

1987/19. Grain size analyses of magnesite, Pinner deposit, Lyons River.

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Abstract

The grain sizes in various magnesite samples are highly variable and bimodal. An early, microcrystalline, variety of magnesite has been variably recrystallised into a medium-grained to coarse-grained variety which is difficult to sinter.

INTRODUCTION

Six samples of magnesite were submitted for grain size analysis by CRA Pty Ltd, via the Department's Launceston Laboratories, in relation to metallurgical test work being conducted at Launceston (R869) and elsewhere. The study relates to difficulties in sintering this magnesite.

Sample details are shown in Table 1.

MINERALOGY

All samples were prepared as polished thin sections and examined by transmitted light microscopy and X-ray diffraction. Magnesite was dominant in all samples; dolomite was subdominant in sample G400302, significantly less abundant in G400301, and not detected in the other samples; no other carbonates were detected. All samples contained a trace of quartz, and trace talc was identified in sample G400304. The iron present in ore assays would almost entirely be due to solid solution in magnesite. Most quartz is around 0.01 - 0.1 mm in size and is typically intergrown with fine-grained magnesite, which appears to have been restricted in grain growth by the presence of the quartz. Veins of coarser magnesite, from about 0.1 to 10 mm in thickness, intersect the matrix of finer magnesite.

GRAIN SIZE DISTRIBUTIONS

The grain size distributions were determined semiquantitatively and expressed graphically (fig. 1-2). Approximate average grain sizes are given in Table 1, and cumulative size distributions in Figures 3-4. The results indicate a very variable grain size range, basically bimodal, and two ore types can be distinguished: microcrystalline (<10 μm) and recrystallised/vein type (mostly 50-2000 μm).

Table 1. SAMPLE DETAILS OF MAGNESITE, FINNER DEPOSIT.

Sample number (TDM)	Laboratory number	Identity	Approximate average grain size (μm)
G400301	870245a	Flotation Concentrate	50
G400302	870245b	Head Sample	300
G400303	870493a	Rock, West deposit	500
G400304	870493b	Composite: W1+W2+W4	800
G400305	870494a	Rock: East deposit	10
G400306	870494b	Composite: E5+E6	200

CONCLUSIONS

The results indicate two generations of magnesite: an early, microcrystalline variety, and a later, medium-grained to coarse-grained, variety which veins and brecciates the former. No dolomite was detected in the veins tested, although earlier studies revealed both dolomite veins and disseminated dolomite (Kellerwessel and Imhof, 1985). The highly variable intergranular and intragranular distribution of these two varieties of magnesite suggest that it may be difficult to selectively mine magnesite of a limited grain size range. This will, of course, need to be studied of the scale of the deposit. Duncan (1986) indicates that coarse grained magnesites (such as make up a large proportion of these samples) may generally be unsuitable for sintering.

REFERENCES

DUNCAN, L.R. 1986. Synthetic and natural magnesias : Their past, present, and future. *Industrial Minerals* 226:43-49.

KELLERWESSEL AND IMHOF. 1985. *Report on process engineering tests carried out with magnesite for CRA, Melbourne, Australia.* Unpublished Report by KHD Humboldt Wedag AG for CRA. [TCR86-2593].

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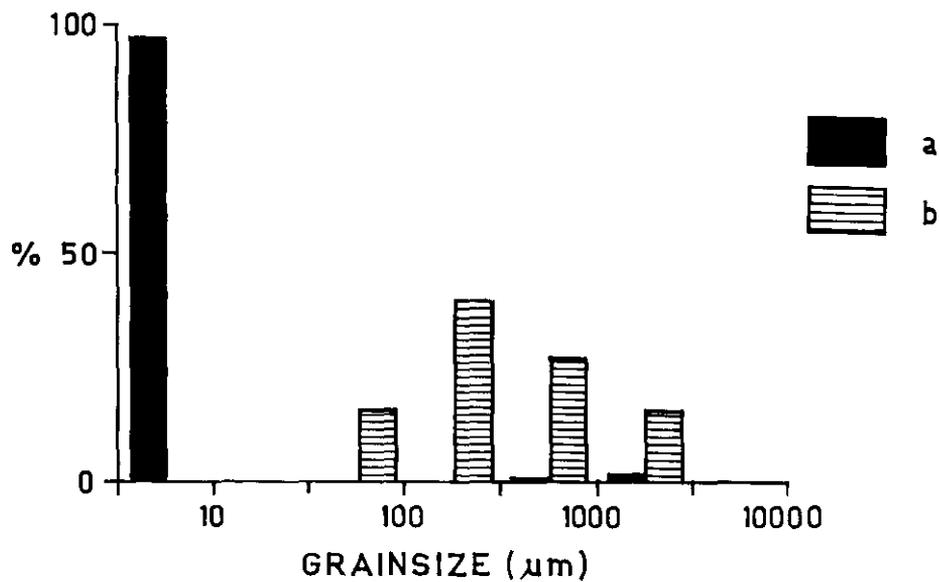


Figure 1. Grain size distribution in magnesite ore samples.
 a = G400303, b = G400305

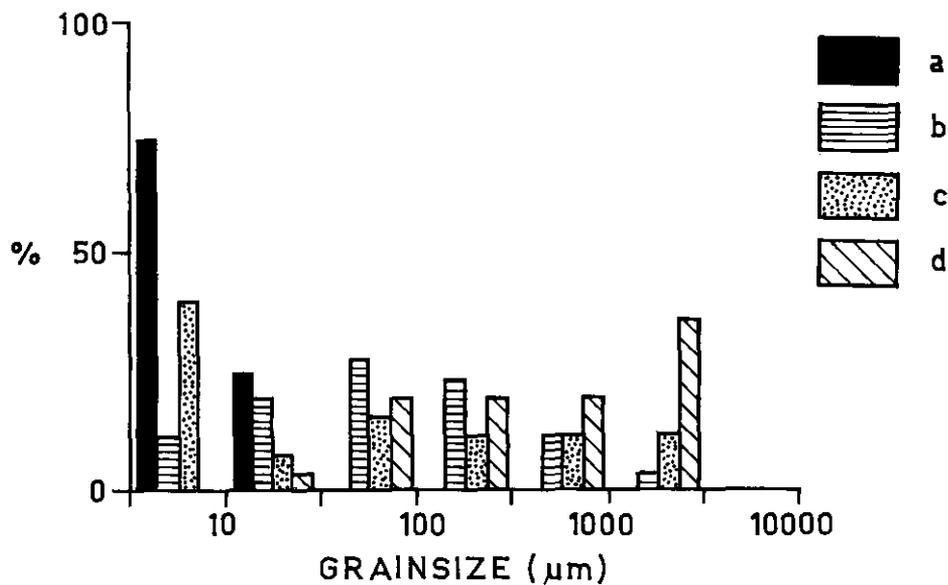
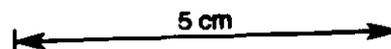


Figure 2. Grain size distribution in grinding and flotation products.
 a = G400301, b = G400302, c = G400304, d = G400306



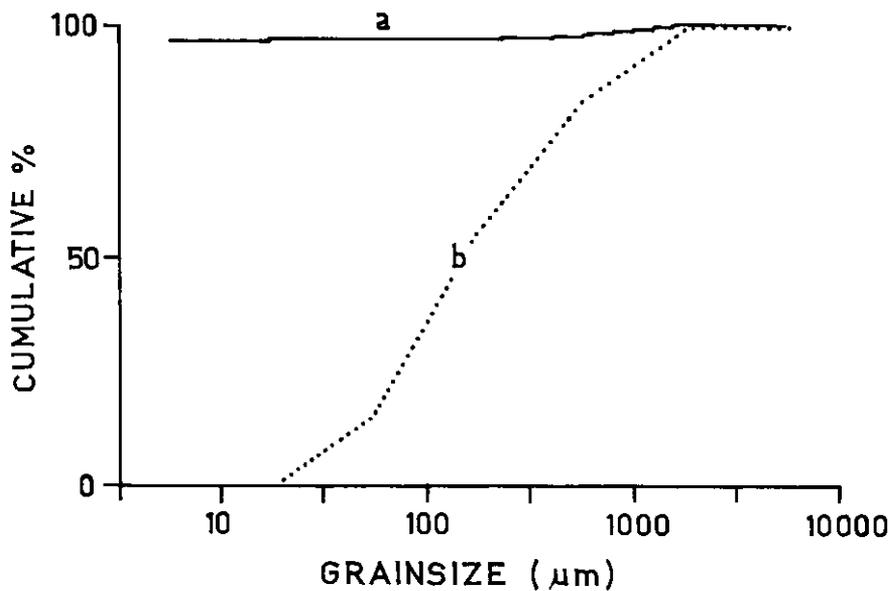


Figure 3. Grain size distribution in magnesite ores, expressed as cumulative mass % less than a given diameter.
 a = G400303, b = G400305

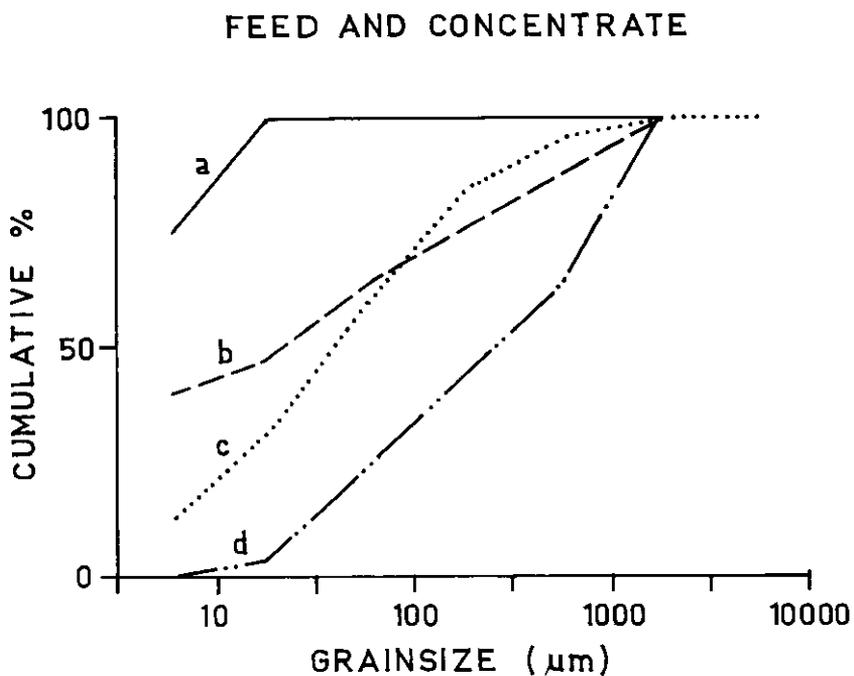


Figure 4. Grain size distribution in magnesite ores, expressed as cumulative mass % less than a given diameter.
 a = G400301, b = G400302, c = G400304, d = G400306