pyrrhotite structures allows rapid quantitative determination of amounts and proportions of these structures in certain sulphide ores carrying at least 3% of either pyrrhotite type. The differences in amplitudes from synthetic mixtures of the pure structure types are divided by the amplitudes of a nearby diffraction peak from an internal standard added in constant proportion; and the resulting ratios are plotted against the known proportions of either structure. The plot may be checked against weights of magnetic concentrates of monoclinic pyrrhotites from the ores under study.

Determination rates of at least two to three samples per hour at precisions averaging about ±12% of the amounts present may be readily attained with suitable instrumentation. Economical and relatively precise contouring of sulphide bodies for the amounts and distributions of hexagonal (paramagnetic) and monoclinic (ferromagnetic) pyrrhotites is thus feasible.

CRYSTAL SETTLING IN THIN SILLS: A MODEL

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An expression relating the concentration of cumulate crystals, at a given point in a thin sill, to their settling velocity and the rate of solidification at the roof and floor is derived for:

i) settling from an homogeneous crystal suspension

ii) settling of crystals nucleating and growing through a given fraction of the sill.

Account is taken of the effect on the settling velocity due to a magma viscosity gradient across the sill.

In the case of suspension settling the time required for crystallization at a given position in the sill is a function of the relative concentration of cumulative particles at that point. The solution for a natural sill requires a knowledge of the number of particles per unit volume and their size distribution, not just modal per cent as is universally reported in the literature. Nevertheless, this latter parameter allows us to make, with certain assumptions, an approximation of the time of crystallization at a given position in a sill.

The Fourier heat flow equation under appropriate initial and boundary conditions may yield a good approximation for the rate of solidification at the roof and floor of the sill. The form of the particle concentration vs. height curve can then be calculated for various nucleation and growth rates. The results appear to compare favourably with those found in natural sills. The average viscosity and settling velocity in natural sills can be estimated from theory for the case of suspension settling.

THE FELDSPARS FROM A THOLEIITE SILL, GRAND MANAN, N.B.

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The Triassic basalt flows and related sills of Grand Manan Island were mapped during the summer of 1965. A 500-foot tholeiitic sill was sampled in four sections, as a single section from the roof to the base was not available. Two of the sections extended upward from the chilled base and two from the roof downwards.

The chemistry of the sill has been defined by *x*-ray fluorescence and chemical analysis.

The results of a study of the feldspars by optical, chemical and *x*-ray methods are described. An attempt is made to relate these results to the chemistry and differentiation trend of the sill.