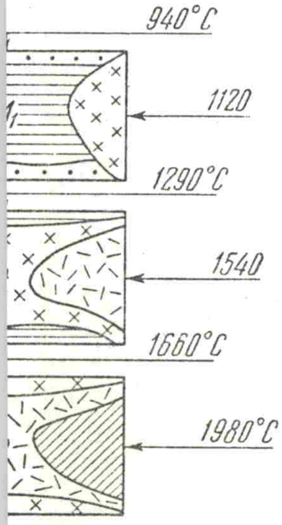
W



f location of neogenic phases
sections of specimens from
1, 2, and 3 (table 3).

l of initial muscovite
of initial muscovite

ry mineral of "a" type
ry mineral of "b" type
ry mineral of "c" type
ation in text)

ch sketch are the temperatures
hot zones of the specimens.

nen where the temperature
nuscovite is replaced by a
of the "a" type. Figure 1,
of a thin section, whose
emperature of 940°C (relict
ained in this zone). In the
ecimen the temperature
and an association of the "a"
. The boundary between
e and the "a" material cor-
ately to an isothermal sur-

s under the microscope, "a"-
rial is brown. In the sector
act with muscovite we see
s an association of several
ctor displays pointed (up to
s and round (0.016 x 0.008
platy (0.04 x 0.008 mm)
dary of the "a"-type neogenic
rpendicular to the cleavage
vite, we observe development
als at the cleavage planes
f the main front of muscovite
e 4 shows the densities and
f the minerals of this asso-
ol. a) gives the interplanar
from the powder pattern of

TABLE 4. Refractive indices and densities of decomposition products of muscovite ("a" association).

	Platy mineral	Isotrop. weakly birefring.	Kyanite*
Refractive index	Ng′ = 1.735 Np′ = 1.725	Ng′ = 1.558 ± 003 Np′ = 1.549	Ng = 1.728 Nm = 1.722 Np = 1.713
Density, g/cm^3	3.60 + 0.02	2.82 ± 0.02	3.56-3.68

*Larsen and Berman, 1965; **All ±0.003.

TABLE 5. Interplanar spacings of "a"-type neogenic association.

a		b		c		a		b		c	
Association "a"		$K_2O \cdot Al_2O_3 \cdot 4SiO \cdot H_2O$**		Kyanite***		Association "a"		$K_2O \cdot Al_2O_3 \cdot 4SiO \cdot H_2O$**		Kyanite***	
d*	I	d	I	d	I	d*	I	d	I	d	I
		5.67	10	—	—	2.22	3	2.22	4	—	—
5.02	4	4.92	2	—	—	2.15	1	—	—	2.16	6
4.65	7	—	—	—	—	1.98	6	—	—	1.95	10
4.50	2					1.93	8	1.90	6	—	—
4.33	2	—	—	4.35	6	1.86	1	1.87	4	—	—
3.99						1.77	1	—	—	1.76	6
4.05	5	—	—	—	—	1.75	1	1.74	8	—	—
3.83	1					1.59	5	—	—	1.60	6
3.68	5	—	—	—	—	1.56	1				
3.52	2	3.46	10	—	—	1.52	1	—	—	1.50	2
3.38	6	—	—	3.33	8	1.51	1	—	—		
3.28	4	—	—			1.47	1	—	—	1.48	6
3.21	7	—	—	3.14	8	1.39	4	1.41	6	1.40	4
2.97	10	2.94	8	—	—	1.37	10	1.36	6	1.38	10
2.68	10	2.68	2	2.69	6	1.34	2	—	—	1.34	6
2.61	5	—	—	—	—	1.33	1				
2.54	4	2.51	4	2.52	7	1.30	1				
2.36	3	2.42	2	2.37	8	1.29	1				
2.31	1										

*Corrected with respect to NaCl; **Barrer, Baynham, 1956; ***Seki, Kennedy, 1964.

Comparison of all the data enables us to infer that one of the minerals formed is kyanite (for comparison Table 4 gives the literature values of the density and refractive index of kyanite – Larsen and Berman, 1965); col. c of Table 5 gives its interplanar spacings (Mikheyev, 1957). From the other lines on the powder pattern we can assume that a second mineral formed by breakdown of muscovite is the potassium analog of analcime ($K_2O \cdot Al_2O_3 \cdot 4SiO_2 \cdot H_2O$).[1] Column b (table 5) gives the interplanar spacings of this mineral from data of Barrer and Baynham (1956). Unfortunately, a search revealed no literature on the density and refractive indices of this mineral (the report by these authors mentions only that the mean refractive index is ~1.490), so that its identification from X-ray data cannot be taken as final.

Thus at a pressure of 66 kbar in the range 1050-1350°C, muscovite decomposes, probably by the following scheme:

$$K_2O \cdot 3Al_2O_3 \cdot 6SiO_2 \cdot 2H_2O = 2[Al_2O_3 \cdot SiO_2] +$$
(muscovite) (kyanite)
$$+ K_2O \cdot Al_2O_3 \cdot 4SiO_2 \cdot xH_2O + (2-x) \cdot H_2O$$
(K-analcime)

(Since the water content of K-analcime is not accurately known, we do not know whether free water is formed during breakdown of muscovite.)

Above 1350°C the kyanite + K-analcime

[1] An artificial mineral synthesized by Barrer and Baynham, 1956.