

Measurement of volume resistivity in a series of copolymers of 4-methylstyrene- α -methylstyrene and 4-methoxystyrene- α -methylstyrene

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Abstract

In the course of previous experiments, a technique was developed for the preparation of a copolymer of styrene and α -methylstyrene. This technique is an emulsion polymerization in the initiator of ammonium persulfate in an inert zone of direct current argon. It was found that the best emulsifier is potassium stearate. This substance can be explained by those copolymers that showed the best dielectric performance. In the course of the new experiment, a series of new copolymers of 4-methylstyrene- α -methylstyrene and 4-methoxystyrene- α -methylstyrene was obtained in the molar ratios of the initial monomers of 8 : 3, 9 : 2 and 10 : 1 for both rows of copolymers. The outputs of the pure product for all compounds accounted for more than 60% in terms of the initial monomers. To further measure the value of the specific volume resistance of the material, films of each newly synthesized copolymer were obtained. Samples of the copolymers were dissolved in methylene chloride and applied to a smooth glass substrate. The choice of this solvent is due to its low toxicity and low boiling point. For the experiment were selected samples with a film thickness of 50 microns. Measurements of the specific volume resistance were carried out at the Research Institute "Girikond" (St. Petersburg) using an *Agilent 4339B* instrument. The operating voltage was 100 V. The measurement results showed that samples of 4-methoxystyrene- α -methylstyrene copolymer were several orders of magnitude superior to samples of 4-methylstyrene- α -methylstyrene copolymer. Most likely in this case such a difference in the indices of the specific volume resistance of the copolymer films is due to the nature of the functional groups of substituents in the copolymer. From the obtained measurement results it can be seen that the samples containing the methoxy group have a high resistance value compared to the samples containing a methyl group in their structure. In a series of samples of copolymer films, an increase in the specific volume resistivity index is observed with a decrease in the α -methylstyrene content in the copolymer structure. This dependence is observed for copolymers of 4-methylstyrene- α -methylstyrene and for 4-methoxystyrene- α -methylstyrene. The sample of 4-methoxystyrene- α -methylstyrene with a molar ratio of initial monomers of 10 : 1 has the highest value of specific volume resistance among all the obtained samples of copolymer films.

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