LATTICE MISFIT IN M ICAS AND THE GROWTH BENDING PROBLEM.

By A. G. Shikanovich*, Y. O. Punin and E. N. Koteinikova, Crystal Genesis Laboratory, University of St. Petersburg, Russia.

The origin of micas with sphene bending of basal plane is part of the general problem of growth curvature of crystals. Complex investigation of phengite-muscovite from Urgals amazonite pegmatites has been performed to find out the connection between lattice bending and chemical deformation of crystal lattice. Geometric research has shown sharp oscilations of crookedness due to bending are from the law of inheritance of crookedness. Geometry of bending and degree of deformation are different in various growth sectors for faces of various simple forms. This is evidence of growth origin of bending and also of changeability of bending factor with time.

Variations of cell dimensions within the volume of the crystal have been determined by the X-ray powder diffraction method. They have been compared with local changes of chemical composition obtained by microprobe analysis. Linear correlation of lattice parameters a and b with iron content and of d_001 with rubidium content has been found. Same increase of the parameter and d_001 in growth sector (110) in comparison with those (001) sector has been revealed. Cation composition and lattice parameters of investigated crystals vary strongly within the crystal. The most significant variations have been observed for b parameter and estimated to be 1/3 of the mean value.

Data received prove the existing hypotheses to be insufficient. High polytype homogeneity (2M_n) of crystals excludes bending because of coherence synthetic collection of polytypes. Random character of cell dimensions variation excludes the existence of constant moment on growth front. However existing differences in lattice parameters are sufficient for formation of mosaic structure. Mosaic structure of (110) growth sector confirms this proposal. A new mechanism of the bending of crystals is being suggested. The bending of crystals is the consequence of geometrical selection of systematically misoriented blocks, derived by lattice misfit strains.

ESTIMATION OF HYDROTALCITE IN SERPENTINITES BY X-RAY DIFFRACTION AND IR SPECTROSCOPY.

By T. Moroz, D. Archipenko*, Institute of Geology, Novosibirsk, 630090, Russia.

The amount of hydrotalcite Mg_4Al_6(OH)_10CO_3_2H_2O (HT) in serpentinite is of importance since it is responsible for many properties of this material, as well as being acid absorbent and catalyst for practical use in cement and metal corrosion technologies. For studies of different geological processes, the determination of HT in natural mixtures by XRD is beset with problems of X-ray amorphous serpentine, of preferred orientation and disorder in minerals. These reasons prevent the use X-ray method alone to estimate HT content in mixtures, because often more than one crystal type—usually several serpenites and other minerals—is present (Moroz T., Archipenko D. Geol. Geophys., 1991, 2, 58). The development of a simple and convenient IR spectroscopic method for quantitative determination of HT in serpentinite is based on measurements of the relationship between intensities of v_1 vibrations of CO_3_2H_2O group (at 1373 cm^-1) and v_3(OH) (at 880-860 cm^-1). The former being absent in serpentine, the latter in HT. Calibration is required by another established method (DTA, microchemistry) and the accuracy of the calibration is ±10%. The intensity and position of carbonate-related absorption defines the amount of interlayer carbonate and the local environments of the anions, and gives information about the cation-order disorder in octahedral sheets. The method appears to be applicable to crystallographic estimation of natural HT from different deposits in mixture with chloride and talc, for checking the separation of five fractions and determination of structural regularities of hydrotalcite after T-P treatment.

STRUCTURAL PECULIARITIES OF PHASE TRANSITION ANATASE - RUTILE.


In nature there are 3 polymeric modifications of TiO_2: anatase -Dl, z=4, brookite -Dl, z=8, rutile -Dl, z=2. It is known that anatase and brookite on heating transform to rutile. Methods of X-ray diffraction and vibration spectroscopy have been used. X-ray anomalous intensities ("Axl") different in kkl reflections depending on temperature and heating conditions have been observed. The differences have been registered in IR and Raman-laser spectra as well. Lab IR - study of sorption of oleic acid on anatase, brookite and rutile structures showed essential differences. On the other hand X-ray analyses of samples of anatase and rutile from agglutinate registered "Axl" also as "markings" of phase transition, bipyramidal anatase forms were substituted by rutile. Samples of rutile with "Axl" from differ-