08.4-16   НЕОБЫЧНЫЙ СЕРПЕНТИН ИЗ КИМБЕРЛИТОВ.

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В электронном микроскопе изучены серпентиновые минералы из кимберлитовых пород Якутии. Обнаружен хризотил в виде коротких толстых трубок-рулонов с большими диаметрами волокон (600-1500Å). Отношение диаметров к длине порядка I:2-I:5. Период вдоль удлинения 5,38 Å. На картинах микродифракции рефлексы на слоевых сливаются в непрерывные линии, параллельные оси c^*. Часто на фоне таких линий на чётных слоевых наблюдаются интенсивные дискретные отражения, расположение и интенсивность которых не позволяют отнести изученный материал к какому-либо определенному типу по существующим номенклатурам серпентиновых минералов (Звягин, Мищенко, Шитов, Кристаллография, (1965) 10, 635; Wicks, Whittaker, Can. Miner.(1975) 13, 227).Предполагается, что в данном случае встречен полигональный серпентин (Cressey, Zusseman, Can. Miner. (1976) 14, 307; Cressey, Can. Miner. (1979) 17, 741).

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with 20 per cent replacement of calcium by strontium and similar replacement of silicon by germanium display a ring form at all temperatures, with either well ordered four- or six-layer polytypes, the latter being identical to the determined structure of strontium germanate (Hilmer, Soviet Physics, Crystallography, (1962) 6, 694). With further germanium substitution, the chain variety re-appears, existing in an ordered form when 80 per cent of the silicon has been replaced. At the annealing temperatures employed (1100 - 1350 °C), the maximum strontium replacement of calcium is limited to just over 20 per cent.

The observed results are in accordance with the structural principles established by Liebau (Handbook of Geochemistry, (1972) Vol. II, Chap. 14), namely that structure type is mainly dependent upon the radius ratio of tetrahedral and octahedral cations. Strontium replacement of calcium rapidly stabilises the ring structure, the chain variety only re-appearing if the larger germanium replaces silicon. With larger cations in both tetrahedral and octahedral sites, the anion framework is strained and structural distortions might be expected to be severe, resulting in a greater tendency to form regular stacking sequences. The experimental observation that severe disorder occurs only in calcium- and silicon-rich phases is in accordance with this hypothesis.

08.4-17   HIGH RESOLUTION ELECTRON MICROSCOPIC STUDIES OF THE SYSTEM (Ca,Sr)(Si,Ge)O$_3$

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The nature of phases and defect-structure phenomena, and the transformations in this system are clearly revealed by the lattice-imaging technique, using samples prepared by annealing the amorphous quench product from the appropriate oxide melts. In the calcium-silicon end member, conversion from chain- (wollastonite) to ring-structure (pseudowollastonite) is observed at 1150 °C. The transformation proceeds via an amorphous intermediate stage, which is directly observed. No evidence is found for a topotactic process. With 20 per cent germanium substituted for silicon, almost identical behaviour is noted, but at a higher (1250 °C) temperature. In both cases the ring form is a disordered four-layer polytype, and in the latter the chain variety also exhibits almost completely random stacking disorder. With germanium substitution of 40 per cent, the ring structure is not found, but severe stacking disorder persists in the chain form until more than 60 per cent substitution. Beyond this figure, only regular chain structures are found.

Replacement of calcium by strontium in the wollastonite structure has already been reported (Wen Shu-Lin, Jefferson and Thomas, Mat. Res. Bull. (1980) 15, 1643) where ring structures are observed at all compositions. With germanium substitution for silicon, this behaviour is modified. Compositions

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08.4-18   THE NATURE OF COHESION ENERGY OF DICKITE LAYERS ON THE BASIS OF ITS STRUCTURE REFINEMENT.

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Refinement of the dickite structure with modern X-ray techniques did not produce appreciable deviations from the previous study (Newnham, Min. Mag. (1961) 32, 683). However, with more accurate data, the difference Fourier map contained peaks corresponding to the H atoms of the hydroxyls:

	x/a	y/b	z/c	O-H (Å)	Θ experimental	ϕ experimental	Θ calculated	ϕ calculated
H1	.425	.254	.144	.965	14	210	16	212
H2	.289	.917	.355	.805	83	143	70	138
H3	.282	.261	.361	.976	72	30	63	20
H4	.299	.588	.352	.898	72	266	66	255

where Θ is the angle between O-H and the ab plane, and ϕ is the angle between its projection and the a axis.

The orientations of the O-H bonds were also calculated by minimizing the electrostatic energy. The results of the two procedures showed good agreement for the 'inner' hydroxyl H1 but systematic discrepancies for the 'inner surface' ones, H2-H4, as shown in the Table. This led us to conclude that the approximation of formally-charged point ions is adequate in the first case but not in the last ones. This phenomenon is a good confirmation of the occurrence of hydrogen bonds between the 'inner surface' hydroxyls and the basal oxygen atoms of the next layer, namely the ones of donor-acceptor type but not those of electrostatic nature (Giese, Clays Clay Min. (1972) 21, 145).

The orientations of O-H bonds testify to their non-equivalence and throw doubt on the interpretation of the IR-spectra of kaolinite, based on the vibrations of the hydroxyls which are related by a 3-fold axis (Farmer,