

*Thematic course:* Possibility of using the brabender plastometer to study the peroxide crosslinking of polyethylene. Part 2.

## Use of the mixture 1,3- and 1,4-bis(*tert*-butylperoxyisopropyl)benzene for crosslinking polyethylene

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### Abstract

The paper shows the possibility of using the mixture 1,3- and 1,4-bis(*tert*-butylperoxyisopropyl)-benzene as a cross-linking agent in the production of polyethylene foam. Most often, cross-linked polyethylene foam, which has high performance properties, is obtained by pressing, using azoicarbonamide as a foaming agent and dicumyl peroxide as a cross-linking agent. Dicumyl peroxide has a significant drawback: high toxicity of decomposition products. Using the Soxhlet extractor, the optimal degree of crosslinking (57-62%) required to obtain foam with optimal performance properties was determined. Using the brabender plastograph, which allows you to study, in a wide range of values, the crosslinking kinetics. It was found that the degree of crosslinking 57-62% corresponds to the torque in the range of 1700-2500 g·m. a comparative characteristic of two crosslinking agents is given: traditional (dicumyl peroxide) and the studied peroxide. It was found that the crosslinking rate in the presence of the mixture 1,3- and 1,4-bis(*tert*-butylperoxyisopropyl)-benzene is significantly lower, but the final degree of crosslinking is at the same level as when using dicumyl peroxide. The dependence of the maximum torque on temperature is studied. There are restrictions on the Use of the brabender plastometer for studying the crosslinking kinetics. When the degree of crosslinking is more than 70%, the composition goes into a non-melting state, and the device's performance drops sharply. For practical use of the mixture 1,3- and 1,4-bis(*tert*-butylperoxyisopropyl)-benzene, the degree of crosslinking in the presence of the foaming agent azodicarbonamide was studied. It is shown that the introduction of a gas-forming agent (azodicarbonamide) into the composition significantly reduces the degree of crosslinking of polyethylene foam only in the case of the mixture 1,3- and 1,4-bis(*tert*-butylperoxyisopropyl)benzene. The optimal concentration of new crosslinking peroxides, allowing to foam, density 80-100 kg/m<sup>3</sup>, not inferior to original compositions by main technical-economic indicators have been determined.

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