, and these were used subsequently in tests for physical – mechanical characteristics. EPDM/plasticized PVC blends containing 100 %, 80 %, 60 %, 40 %, 20% and 0% (by weight) elastomer based on the total polymer weight in the blend were prepared. For the blend containing 60% EPDM (percent by weight based on the total polymer weight in the blend) two methods of compatibilizing have been used: (1) the addition of

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