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CROSSED AXIAL PLANE DISPERSION IN EPIDIDYMITE[1]

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During the examination of thin sections of epididymite from veinlets of albitite intersecting the naujaite of the Taseq plateau in the Ilímaussaq alkaline complex, South Greenland (Semenov and Sørensen, 1965), Professor H. Sørensen of the Mineralogical-Geological Institute of the University of Copenhagen noticed an extreme dispersion of the axial angle.

The material, collected under the auspices of the Geological Survey of Greenland, during the summer 1964, was handed over to the author who has undertaken an examination of the dispersion in the mineral from Ilímaussaq. He also examined part of the material on the basis of which Flink (1893) established epididymite.

Table 1 presents the Debye-Scherrer diagrams of: column 1, epididymite from Narssârssuk published by Christophe-Michel-Lévy, 1961; column 2, epididymite from Narssârssuk (Flink's material), and column 3, epididymite from Ilímaussaq.

The principal indices of refraction were determined on powder preparations (150–200 mesh) by means of the $\lambda-T$ variation method with optical glass as internal standard (Micheelsen, 1957). The principal indices of refraction for $\lambda=589$ mμ are for epididymite from both localities:

$$n\alpha = 1.540 \pm 0.001$$
$$n\beta = 1.544 \pm 0.001$$
$$n\gamma = 1.544 \pm 0.001$$

The path differences were measured by means of the Berek compensator, and the thickness of the plates by means of an ocular micrometer. The axial angles were measured with an ocular screw micrometer; cerussite and aragonite were used to determine Mallard's constant. As monochromator a Zeiss 20 cm interference filter monochromator was used.

$(\gamma-\alpha)$ and $(\beta-\alpha)$ for $\lambda>4400$ Å and $\lambda<4400$ Å, respectively, and the thickness of the plates perpendicular to α were measured on (001); $(\gamma-\beta)$, the axial angles, and the thickness of the plates perpendicular to β, on (100).

The limits of experimental error are estimated to be: the path differences ± 20 mμ, the birefringences ± 0.00003 and the measured axial angles $\pm\frac{1}{2}°$.

[1] Contribution to the mineralogy of Ilímaussaq no. 8.

TABLE 1. X-RAY DIFFRACTION DATA FOR EPIDIDYMITES

Epididymite from Narssârssuk Christophe-Michel-Lévy 1961		Epididymite from Narssârssuk (Flink's material) Fe radiat. Mn filt. Camera rad. =90 mm		Epididymite from Taseq, Ilímaussaq Fe radiat. Mn filt. Camera rad. =90 mm	
Int	d (Å)	Int	d (Å)	Int	d (Å)
tf	6.8	—	—	2	6.77
m	6.3	4B	6.32	3B	6.35
>f	5.78	2B	5.74	2B	5.74
>f	4.64	4	4.62	4	4.62
—	—	3	4.12	3	4.12
m	3.65	4	3.66	4	3.65
—	—	2	3.41	—	—
i	3.40	10	3.37	10	3.40
tf	3.22	—	—	—	—
f	3.17	—	—	—	—
i	3.09	10	3.08	9	3.07
i	2.99	10	2.96	10	2.97
tf	2.88	—	—	—	—
f	2.60	3	2.59	3	2.59
m	2.49	5	2.48	4	2.48
f	2.40	2	2.39	2	2.39
f	2.26	3	2.25	3	2.25
m	2.13	4	2.11	4	2.12
tf	2.07	1	2.06	—	—
tf	2.023	1	2.01	—	—
tf	1.965	1	1.948	1	1.952
—	—	—	—	1	1.915
f	1.836	1	1.831	1	1.828
>m	1.799	6	1.790	6	1.792
tf	1.747	2	1.742	2	1.742
tf	1.703	3	1.688	3	1.692
>f	1.641	6	1.634	5	1.635
tf	1.589	1	1.580	1B	1.581
>f	1.545	5	1.537	5	1.537
tf	1.475	2	1.473	—	—
tf	1.451	2	1.445	2	1.447
f	1.390	4	1.384	4	1.384
f	1.361	6	1.357	6	1.358
f	1.326	3	1.322	3	1.323
>m	1.284	6B	1.279	6B	1.280

i intense [intense]
m moyen [medium]
f faible [weak]
tf très faible [very weak]

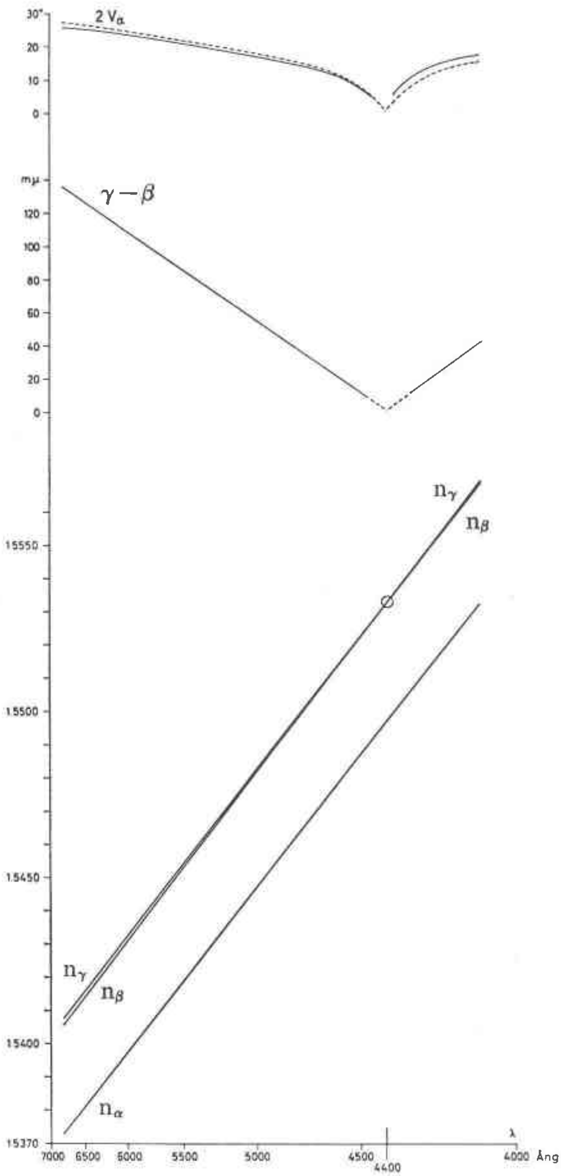

FIG. 1. The refractive index curve of α has been drawn on the basis of the refractive index measurements. The known differences ($n\gamma-n\alpha$), ($n\beta-n\alpha$) and ($n\gamma-n\beta$) were used in the construction of the refractive index curves of γ and β respectively. The middle curve shows the path differences between γ and β. The two curves at the top represent $2V_\alpha$ measured (full line) and calculated (dotted line).

The dispersion images of epididymite from Ilímaussaq and epididymite from Narssârssuk (Flink's material) are completely identical.

The acute bisectrix is perpendicular to (100). The axial angle $2V_\alpha$ varies from $26° \pm \frac{1}{2}°$ in red light where the axial plane is parallel to (001), over 0° in bluish violet (4400 Å) to $16° \pm \frac{1}{2}°$ in the deepest violet, the axial plane now being parallel to (010).

$$\text{For } \lambda = 589 \text{ m}\mu$$
$$2V_\alpha \text{ calculated} = 26°$$
$$2V_\alpha \text{ measured} = 25° \pm \tfrac{1}{2}°$$
$$(n\gamma - n\alpha) = 0.00350 \pm 0.00003$$

The results are presented in Fig. 1.

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DETERMINATION OF INDICATRIX ORIENTATION AND 2V WITH THE SPINDLE STAGE: A CAUTION AND A TEST

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Introduction

A series of recent papers has highlighted the potentialities of the spindle stage in the determination of the optical constants of small crystal fragments: a short bibliography of the most recent and accessible papers on this topic is given at the end of this contribution, but it is not intended to review these here. The principal advantage of the spindle stage is that,