CHARACTERISATION OF THE MAGNESITE ORE FROM BRUMADO, BAHIA, BRAZIL

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Magnesite ore classification based on colour and MgO, SiO_2 and Fe_2O_3 content was used for several years as a mining control. Selected samples from Brumado magnesite ore were studied to define its mineralogical characteristics, with particular emphasis on Fe and Si bearing minerals, the main deleterious contaminants for industrial applications, and to establish a mineralogical control for mining purposes.

The magnesite ore body, approximately 90 m thick, is essentially constituted of magnesite-marbles. They are white to light grey in colour, locally grey to yellowish, while the grain size, predominantly of 250μm, ranges from 20μm to 5mm [1].

Silicate minerals as talc, chlorite and serpentine, detected by optical microscopy, are responsible for the SiO_2 content. Very small amounts of chalcopyrite and pyrite, the only identified Fe-bearing minerals, could not explain the relatively high global Fe_2O_3 content in some samples.

Two varieties of magnesite were identified by X-ray powder diffraction, respectively magnesite [$MgCO_3$] and iron bearing magnesite - breunerite - [$(Mg,Fe)CO_3$]. Fe substitutes for Mg in the breunerite crystal structure, can lead to FeO content up to 9.0%, according to the literature. Small amounts of Mn can also be incorporated.

Although frequent iron bearing magnesite occurs in all studied materials, it is specially concentrated in some samples (35, 41 and 66), explaining their high Fe_2O_3 content. These samples, previously classified as grey (MM), dark grey (ME) and white to light grey (MB) ore types, respectively, using the local geological classification, demonstrate that rock colour cannot be directly correlated with iron oxide content.

Common Fe substitution for Mg observed in SEM studies helped to understand its irregular distribution with respect to magnesite. EDS analysis did not reveal a regular iron distribution, demonstrating that the degree of magnesium substitution in breunerite is quite variable. This irregular iron distribution makes the distinction between breunerite and magnesite difficult.

As a result of this investigation magnesite ores were subdivided into three types for mining purposes: Low iron oxide content: 1.4 to 3.0% of Fe_2O_3; medium iron oxide content: 3.0 to 8.0% of Fe_2O_3; high iron oxide content: above 8.0% of Fe_2O_3.

For practical mining purposes it can be admitted that silicates can be removed, at least in part, by cationic flotation process, while the iron oxide cannot be physically reduced, as it is retained in the crystal structure of a mineral variety (breunerite) of magnesite. Dry magnetic separation on grinded burned ore is visualised as the exclusive physical alternative to reduce the iron content.

REFERENCES

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