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Analysis of the effect of radiation sterilization on the consumer properties of a bulky nonwoven fabric

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Abstract

Bulk nonwoven materials have a wide range of applications, including in medicine, for the manufacture of bedding for patients, envelopes for newborns, materials used on wound surfaces. The use of HoloFiber® bulky nonwoven fabrics produced by thermal bonding for medical purposes is primarily due to their high functional characteristics: microporosity; hydrophilicity (hydrophobicity); good air permeability at the same time as dustproof function; antiseptic (barrier properties to microorganisms, low bacteriological permeability); non-toxic and hypoallergenic. As you know, all disposable medical devices, in general, must undergo mandatory sterilization, in particular, radiation sterilization. Sterilization by ionizing radiation allows very effective inactivation of microorganisms and, when used in the packaging process, guarantees the reliability and safety of medical devices. But, as you know, when exposed to radiation, destruction of some polymers can occur, which is reflected in the technical parameters of nonwoven materials (NM) based on them. Considering that a fairly wide range of absorbed doses (15-60 kGy) is used during sterilization, the degree of material destruction can be significant. For safe use, it is necessary to have an idea of the effect of the absorbed dose during radiation sterilization on the properties of the material, as well as for the development of radiation-resistant polymers for nonwovens. For this purpose, the effect of radiation sterilization on the properties of NM HoloFiber® was studied. The following were selected as the object of research: HoloFiber® PROFI article P 35191, surface density 100 g/m²; HoloFiber® MEDIUM article P 103, surface density 100 g/m². The following indicators were investigated: surface stiffness coefficient, electrostatic field strength, breaking load. Based on the data obtained, we can conclude about the possibility of sterilization by ionizing radiation of bulk NM HoloFiber®.

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