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Composition of type dachiardite from Elba: a re-examination

DACHIARDITE, a rare silicon-rich zeolite of the mordenite group, was originally reported by D'Achiardi (1906) from a pegmatite dike in the S. Piero in Campo granite, Elba, Italy, where it occurs with pink tourmaline, pollucite, mordenite, stilbite, and heulandite. Results of the original chemical analysis obtained by D'Achiardi are given in Table I, column B. A new chemical analysis reported by Gottardi (1960), following an optical and structural study by Bonatti and Gottardi (1960), indicated that dachiardite and mordenite from the Elba locality should be considered as two polymorphs of the same compound. The Gottardi analysis (Table I, column C), using the classical method except that alkalis were determined by flame photometry, gave Si and Al values more in accordance with the requirements for tectosilicates.

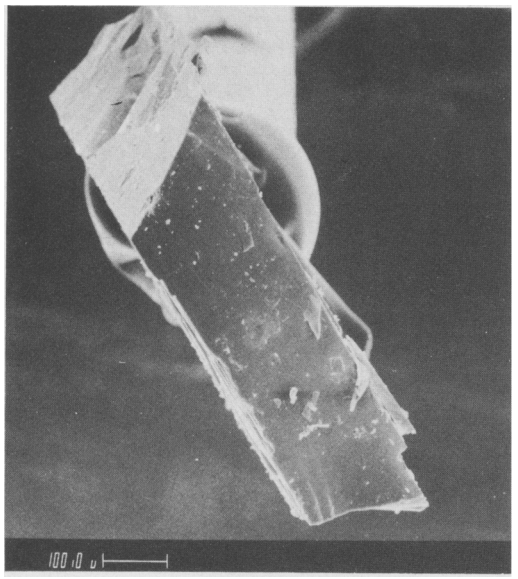
The present writer's comparative study of the chemical composition of dachiardite from various localities (manuscript in preparation) included an electron microprobe analysis of type dachiardite from Elba. A fragment measuring about 1 mm in diameter was used for an X-ray powder diffraction identification and another portion was mounted in Petropoxy(R) for the microprobe study. The mount was polished and carbon coated in vacuum, and the chemical composition was determined by energy dispersive analysis using a Material Analysis Company electron microprobe operated at 20 kV accelerating voltage, with counting times of 100 seconds. A specimen current of 10 nA was measured on a kaersutite standard. A slightly defocussed beam was used to minimize water loss and other compositional changes due to vacuum conditions and heat generated by the electron beam. A computer program, developed by Plant and Lachance (1973), was used to convert energy dispersive spectra into oxide weight percentages. The specimen was analysed for Si, Al, Ca, Na, K, Cs, and Sr, using the following standards: cleavelandite (Na,Al,Si), kaersutite (Ca), orthoclase (K), pollucite (Cs) and synthetic plagioclase containing 1.60 per cent Sr (Sr). The compact platy structure of the grain analysed (figs. 1, 2), and its high Ca content apparently retarded the volatilization of H_2O and K during the analysis.

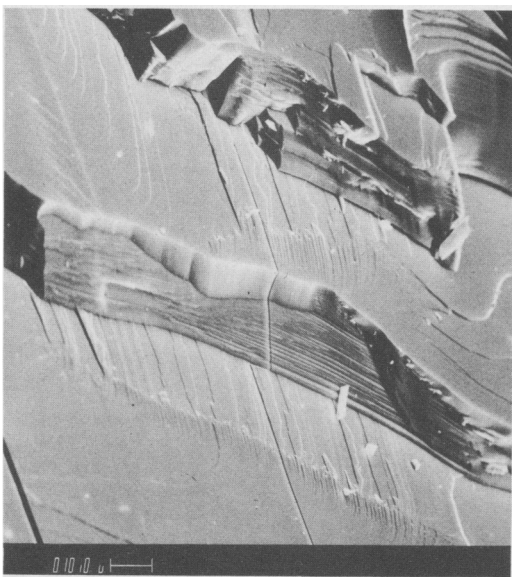
The average of five microprobe analyses with a balance error E (Passaglia, 1970) less than $\pm 7\%$, and the calculated cell content are reported in Table I, column A. The composition is in good agreement with that given by Gottardi (1960), except that Cs had not been detected previously. The Si/Al ratio is 3.72, slightly higher than the 3.62 obtained by Gottardi (1960).

TABLE I. *Chemical analyses of dachiardite from Elba, Italy*

	Energy dispersive analysis† A	D'Achiardi (1906) B	Gottardi (1960) C
SiO_2	63.20	61.41	63.00
Al_2O_3	14.31	11.15	14.78
Fe_2O_3	—	—	tr.
CaO	5.49	5.52	5.10
SrO	0.13*	1.14	tr.
MgO	—	tr.	0.21
K_2O	1.92	3.31	1.77
Na_2O	1.20	2.06	1.81
Cs_2O	0.96*	—	—
H_2O (< 110 °C)		3.20	2.69
H_2O (110-400 °C)		10.31	8.87
H_2O (400-900 °C)			1.18
Total	87.21**	98.10	99.41
Cell content based on 48 oxygens			
Si	18.93	19.24	18.81
Al	5.05	4.12	5.20
Fe^{3+}	—	—	—
Ca	1.76	1.85	1.63
Sr	0.02	0.21	—
Mg	—	—	0.09
K	0.73	1.32	0.67
Na	0.70	1.25	1.05
Cs	0.12	—	—
Si + Al	23.98	23.36	24.01
Σ charge	5.23	6.69	5.16
Error	−3.4	−38.0	0.8
Si/(Si + Al)	0.79	0.82	0.78
Si/Al	3.75	4.67	3.62
Ca/(Na + K)	1.23	0.72	0.95

† Average of five selected analyses, this study
* From wavelength dispersive analysis
** Remainder H_2O; Mg, Ti, Cr, Mn, Fe, Ba not detected.





FIGS. 1 and 2. Scanning electron micrographs of a small fragment of the type dachiardite from Elba, showing, FIG. 1 (*left*), the compact (×85) and, FIG. 2 (*right*), platy structure (×550).

The Elba dachiardite is unique in that it is Cs-bearing and its Ca content is the highest reported so far for the mineral. In the aforementioned comparative study of dachiardite from other localities, none was found to contain Cs.

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REFERENCES

Bonatti (S.) and Gottardi (G.), 1960. *Period. Mineral.* **29,** 103–7.
D'Achiardi (G.), 1906. *Mem. Soc. Tosc. Sci. Nat.* **22,** 150.
Gottardi (G.), 1960. *Period. Mineral.* **29,** 183–4.
Passaglia (E.), 1970. *Am. Mineral.* **55,** 1278–1301.
Plant (A. G.) and Lachance (G. R.), 1973. Proc. Eight Nat. Conf. Elect. Probe Anal. 13, 13a.

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