

bentonite, and since $2M$ pegmatitic muscovite does yield a post DTA μ pattern, it is suggested that the presence of a well crystallized mica may govern the appearance of a metastable alumina polymorph immediately previous to the formation of corundum, and having a structure approaching that of corundum. This metastable alumina polymorph has been designated μ alumina for reference convenience, and is an equilibrium modification not to be expected in natural materials.

REFERENCE

SWANSON AND FUYAT, 1953, *NBS Circular No. 559*, II, p. 20.

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MAGNETITE IN MICROCRYSTALLINE QUARTZ,
LANCASTER COUNTY, PA.

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During a research project on the chromites and serpentines of southeastern Pennsylvania, blebs of magnetite were observed in the silicified contact zone between a serpentinitized ultramafic and a later quartz pegmatite dike. The unusual occurrence and non-crystalline, vitreous appearance of the magnetite are of interest.

The magnetite occurs near the Red Pit, two-thirds of a mile southwest of Rock Springs Church near Pennsylvania Route 222 in Lancaster County, Pennsylvania. The magnetite blebs are highly magnetic. It is restricted to hematitic microcrystalline quartz replacing bastite at a quartz pegmatite-chromiferous serpentine contact (Fig. 1).

X-ray powder diffraction patterns indicate that at least some of the magnetite is crystalline with crystallites exceeding 1000 Å. Electron photomicrographs (Fig. 2) indicate that some of the material may be amorphous, since no crystal outlines or cleavage directions are visible.

Composition, determined from a unit cell spacing of $a_0 = 8.352 \text{ \AA} \pm .006 \text{ \AA}$ and from emission spectrographic analyses, corresponding to one magnesioferrite, one magnetite, and two ferrochromite molecules, is $(\text{Fe}_{1.7}\text{Mg}_{1.0})(\text{Cr}_{30}\text{Fe}_{1.3}\text{Al}_{0.7})\text{O}_{10}$.

Evidence bearing upon the paragenesis and genesis of this magnetite may be summarized as follows:

1. Microcrystalline quartz and chalcedony replace serpentine textures.
2. Silicification increases toward pegmatitic quartz while serpentinitization textures and minerals are gradually obliterated.
3. Magnetite is restricted to microcrystalline chert which is the chilled contact zone of a quartz pegmatite intrusive into serpentine.



FIG. 1. Photomicrograph of magnetite in microcrystalline quartz. Crossed nicols. $\times 30$.



FIG. 2. Electron micrograph of magnetite. $\times 11400$.

4. Microcrystalline quartz, and magnetite textures and crystallite sizes indicate rapid cooling and growth by multiple nucleation.

5. This serpentinized ultramafic contains sufficient Mg, Fe, Cr, and Al to have been the source of the magnetite.

These points indicate that the glassy appearing magnetite originated from pre-existing iron-magnesium silicates by alteration and remobilization of a serpentinized ultramafic along the contact of a quartz pegmatite intrusion. Crystallization was rapid, producing microcrystalline quartz, crystallites of magnetite as small as a few thousand angstroms, and possibly a magnetite glass phase. The magnetite represents a complete recrystallization rather than simply alteration of a pre-existing spinel. Silicification by granitic pegmatite intrusion may be genetically related to similar granitic intrusives in this region commonly spatially associated with serpentinized ultramafics.

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DIFFERENTIAL THERMAL ANALYSIS OF EVAPORITES

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In view of the recent interest shown by petroleum geologists in the thermal history of evaporite minerals, a new development in the application of differential thermal analysis (D.T.A.) to this group may be of interest. Improved D.T.A. technique has made possible the analysis of minerals containing corrosive sulfur and arsenic (Kopp and Kerr, 1957, 1958) formerly beyond the scope of the method. More recently several evaporite minerals have been analyzed which contain elements of the halogen family, and the borate and nitrate radicals.

Difficulties ordinarily encountered in applying D.T.A. to a number of these minerals include the fluxing action of the molten material upon the metal thermocouples, corrosive gases released at some stage during the heating process, and the difficulty of sample removal upon cooling. Minerals for which difficulties have been reported include: cryolite,

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