

the decomposition of the  $\text{FeCO}_3$  and the immediate oxidation of the resulting  $\text{FeO}$  to  $\text{Fe}_2\text{O}_3$ ." This assumption of "immediate oxidation" is open to question because the decomposition of the tightly packed powder in the thermal well is relatively sudden and the large evolution of  $\text{CO}_2$  in the first few minutes of reaction would prevent the ready access of oxygen to the powder. After the major part of the  $\text{CO}_2$  evolution has ceased, oxidation may proceed as observable in the accompanying curves.

TABLE 1: CHEMICAL ANALYSES OF SIDERITE FROM ROXBURY, CONN.

	Cuthbert and Rowland <i>Anal. by L. D. McVicker</i>	Kerr and Kulp <i>Anal. by Ledoux &amp; Co.</i>
CaO	—	0.86
MgO	—	4.10
FeO	53.80	56.80
CO <sub>2</sub>	38.21	37.25
Total	92.01	99.01

The cause of the reported exothermic peak is not clear. Neither unusual purity of sample, dilution or change in heating rate appear to furnish an adequate explanation. Until the exothermic peak is confirmed, the primary reaction for siderite should be regarded as endothermic as Cuthbert and Rowland report for other rhombohedral carbonates.

## SYNTHESIS OF TOURMALINE

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The writers recently have synthesized tourmaline by a hydrothermal method at temperatures in the range from 400° to 500° C. The method employed was based on the recrystallization of powdered tourmaline glass heated in contact with water solutions of magnesium and alkali borates. The largest crystals so far obtained are slender prisms about 0.5 micron in length. Spherulitic aggregates of microcrystals also have been obtained by direct devitrification of the glass under these conditions. Alloy steel bombs basically of the Geophysical Laboratory type were employed.

Tourmaline melts incongruently at temperatures varying roughly from 1050° to 1200° C. for the iron-rich types, the melting temperature decreasing with increasing content of iron or magnesium. Homogeneous glass can be prepared from high-iron tourmaline by quenching from about 1550°. The point of complete melting of lithia-tourmaline, however, is over 1725° C. When the melts approach fluidity they boil slightly

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due to loss of water (contained as (OH) in the crystal) and give an odor of fluorine. Some  $B_2O_3$  also may be lost. Tourmaline has been synthesized from such glass when no added fluorine was present in the solution, indicating that most or all of the original fluorine can be replaced by hydroxyl. Differential thermal analysis of a black, high-iron tourmaline revealed an endothermal break (melting) at about  $1050^\circ$  C. immediately followed by a sharp exothermal break presumably representing partial crystallization of a transient complete melt. No thermal breaks were observed below  $1050^\circ$  C.

Synthetic tourmaline made at  $500^\circ$  from a high-iron glass with  $G=2.67$  and  $n=1.582$ , prepared by melting black tourmaline with  $G=3.16$  and  $O=1.647$ , was pleochroic in minute crystals and varied in indices with  $O$  for the most part over 1.65. Material with much lower indices, reflecting variation in the composition of the tourmaline, has been made from such glass by adjusting the composition of the solution which effects the re-crystallization.

The work here described is being carried on in the laboratories of Baird Associates, Inc., Cambridge, under a development contract with the Squier Signal Laboratory, U. S. Army Signal Corps, Fort Monmouth, New Jersey.

#### OCCURRENCE OF BARITE AT PILOT KNOB, MISSOURI

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A specimen of felsite containing hematite was found at the top of a chute leading to a dump on the north side of Pilot Knob. The surface of one side of this specimen is covered with a series of vesicules which appear to be gas holes along a flow surface. Almost all of these vesicules contain orthorhombic crystals of colorless barite ranging in size from those barely visible with a hand lens to the largest with a vertical axis almost one half an inch long; nearly all of these can be described as bladed. They were identified optically as they have the correct indices and optic sign of barite. Besides these crystals show characteristic striations parallel to the length and give the yellow-green flame of barium.

Further study has revealed that these crystals can be found *in situ* near the top of the Knob in cavities in a pyroclastic ferruginous agglomerate. Barite crystals were also found *in situ* in cavities in the main pit; the rock here is a hematitic rhyolite porphyry containing a few xenoliths of red rhyolite. Many of these cavities contain quartz crystals with the barite on the quartz and therefore later than the quartz. If the rock was coarse grained, these cavities could be described as miarolitic.