DENSITY MEASUREMENTS BY GAMMA-RAY ATTENUATION IN THE MANUFACTURE OF ASBESTOS-CEMENT PRODUCTS

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In the manufacture of asbestos-cement products great care should be taken to the working suspension density, since it greatly affects the manufacture[1]. The problem is to maintain the suspension density at the optimal value.

The classical method of determination of the weight percentage of the solid in the working suspension is a process of hours duration (filtration, drying and weighting). Thus the control of the technological process of manufacturing is greatly delayed. Our latest research in this field has shown that the application of gamma-ray attenuation in determining the solid concentration in suspension samples is acceptable not only from the point of view of a more rapid tracing of the technological process, but also from the point of view of gamma-radiation intensity minimization in industrial application[2]. The principle of the measuring instrument is shown in Fig. 1. Radio-

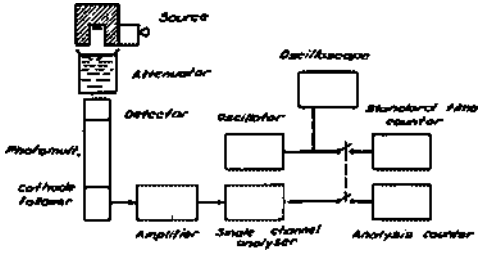

Fig. 1. *Scheme of the measuring instrument*

active source ^{137}Cs (150 μCi, 662keV)[3] and uncollimated beam have been employed. A $NaJ(Tl)$ 2" × 2" crystal has been used as detector. In the measuring system it is necessary to ensure a constant column height of the sample.

During the measurements the calibration of the measuring instrument was taken every 24 hours by means of samples

of known concentration prepared in the laboratory. The calibration points on Fig. 2. show that there exists a linear dependence of yields upon the percentage of the solid in a sample of

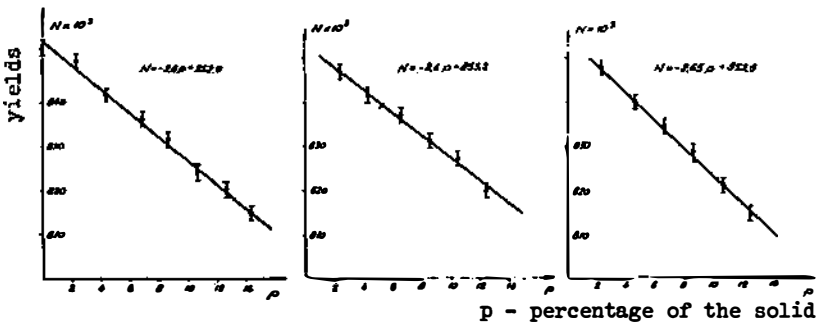

Fig. 2. *Calibration lines*

suspension. This is in agreement with the linear approximation of the exponential dependence of attenuation upon the attenuator density for small changes density[4]. 48 of the working suspension have been measured both by the classical and the gamma-ray attenuation method. The results of these measurements are shown in Fig. 3. The density of each sample has been determined

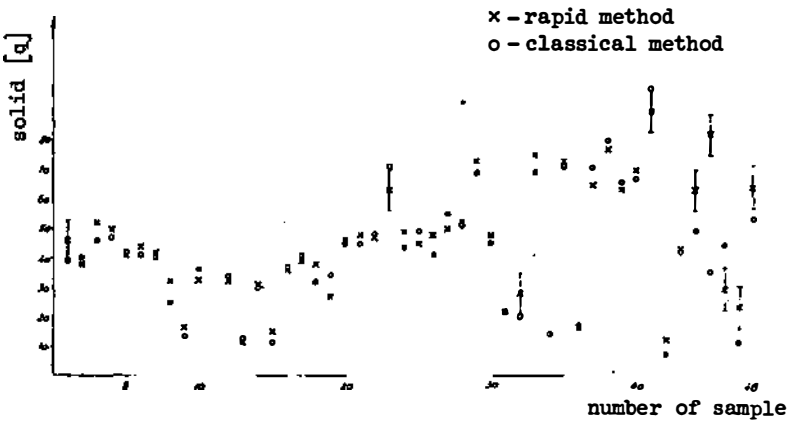

Fig. 3. *Comparison of results between rapid and classical methods*

in the time intervals being at most of 10 minutes duration (100 seconds for the counting and the rest for the preparation of the sample). It can be seen that in 90% of cases the determined

actual quantity of the solid in the examined sampleis in accordance with the result obtained by "the rapid method" within the measurement error. The measurement errors plotted in the figure are mainly of statistical character. Large discrepancies are caused by the rough errors in sustaining a constant column height of the attenuator sample.

The applied method of gamma-ray attenuation allows a rapid and reliable laboratory determination of suspension density.

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