

lucent. This is doubtless due to the change of  $\beta$ -cristobalite to  $\alpha$ -cristobalite, which, according to Fenner, takes place at a temperature varying from 198 to 240° C. This simple blowpipe test may be of service in identifying cristobalite, a mineral which otherwise can only be distinguished by optical tests, and one which may have consequently been overlooked many times.

Since cristobalite is a form of silica, one would expect to find it in the persilicic (so-called acid) rocks, but all the earlier described occurrences are in andesite, auganite, or basalt. Tridymite, on the other hand, is found in rhyolite and trachyte as well as in the medio-silicic rocks. The Yellowstone Park occurrence, together with the writer's recent identification of the mineral in the rhyolitic obsidians of two localities in California, proves that cristobalite as well as tridymite is characteristic of the persilicic volcanic rocks, for, of the five American occurrences known, three are in rhyolitic obsidians. It is believed that a careful search in obsidians and related rocks will reveal the presence of cristobalite in many additional specimens.

## MASSIVE LAUMONTITE FROM MONTANA

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Laumontite is a mineral of the zeolite group which is ordinarily found in the form of well-developed crystals associated with related minerals as an alteration product in cavities in basic igneous rocks. The mineral is rarely found massive and is seldom present in any great quantity. Some time ago Dr. E. S. Larsen turned over to the writer a specimen of a massive earthy material with the statement that its optical properties identified it as laumontite. The mineral had been sent to the U. S. Geological Survey by Mr. Chas. P. Farnquist of Spokane, Wash., who gives the locality as near Wolf Creek Station, Lewis & Clarke Co., Mont. There are said to be several veins solidly filled with the mineral in a distance of 5 meters, the individual veins reaching a thickness of 0.6 m. In appearance the specimen resembles a compact altho somewhat friable sandy clay of a dirty grayish

<sup>1</sup> Published by permission of the Secretary of the Smithsonian Institution. [In contrast to the preceding article this one shows how optical methods led to the correct identification of a very unusual form of a fairly common mineral. Ed.]

pink color with an occasional bright grain giving a vitreous or pearly reflection. The aggregate can be crushed to sand with the fingers. No information regarding the wall rocks is available. The optical measurements made by Dr. Larsen are as follows: Optically negative (—); extinction apparently highly inclined; axial angle,  $2V$ , medium; refractive indices  $\alpha = 1.505$ ,  $\beta = 1.515$ ,  $\gamma = 1.517$ .

The material was so different in appearance from ordinary laumontite that it was examined chemically in the laboratory of the National Museum. Before the blowpipe it fuses with intumescence to a white enamel. In the closed tube yields abundant water. It is soluble in hot hydrochloric acid with gelatinization.

Upon analysis the following results, agreeing with the recognized composition of laumontite, were obtained upon the air-dried material:

SiO<sub>2</sub> 50.90, Al<sub>2</sub>O<sub>3</sub> 21.26, Fe<sub>2</sub>O<sub>3</sub> 1.66, CaO 13.91, MgO trace, MnO trace, H<sub>2</sub>O 12.64, sum 100.37%.

The mineral is of interest in its unusual form and mode of occurrence. The instance shows with what certainty a mineral may be identified by means of its optical properties alone.

## THE MINERALS OF MADISON COUNTY, MISSOURI<sup>1</sup>

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Madison County, Missouri, is noted especially for the linneite<sup>2</sup> found in the old Mine La Motte Mine. The occurrence of this rare mineral in abundance in this and nearby mines makes the area of interest, but many other minerals (one of which is known nowhere else in the United States) are found in this county.

Madison County is in the southeastern part of the state, about 145 kilometers (90 miles) south of St. Louis. It includes part of the St. Francois Mountains, which comprise an irregular series of rounded hills, some of which reach an elevation of 550 meters (1800 feet). In the eastern part of the county there are

<sup>1</sup>[Our "Famous Mineral Localities" series, more or less interrupted during the past few months because of lack of space, recommences with this article, and will, it is hoped, be represented in every number during the current year. Ed.]

<sup>2</sup>[The simplest spelling of this name is preferred in this magazine. Ed.]