

Ottawa, April 11, 1927

REPORT #246
OF THE
ORE DRESSING AND METALLURGICAL LABORATORIES

The fine grinding of calcite containing a
small amount of graphite, from near Perth, Ont.
by R. K. Carnochan

Shipments: Four shipment of calcite were sent in by Mr. M. Day
Baldwin, of the Continental Industrial Minerals Ltd. 719 Pine Ave. W.
Montreal. All of these shipments were from a property near Perth,
Ont. The dates upon which these shipments were received, the number
of bags in each, and the shipping weights, are as follows:

August 5, 1925	35 bags	7080 pounds
Oct. 6, 1925	1 "	"
Oct. 12, 1925	2 "	420 "
Oct. 23, 1925	18 "	2050 "

Purpose of Tests: Fine grinding tests were desired on the calcite to
determine if products could be prepared from it suitable for use in
making paint, linoleum, rubber goods, etc.

Characteristics of the calcite: The calcite was pure white and
crystalline, and contained a small amount of graphite. The graphite
was in small flakes.

Sampling and Analysis: A head sample was taken of the lot received
on August 5th. This sample upon analysis gave the following:

CaO	50.55	%
MgO	1.68	%
SiO ₂	2.80	%
C	0.35	%
Fe	0.16	%
CaF ₂	0.95	%
Al ₂ O ₃	trace	
Mn	nil	

Experimental Tests: - Grinding with Raymond pulverizer and Gayco
separator - Twenty three bags of the shipment received August 5th.
were ground in a No. 0000 Raymond pulverizer. The ground product from
the Raymond was separated in a 30" Gayco air separator, the fines being

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finished product and the coarse being fed back as produced to the Raymond
This method of grinding gave a product 99.9% -200 mesh. This product
was slightly grey in colour and when mixed with linseed oil it became
a dirty greenish grey, which makes the product unsuitable to use in
making paint or linoleum.

Twelve bags of the lot received on August 5th. were ground in a
4½' x 16" Hardinge ball mill to see what capacity this machine would
have. It was intended to feed the mill product to the Gayco air
separator and return the oversize of the separator to the mill.
However, the mill discharge was so off colour that this test was not
completed.

Removal of Graphite by screening and grinding calcite with pebble
mill and Gayco.

A lot of 1755 pounds of the shipment received on Oct. 23rd. was
crushed by passing it twice through a small jaw crusher and four times
through a small set of rolls, a 35 mesh screen being used to remove
the fines after each crushing.

-35 mesh	1st. pass	175 pounds
	2nd. pass	408 "
	3rd. pass	469 "
	4th. pass	199 "
	5th. pass	120 "
	6th. pass	99 "
+35 mesh	6th. pass	257 "

The + 35 mesh contained a lot of graphite and the -35 of the 1st. and
2nd. passes contained a little graphite and were a little off colour.
The -35 mesh of the 3rd, 4th, 5th, and 6th. passes contained a little
graphite, but outside of this were white in colour. The -35 of the
3rd, 4th, 5th, and 6th. passes were mixed and ground fine by means of
a 4 x 6-foot pebble mill and 30" Gayco air separator, the method used
being to charge, grind in the mill, and then separate in the Gayco, the
oversize being charge-ground again and separated, this being continued
till the oversize from the separator was a very small amount.
The Gayco fines are 99.9% -200 mesh and are very white in colour.
When mixed with linseed oil they give a light grey colour

Removing graphite by flotation and grinding calcite with pebble
mill and Gayco.

The graphite was removed from a lot of 840 pounds of calcite by oil
flotation. This lot consisted of the -35, 1st and 2nd. passes and
the +35, 6th. pass of the previous test. After removal of the graphite

the calcite was dried and ground fine by means of the ^{4x6ft.} pebble mill and 30" Gayco air separator. The method of grinding was the same as in the previous test.

The Gayco fines are 99.8% -200 mesh and are very white in colour, when mixed with linseed oil they give a light fawn colour.

Conclusions: The best way to treat this calcite would be to remove the graphite by oil flotation and then dry the cleaned calcite and grind in a pebble mill in closed circuit with an air separator. This would give a very large percentage of the crude as very white fine ground material.

If a finer product than that obtained by dry grinding was desired the calcite, after the removal of the graphite, could be ground wet in a pebble mill in closed circuit with a Dorr bowl classifier. The ground pulp could be thickened, filtered, and the filter cake dried and reground.