O T T A W A August 30th, 1940.

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ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 892.

Microscopic Examination of Ilmenite-Magnetite Ore from near Mine Centre, Ontario, submitted by L. W. Wilson, International Falls, Minnesota.

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Sample:

A sample of ilmenite-magnetite ore from near Mine Centre, Ontario, was received by the Division of Metallic Minerals, Bureau of Mines, Ottawa, Ontario, on July 18th, 1940. It was submitted by L. W. Wilson, International Falls, Minn., and consisted of pieces

picked up from a previous experimental shipment sent East by Dr. Wm. Goodwin and his associates in 1931.*

Purpose and Method of Examination:

The object of the examination was to ascertain the size of the ilmenite particles enclosed in magnetite with a view to a method of separating these two minerals.

For this purpose six polished sections were prepared and then examined under the reflecting microscope.

Description of the Polished Sections:

In the polished sections the ore is seen to consist of three chief components, as shown in Figure 1, namely:

A. Coarse disseminated grains of dense, homogeneous ilmenite averaging about one millimetre in size.

B. A fine-grained admixture of ilmenite and magnetite in which the former is intergrown with the latter as elongated particles along crystallographic directions. The arrangement and shape of the ilmenite suggest that the intergrowth is the result of exsolution. (See Figure 2).

C. Gangue as irregular patches and stringers erratically scattered throughout the other two components.

Besides the three constituents described above, a negligible quantity of pyrite is present as rare, small, disseminated grains.

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* Canadian Department of Mines test work on this shipment is covered by Investigation No. 463, Investigations in Ore Dressing and Metallurgy, 1932. (Mines Branch Report No. 736).

Relative Amounts by Volume of the Three Chief Components:

The sections were traversed under the microscope and the percentages by volume of the chief components were determined (Rosewahl method), with the following results:

Component	Percentage by volume
A. Coarse grains of ilmenite	26.6
B. Fine admixture of ilmenite and magnetite	56.8
C. Gangue	16.6
	100.0

Conclusions:

1. Satisfactory separation of the three components from one another should be comparatively simple, owing to the following facts: (a) All three are essentially coarse (+65 mesh); (b) Components A and B are much heavier than C; (c) Component B is magnetic, due to the admixed magnetite, while Component A is not.

2. The satisfactory mechanical separation of magnetite from ilmenite in Component B is impossible economically, and it is doubtful whether grinding can be carried sufficiently far to effect any appreciable degree of freedom of these two minerals.

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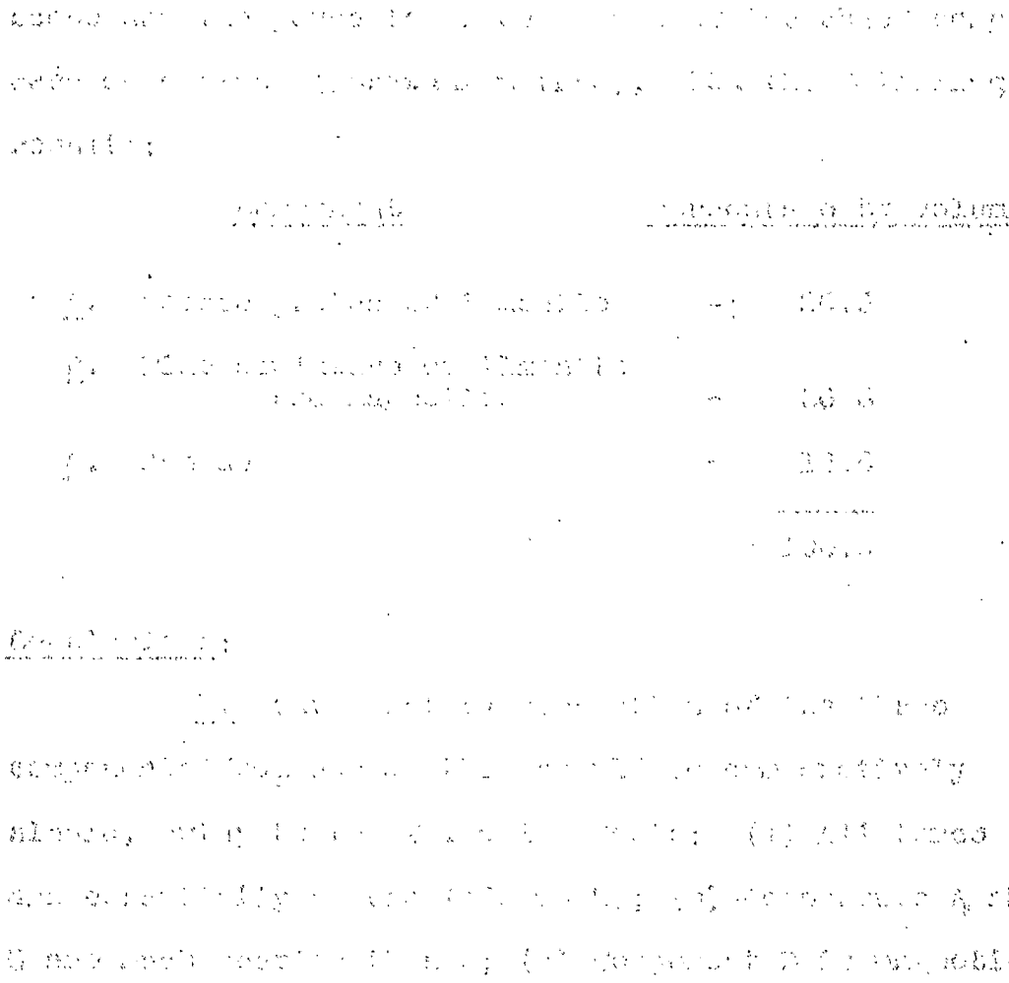
WEW:MHH:PES.

Figure 1.



Photomicrograph showing Components A, B, and C.

The square is equivalent to 14 mesh (1.17 mm.).
Magnification, X42.

Figure 2.

Photomicrograph showing intimate intergrowth of ilmenite and magnetite in Component B, and the impossibility of separating these two minerals economically.

Ilmenite - dark grey.
Magnetite - light grey.
Pits and gangue inclusions - black.

The square is equivalent to 200 mesh (74 microns).
Magnification, X 825. (Oil immersion).

WEW:MHH:PES.