THE AMERICAN MINERALOGIST, VOL. 42, JULY-AUGUST 1957

NOTES AND NEWS

A NOTE ON CALCITE-ARAGONITE EQUILIBRIUM*

SYDNEY P. CLARK, JR. *Harvard University, Cambridge, Massachusetts.*

MacDonald (1956) has recently reported the results of an experimental determination of calcite-aragonite equilibrium. His work was done in the "simple squeezer" type of high-pressure apparatus, and since the state of stress to which the sample is subjected in this equipment is not susceptible to direct determination, it is interesting to compare his results with those obtained in an apparatus in which the pressure is truly hydrostatic.

The apparatus used in the present study has been described previously by Robertson, Birch, and MacDonald (1957). Pressure is generated by the compression of nitrogen and is measured with a manganin coil. The temperature of the charge is measured with thermocouples placed at each end of the platinum capsules in which it is held.

Synthetic aragonite was freshly prepared before each run by mixing Na_2CO_3 and $CaCl_2$ at 100° C. Synthetic calcite was obtained by allowing the resulting precipitate to stand for several weeks. Natural calcite was also tried as a starting material, but it proved to be much less reactive than the synthetic calcite.

Phases present in the synthetic reactants were identified by their x-ray diffraction patterns. The synthetic calcite gave sharp patterns with no aragonite lines. Sharp aragonite lines were obtained from the synthetic aragonite, and the strongest line of calcite also appeared. Evidently some inversion of this material took place in the few hours between its preparation and its examination by x-ray, and the reactant described as aragonite is actually a mixture of calcite and aragonite. The mixture is a perfectly satisfactory reactant, since the disappearance of aragonite lines during a run indicates that the run was in the calcite field as surely as if no calcite had been present initially.

Products formed in the runs were identified by x-ray. In all cases lines of only one of the two phases appeared.

In making a run, the pressure was raised before the furnace was heated. At the end of the run the charge was quenched before lowering the pressure. The temperature of the charge drops below 300° C. less than 30 sec. after cutting the power to the furnace, and there is no evidence of reaction taking place during quenching.

Experimental results are given in Table 1 and Fig. 1. They are in ex-

* Paper No. 152 published under the Auspices of the Committee on Experimental Geology and Geophysics and the Division of Geological Sciences at Harvard University.

TABLE 1. EXPERIMENTAL RESULTS

Run No.	Pressure (bars)	Temperature (° C.)	Duration (hrs.)	Reactant	Product
102	10,000±200	410±30	1½	Synthetic Aragonite Natural Calcite	Calcite Calcite
104	10,500±100	450±25	1½	Synthetic Aragonite Natural Calcite	Calcite Calcite
105	11,900±100	440±20	1½	Synthetic Aragonite Natural Calcite	Aragonite Calcite
129	13,200±100	575±15	2¼	Synthetic Aragonite Synthetic Calcite	Aragonite Aragonite
130	12,700±100	575±10	2	Synthetic Aragonite Synthetic Calcite	Calcite Calcite

cellent agreement with those of Jamieson (1953). The curve determined by Jamieson and extended by the present work is parallel to MacDonald's curve and departs from it by about 1300 bars. Professor Kennedy, in whose laboratory MacDonald's work was done, has informed me that the accuracy of his determinations of pressure in the simple squeezer

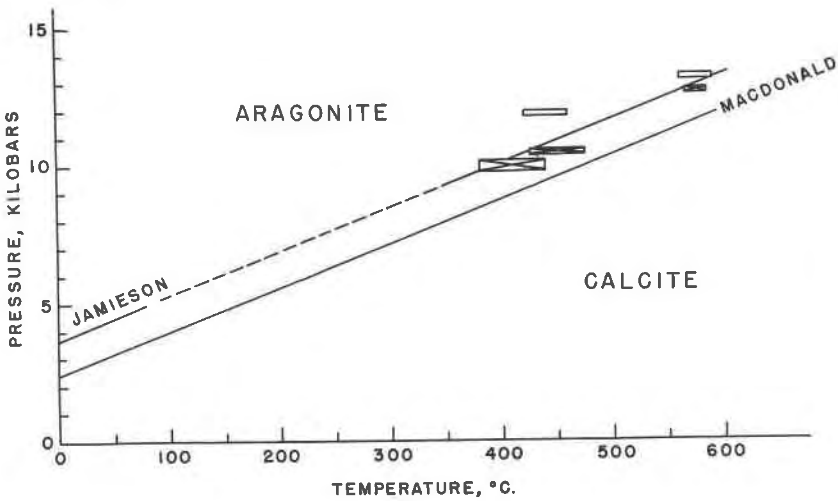

FIG. 1. Comparison of present results with those of MacDonald and Jamieson. The present results are shown as boxes, with open boxes representing runs which produced aragonite and boxes with crosses representing runs which produced calcite.

have recently been improved, and that further work on this reaction is in good agreement with the results presented here.

I am indebted to Prof. MacDonald for providing me with a copy of his manuscript in advance of its publication, and for several stimulating discussions of this work.

References

JAMIESON, J. C. (1953), Phase equilibrium in the system calcite-aragonite: *J. Chem. Phys.*, **21,** 1385–1390.

MACDONALD, G. J. F. (1956), Experimental determination of calcite-aragonite equilibrium relations at elevated temperatures and pressures: *Am. Mineral.*, **41,** 744–756.

ROBERTSON, E. C., BIRCH, F., AND MACDONALD, G. J. F. (1957). Experimental determination of jadeite stability relations to 25,000 bars: *Am. J. Sci.*, **255,** 115–137.

THE AMERICAN MINERALOGIST, VOL. 42, JULY-AUGUST 1957

FUCHSITE FROM A SILURIAN (?) QUARTZ CONGLOMERATE, ACWORTH TOWNSHIP, NEW HAMPSHIRE

TOM N. CLIFFORD, *Harvard University, Cambridge, Massachusetts.**

During the remapping of the New Hampshire portion of the Bellows Falls quadrangle a small pod of the emerald-green chromian muscovite *fuchsite* was discovered in the Clough quartz conglomerate (of Lower Silurian (?) age) within the staurolite zone of metamorphism. The occurrence was 10–20 feet above the base of the formation at a locality some 480 yards N.52° E. from the intersection of the Acworth-Langdon townline with State Highway 123.

The fuchsite is in flakes up to 1 mm. in diameter and, in the field, was disposed in a lenticular pod measuring 14×6×3.4 mms. (for the long, intermediate and short axes respectively) in the granular quartz matrix of a quartz-pebble conglomerate. Fine-grained chromite and quartz are the dominant associated impurities.

The properties of the mica are given below. 19.3 milligrams were analyzed by Mr. Jun Ito and his results are shown in Table 1 (*a*) together with the limits of analytical accuracy imposed by the small amount of material. The indices of refraction were determined, under sodium light, by the immersion method; the 2V was measured by use of the universal stage; and the specific gravity was found by suspension in bromoform. Except for the high value for titania in the chemical analysis, these

* Present address: Research Institute of African Geology, The University, Leeds, 2, England, U. K.