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FUCHSITE AND CHROME-EPIDOTE FROM FISKENÆSSET

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In many places in the Fiskenæsset region the anorthositic rocks show a characteristic emerald green staining. The occurrences are connected with faults and shear zones, along which hydrothermal solutions have circulated, resulting in a bleaching and alteration of the anorthositic rocks (Ghisler, 1970). The plagioclase became saussuritized to white mica and epidote, and occassionally calcite is also found. Mafic minerals were altered to chlorite and more rarely to talc. In some places such as the Majorqap qâva area a green rock consisting of epidote and an emerald green mineral is found as 10–50 cm thick lenses in anorthosite. The emerald green mineral mainly occurs in the vicinity of chromite horizons or where accessory chromite is present in the anorthosite. Chromium was extracted from these chromite grains and entered the lattice of some of the minerals formed as a result of the breakdown of plagioclase. Some mineralogical data on these two chromium bearing secondary minerals, fuchsite and chrome-epidote, are given below.

Fuchsite

Under the microscope the emerald green staining of the anorthosite is seen to be due to a pigmentation in the altered plagioclase. The pigmentation is identified as more or less 'dusty' mica 0.02 mm in size, evenly distributed throughout the plagioclase host. In polished sections the pigmentation is seen as distinctly higher reflecting flakes in the silicate matrix. In some rocks the grain size of the flaky green mineral is big enough to be seen with the naked eye, and in thin section it is identified as muscovite, normally with a grain size of about 0.1–0.3 mm reaching a maximum of 1 mm. The mineral is colourless in thin section, whereas it is pleochroic in different shades of green or emerald green in grain preparates. The alteration of the plagioclase is also accompanied by the formation of sphene rims around rutile.

A spectrographic determination of the trace elements of the muscovite is given in Table 7. The results show a rather distinct content of chromium of 1.9% Cr_2O_3, which classifies the mineral as fuchsite. Fuchsites show contents from 0.27% to 4.81% Cr_2O_3 (Whitmore *et al.,* 1946), but even higher contents are recorded in the literature. Fuchsite with a similar content of chromium and iron to the one analysed was described from New Hampshire by Clifford (1957), who found 2.1% Cr_2O_3 and 2.3% Fe_2O_3 in his samples. Tufar (1968) describes distinctly coloured fuchsite from the Alps with only 0.47% to 1.03% Cr_2O_3.

As relatively few X-ray studies of fuchsites are published, a determination of the cell dimensions was made on material from a sufficiantly coarse grained sample. X-ray diffraction powder data was obtained on a Gunier-Hägg camera using Cu $K\alpha_1$ 1.54051 Å with quartz as internal standard. The calculated lattice constants refined by the least squares method according to a programme made by E. S. Leonardsen are presented in

Table 7. Spectrographic analysis of trace elements

	Cr	Fe	Mg	Mn	Ti	V	Ni	Co	Ca	Na	Ba
Fuchsite	1.3	1.05	1.8	<0.03	0.08	0.015	0.005	0.003	2.7	0.4	0.007
Chrome-epidote	1.1	1.85	n.d.	0.03	n.d.	0.025	0.001	0.002	n.d.	trace	0.03

Weight per cent — Analyst: H. Bollingberg

Table 8. Unit cell dimensions on fuchsite from Manitoba containing 4.81% Cr_2O_3 given by Whitmore *et al.* (1946) and data on 'normal' muscovite given by Deer *et al.* (1962) compare well with the data for the Fiskenæsset fuchsite, which according to Yoder & Eugster (1955) is a muscovite with a $2M_1$ structure.

Chrome-epidote

In thin section the colour of chrome-epidote varies in intensity and pleochroism. Epidote from the same sample as the fuchsite described above was studied in some detail. Epidote occurs in larger grains than fuchsite with an average grain size of about 0.6 mm, but aggregates occur up to several millimetres. Crystals are well-developed with a strong cleavage, and are pale yellow in colour with faint pleochroism. The refractive index is about $\gamma = 1.72$, birefringence is low (0.007) with anomalous blue interference colours dominating the section. The optic angle is near 90°. According to Tröger (1956) this data corresponds to clinozoisite. A spectrographic analysis given in Table 7 confirms this optic determination; the iron content is very small indicating that the mineral is almost pure clinozoisite. The chromium content of 1.6% Cr_2O_3 is, however, remarkably high. As the optical data are rather different from that given for the chrome mineral tawmawite (Tröger, 1967), the present mineral must be classified as a chrome-clinozoisite. In other samples, however, the mineral shows strong colour intensity, with birefringence and refractive index higher due to higher iron and probably also higher chromium contents, and the mineral should be classified as epidote. As it is clear that chrome-bearing minerals corresponding to different representatives within the epidote-group occur, it seems more rea-

Table 8. Cell dimensions of fuchsites and muscovite

	Fuchsite* Fiskenæsset	Fuchsite (Whitmore et al., 1946)	Muscovite (Deer et al., 1962)
a	5.199±0.007 Å	5.19 Å	5.19 Å
b	9.024±0.004	9.03	9.04
c	20.14 ±0.03	19.97	20.08
β	95.84°±0.08	95.00°	95.50°

*by E.S. Leonardsen

Table 9. Cell dimensions of clinozoisites and epidote

	Clinozoisite (Seki, 1959)	Clinozoisite (Dollase, 1968)	Chrome-clinozoisite* Fiskenæsset	Epidote (Ito et al. 1954)
a	8.87 Å	8.879±0.005 Å	8.881±0.001 Å	8.96 Å
b	5.59	5.583±0.005	5.593±0.001	5.63
c	10.15	10.155±0.006	10.144±0.001	10.30
β	115.45°	115.50°±0.05°	115.43°±0.01°	115.40°

* by E.S. Leonardsen

sonable to describe the general occurrences of this mineral in the Fiskenæsset region as chrome-epidote instead of chrome-clinozoisite.

The unit cell dimensions of chrome-clinozoisite were determined in the same way as those for fuchsite. Results are presented in Table 9 together with data on representatives from the epidote group. The results compare well with the data given for clinozoisite by Seki (1959) and Dollase (1968).

In addition to the chrome-epidote and fuchsite as characteristic secondary minerals of the Fiskenæsset anorthosite complex a pinkish mineral occurs locally in altered anorthosite, which has not yet been identified.

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