

# Potential exposure to nanoplates during blending of halloysite nanoclay powder

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Keywords: nanoclay, blending, concentrations, SEM-EDS analysis.

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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 indicate 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 determine 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, AERO-TRAK 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 shows that as an effect of blending number concentration of particles 20-1000nm increased from ca. 17000#/cm<sup>3</sup> to 39000#/cm<sup>3</sup>, when surface concentration of particles 10-1000nm from ca. 60µm<sup>2</sup>/cm<sup>3</sup> to 109µm<sup>2</sup>/cm<sup>3</sup>. 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 than 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).

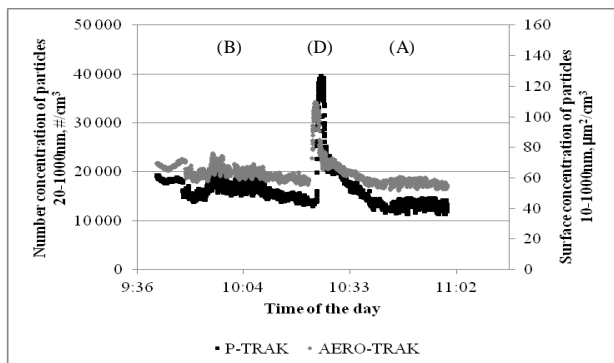


Figure 1. Number and surface concentrations of particles before (B) during (D) and after (A) blending of halloysite nanoclay.

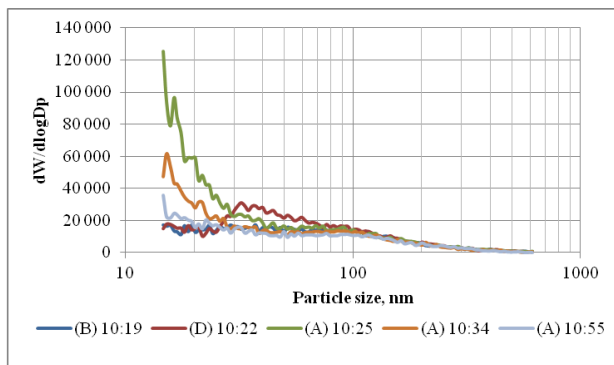


Figure 2. Size distribution of particles before (B) during (D) and after (A) blending of halloysite nanoclay.

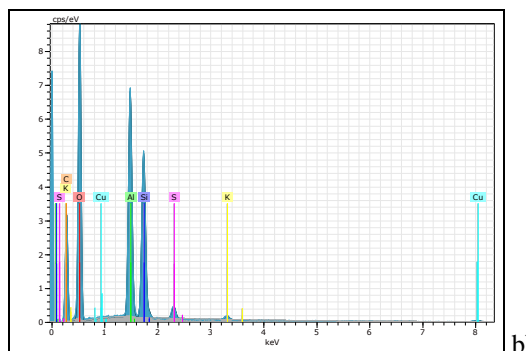
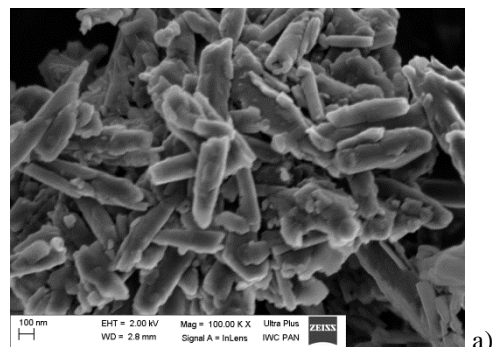


Figure 3. Results of analysis of particles sampled from the air during blending of halloysite nanoclay: a) SEM results, b) EDS results.

This study was prepared on the basis of the results of project I.B.03 carried out within the scope of the National Programme “Safety and working conditions improvement”, funded in the years 2011-2013 by the Ministry of Scientific Research and Information Technology. Main co-ordinator CIOP-PIB.