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A FAYALITE-BEARING PEGMATITE, BURNET COUNTY, TEXAS

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Fayalite has been reported from numerous localities throughout the world, and it is associated with quartz in some igneous rocks and in a few pegmatites (Shibata, 1937).

A fayalite-bearing pegmatite is located half a mile N. 78° W. from the north end of Buchanan Dam on the shore of Lake Buchanan, Burnet County, Texas. The pegmatite strikes N. 50° W., dips 50° to 80° NE., averages 4 to 6 feet wide, and is exposed for about 120 feet when the lake surface elevation is less than 1,010 feet above sea level. The country rock is pink Precambrian granite composed mostly of pink microcline, quartz, biotite, and hornblende.

There are two readily discernible zones in the pegmatite, an outer zone of perthitic pink microcline, in which there are microcline crystals up to 8 inches in diameter, and an inner zone or core of smoky quartz. The quartz and microcline are graphically intergrown at several places along the boundary between the two zones.

The fayalite occurs in anhedral masses and rough tabular crystals in the quartz core of the pegmatite. Crystals 6 inches long and weighing in excess of 2 pounds have been found, but the average size is about 2 inches long and the average weight between 3 and 4 ounces. On fresh surfaces the fayalite is lustrous black and on weathered surfaces dark brown.

X-ray diffraction with copper K_α radiation shows the following prominent peaks in decreasing order of intensity: 2.833, 2.502, 2.567, and 5.250 Å.

Properties are as follows:

Biaxial (−)
$r > v$ distinct
$\alpha = 1.819$, $\beta = 1.858$, $\gamma = 1.868$
$\gamma - \alpha = 0.049$
$2V = 53°$
Specific gravity (28° C.) $= 4.22 \pm 0.02$

The optical properties and x-ray data indicate that the fayalite is not pure Fe_2SiO_4 but probably contains small amounts of additional cations that have been admitted into the orthosilicate structure thereby slightly modifying the crystal structure and properties (Ford, 1935).

The fayalite is a very minor constituent of the pegmatite with only about 12 pounds of the mineral having been collected to date. The only other accessory mineral in the pegmatite is biotite, which occurs throughout both the microcline zone and the quartz core in plates and crystal sections up to 3 inches in diameter.

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THE GROWTH OF SYNTHETIC CHRYSOTILE FIBER

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In the course of numerous studies on the formation of inorganic fibrous material, considerable attention has been drawn to the synthesis of chrysotile asbestos because of the desirable properties of this material in technological applications. Chrysotile has been synthesized under hydrothermal conditions by Jander, W. and Wuhrer, J., (1938) and many others, but the crystals formed were generally in matted fibrils, about 1μ in length, which could be recognized only by examination with the electron microscope. This investigation was undertaken in our laboratory as part of a research program on the ternary system MgO-SiO_2-H_2O to increase knowledge of the genesis and the crystal structure of serpentine materials (Yang, 1960).

It was found that synthetic chrysotile fiber growth can be promoted by employing proper mineralizers, trace elements and controlled pH mediums in the hydrothermal synthesis. Fiber bundles formed under these conditions average 100μ or more in length, but individual fibers are about 15–20μ. These consist mainly of clinochrysotile with trace amounts of platy lizardite.

Experimental

Optimum conditions for hydrothermal synthesis are tabulated as follows: