

## ENERGY ABSORPTION RATE AT THE MECHANICAL TREATMENT OF SPECULARITE FROM BULGARIAN DEPOSITS

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### ABSTRACT

Following an appropriate mechanical treatment, the specularite can serve for the manufacture of anticorrosion lacquer coatings. This ability of its is due to the flaky structure of the ground material. This presentation examines the effect of some basic parameters of the process on the energy absorption rate at the mechanical treatment of specularite on horizontal discs. The topical importance of the presentation is substantiated by the considerable amounts of specularite in Bulgarian deposits.

The specularite from the Kremikovtsi deposit has a flaky structure. The flake thickness is many times less than that of the known MIO, which is used in the chemical industry for the production of quality anticorrosion lacquers. The Kremikovtsi specularite has a very pleasant reddish colour with metallic lustre that makes it very much desired for such use. It is necessary to find a method and a regime of grinding, where the fragile thin film will be kept intact.

In order to determine the possibilities for grinding up to the qualities wanted by the chemical industry for the finished product - in terms of grain size, flaky structure and cost-effectiveness - were conducted a number of experimental investigations.

In a special test bench - a horizontal plate on which a grinding roll moves - were conducted laboratory examinations. The independent parameters were:

- The process speed:  $v = 40.2 \times 10^{-3}$  m/s. This velocity can be obtained by means of one of the standard movement drives of the slide of a combination lathe.
- The grinding roll diameter - D in mm. Rolls having diameters D = 150 mm, 200 mm and 250 mm were used. The main experiments were conducted with a D = 200 mm roll.

- The particles to be ground were selected by their typical size from 1 mm to 10 mm. No crushing was obtained with some of the particles measuring 7 and 10 mm at the adopted regimes.
- Tensioning of the rolls over the ground particles. Such tensioning was obtained by changeable weights from  $G = 243$  N to  $G = 773$  N.

To evaluate the results from the grinding were carried out sieve analyses of the finished product. At almost all the regimes the sieve analysis showed that, as far as the granulometric composition was concerned, the finished product satisfied the anticorrosion lacquer manufacturers. An analysis by microscope was carried out, too, on the condition of the flakes in the finished product.

To determine the energy absorption rate, being the principal technical and economic parameter at similar processes, were carried out measurements and some specific energy consumption rates were found (Fig.1). As is evident from the figure, the respective areas correspond to the energy put into the the crushing of the single grains. The total energy consumed for the grinding of 1 g of finished product was determined -  $E_{og}$ , J/g. The losses at the bench and the net energy applied for grinding were measured, too. The results of these measurements are presented diagrammatically.

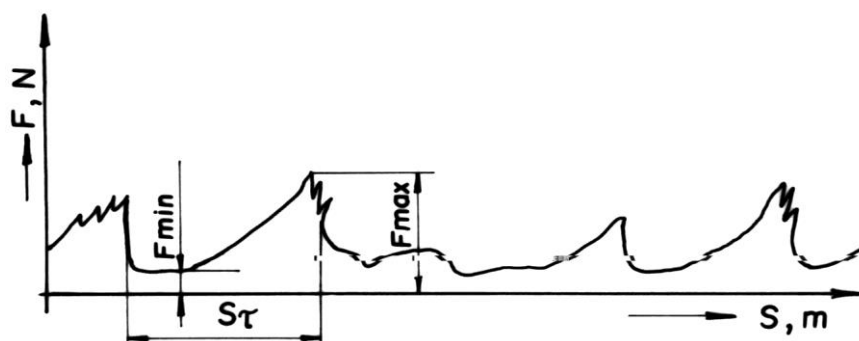


Figure 1.

Fig.2 shows the total energy applied in the comminution of specularite particles having different sizes, depending on the tension  $G$  in N. As a comparison are shown the results obtained in grinding under the same conditions of different particles of quartz (designated in the figure by  $K$ ). The data on the regime are given in the figure.

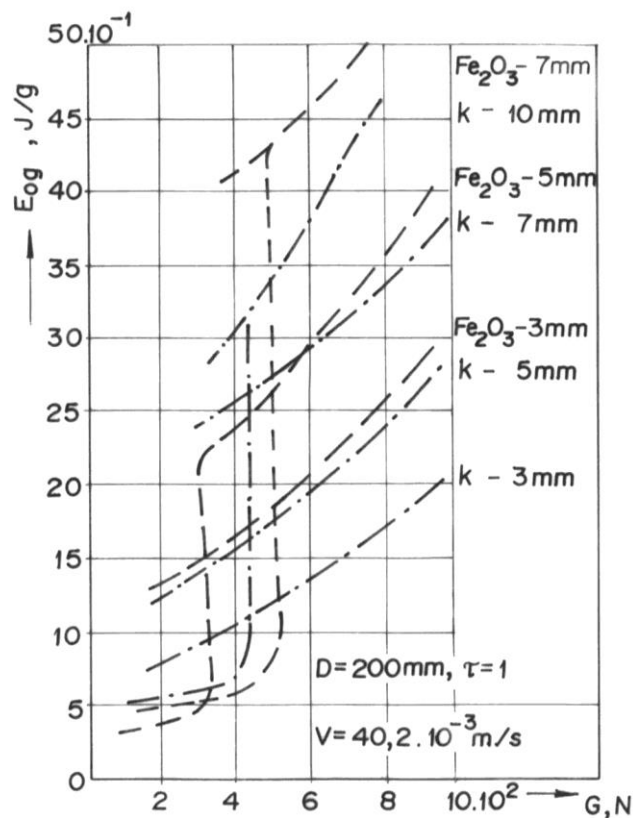


Figure 2.

Fig.3 shows the variation in the total energy applied in crushing specularite particles having different sizes, depending on the tension. The regime data are given in the figure. The vertical tracts of some regimes correspond to the transition from the strain of a particle to its crushing. Here for comparison is also shown the

energy applied for the crushing of quartz particles measuring 7 mm.

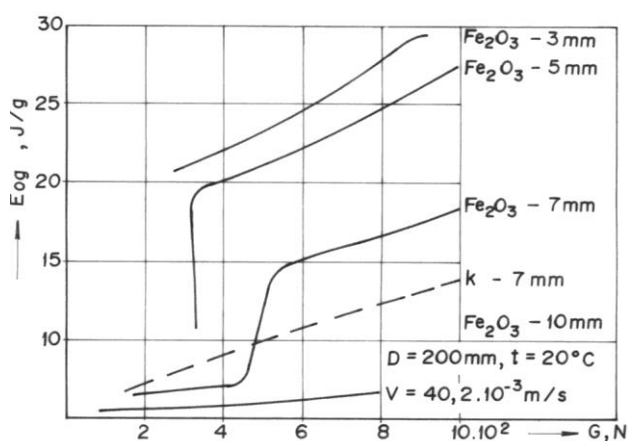


Figure 3.

Fig.4 presents the variation of the same energy, however depending on the grain size of the particles being ground, while Fig.5 indicates the variation of the net crushing energy  $E_{mg}$  depending on the tensioning  $G$  in N. The regime data and the particle sizes are shown in the figures themselves.

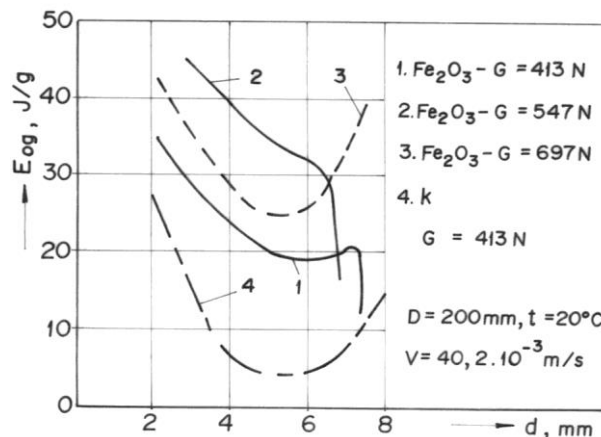


Figure 4.

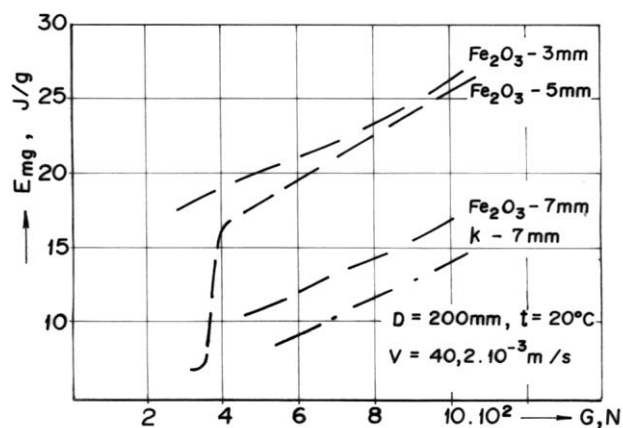


Figure 5.

To determine the flaky structure of the ground specularite were carried out investigations by microscope. It turned out that with all the regimes the flakes were crushed in over 60% of the ground material. This parameter is the most important one with such kind of materials, because it is known that its anticorrosion properties depend on the deposition of the flakes one on top of the other.

The following conclusions can be made as a result of the investigation:

1. The grinding of specularite from the Kremikovtsi deposit to a grain size as required by the chemical industry for the manufacture of anticorrosion lacquers by means of rolls is possible.
2. The regimes of the grinding process, as well as the consumed energy, are comparable with the same parameters in grinding other mineral resources.
3. The flakes of over 60% of the particles are broken as a result of the grinding. Such material is of a relatively low quality.
4. Other technologies should be employed for the production of high quality specularite aggregate from the Kremikovtsi deposit, where the single flakes will be segregated without being broken.

## REFERENCES

- Höfl, K., 1985, Zerkleinerungs und Klassiermaschinen VEB Deutscher Verlag für Grundstoffindustrie Leipzig.
- Höfl, K., Kolberg, L., Bauer, L., 1974, Beitrag zur Untersuchung von Kegelrollenmühlen, *Neue Bergbautechnik* 4.
- Irmer, K., Folgner, Th., Höfl, K., 1982, Untersuchung zur Klinkermahlung auf Wälzmühlen, *Freib.Forsch.-H.A.685*.

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