Potential exposure to nanoplates during blending of halloysite nanoclay powder

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Blending of nanoclay nanoplates is usually most dusty operation in the process of production of foams. Increase of the particles concentrations and the change of the size distribution (increase of number of particles with smaller size) can indicated that particles are emitted, but only stating that of nanoplates are current in the air can confirm potential exposure of workers.

The aim of the investigation was to determined potential exposure to nanoplates during blending of ca. 20g of halloysite nanoclay powder by 20s using drill with a rotational speed of 2000rpm. Halloysite nanoclay is available from Sigma-Aldrich. Sampling point for determination of particles parameters was located ca. 30cm from the place of nanoclay powder blending. Surface and number concentrations and size distribution of particles were determined with P-TRAK, AEROTRAK and SMPS. Samples of air with particles taking with NAS were analysed with SEM and EDS in IWC PAN. Results of investigation are shown on Figures 1-3.

Data presented in Figure 1 shown that as an effect of blending number concentration of particles 20-1000nm increased from ca.17000#/cm³ to 39000#/cm³, when surface concentration of particles 10-1000nm from ca. 60µm²/cm³ to 109µm²/cm³. Decreasing of concentrations after blending to the levels as for the backgrounds was achieved after ca. 18min (Figure 1). During blending of nanoclay powder significant changes in the size distribution in comparing to the background was not observed (Figure 2). But 3 min. later number of particles with diameter less that 100nm increased very much and particles remained in air ca. 30min. when achieved background level. Microscopy (SEM) and chemical (EDS) analysis confirmed that in the air presented nanoplates of halloysite nanoclay (Figure 3).

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