

NANOPARTICLES OF FLAME RETARDANT MAGNESIUM HYDROXIDE AND A PROCESS FOR THE PREPARATION THEREOF

Abstract

The invention relates to chemical technologies, specifically nanoparticles of flame retardant magnesium hydroxide, and a process for the preparation thereof.

The present nanoparticles of flame retardant magnesium hydroxide, including surface-processed nanoparticles, have a hexagonal plate-like structure with a specific surface area of up to 20 m²/g, an average diameter of the secondary particles of up to 2 µm, a diameter of 10 % of the secondary particles of up to 0.8 µm, a diameter of 90 % of the secondary particles of up to 5 µm, with a longitudinal size of the primary particles of from 150 to 900 nm, and a thickness of from 15 to 150 nm.

The present process for the preparation of nanoparticles of flame retardant magnesium hydroxide, including surface-processed nanoparticles, consists of two steps, wherein the first step consists in interacting an aqueous solution of magnesium chloride with an alkali component at a temperature of up to 100 °C and atmospheric pressure, with a molar ion ratio OH⁻ : Mg⁺⁺ in the range of 1,9÷2,1 : 1, and the second step consists in hydrothermal recrystallization of the magnesium hydroxide particles at a temperature of 120 - 220 °C, a pressure of from 0.18 to 2.3 MPa and a duration of from 2 to 24 h, wherein, during hydrothermal recrystallization, in order to prevent the further growth of primary particles and the coarsening of the secondary particles by aggregation, the reaction mass is subjected to periodic hydraulic impacts with superheated vapour at a temperature of 160 - 240 °C and a pressure of from 0.6 to 3.3 MPa.

The nanoparticles of flame retardant magnesium hydroxide, obtained according to the present process, have controllable sizes of the primary and secondary particles and a specific surface area, which allows using them as smoke-suppressing, non-toxic flame retardant without a reduction in mechanical properties and technological effectiveness in organic polymeric matrices comprising polyethylene, polypropylene, ethylene propylene copolymer, ethylene acrylate copolymer, polystyrene, ethylene-co-vinylacetate based polymer, polyamide, polyimide, polycarbonate, polyethyleneterephthalate, polybutyleneterephthalate, ABS plastic.