

Investigation of the dielectric properties of styrene– α -methylstyrene copolymer obtained with various anionic and non-ionic emulsifiers

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Abstract

The method of emulsion copolymerization in the presence of an ammonium persulfate initiator and various anionic and nonionic emulsifiers previously produced a copolymer of styrene and α -methylstyrene at a weight ratio of the initial monomers of 70:30. For different copolymer samples, the dielectric constant and the dielectric loss tangent at 10 GHz. Measurement of these parameters for synthesized samples of styrene– α -methylstyrene copolymer in comparison with the initial ones was carried out using a measuring stand consisting of a high-frequency signal generator G4-83, an electron-counting frequency counter Ch3-54 with a frequency converter YaZCh-43, a measuring amplifier U2-4, low-frequency signal generator G3-109, measuring unit FKDG 418151.002. It was found that the best indices of the dielectric loss tangent at an alternating current frequency of 10 GHz were a copolymer obtained using an emulsifier of potassium stearate. When using anionic emulsifiers containing oleate ion, these values were higher than in the case of stearate ion, which confirms the participation of the oleate ion in the copolymerization of styrene and α -methylstyrene as a comonomer. In the case of non-ionic emulsifiers OS-25 and OS-50, the dielectric characteristics of the obtained copolymer samples were not determined. This is due to the effect of the residues of adsorbed non-ionic emulsifiers in the copolymer even after it has been repeatedly washed with water, which was proved earlier by IR spectroscopy. It has been found that, best of all for dielectric characteristics, the styrene– α -methylstyrene copolymer powder obtained from the starting monomers using the potassium stearate emulsifier. The copolymer in the form of a powder obtained from the initial copolymer granules by reprecipitation of the chloroform solution of the copolymer into ethanol had unstable values of the tangent of the angle dielectric losses.

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