05.1–11 MUSCOVITE STRUCTURAL THERMOSTABILITY AND CATIONIC ISOMORPHISM. By G.I.Kosmacheva, G.A.Kuznetsova, I.M.Michalevich, Irkutsk State University, Irkutsk Politechnic Institute, Irkutsk, USSR.

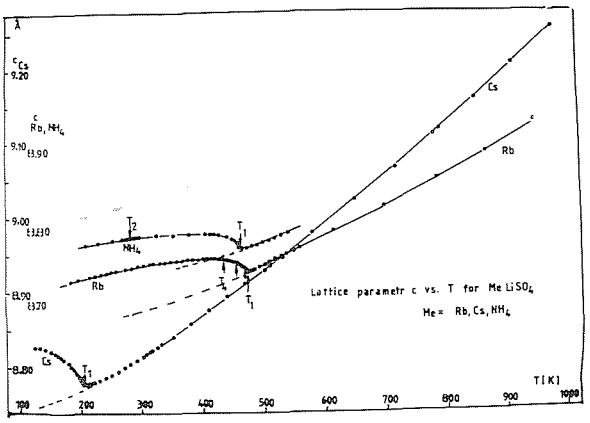
Muscovite of various deposits and genetic types have particular percularities due to the quantative correlation of cations having variable valency and different ionic radii. The structural isomorphism is accounted for the different thermostability of muscovite crystal structures. By phase X-raying it has been determined that after thermal treatment of different muscovite crystals under fixed conditions along with formed dehydroxylate muscovite certain amount of original phase is remained, that may be considered as an criterion of crystal structure thermostability. The attempt has been made to establish the relation of muscovite structural thermostability to its cationic content by using the method of regression analysis. This equation looks as follows

$$C = 0.533 + 0.286\ C_{Ti}\ ,$$

where C is the muscovite phase concentration in the heated specimen, C_{Ti} – shareing coefficient in the chemistry formular of the particular muscovite crystal. C_{Ti} coefficient is of most significance compared with that of other cations proving the considerable dependence of the thermostability of crystals on the cationic content of titan.
This equation may be used for estimating the structural thermostability of muscovite.

05.1–12 THERMAL EXPANSION IN $MeLiSO_4$ WHERE Me = Rb, NH_4, Cs. By A. Pietraszko, Institute for Low Temperature and Structure Research, Polish Academy of Sciences, Wrocław, Poland.

It was shown experimentally that the majority of the $MeLiSO_4$ type crystals exhibit some intermediate phases between the high temperature phase with disordered crystal structure and low temperature phase with ordered crystal structure. In general the phase transitions belong to the order-disorder type due to the ordering of the tetrahedral groups.
In the present paper investigations of the thermal expansion of $RbLiSO_4$, $CsLiSO_4$ |1| and NH_4LiSO_4 |2| are reported in a wide temperature range from about 120 K up to the melting point.
The thermal expansion was calculated from the precise lattice parameter measurements performed by using a Bond diffractometer. The temperature stability of ±0.02° allowed the determination of the lattice parameters to an accuracy of $\Delta a/a = 10^{-5}$.
In general the temperature dependence of lattice parameters is very similar for all investigated crystals. The thermal expansion along *a*,*b* and *c* axis is postive and almost linear function of temperature in the high temperature phase. The anomalous lattice deformation is associated with the phase transition from the high to low temperature phase. The deformation has the same character in the whole range temperature of the intermediate phases. The changes of lattice deformation accompaning the phase transitions between the intermediate phases are very small. In the case of the phase transition involving an incommensurate phase in $RbLiSO_4$ any deformation of lattice parameter have been observed. In connection with the study of the crystal structure it is of interest to compare the anomalies of the thermal expansion with the changes of the crystal structure during the phase transitions. Anomaly of the lattice deformation seems to be coupled with the change of the arrangement of the tetrahedral groups from statistical disorder to order (from high temperature phase to low temperature phase) Other changes of the arrangements of the tetrahedral groups have very small influence on the deformation of lattice parameters.



1. P.E. Tomaszewski and A. Pietraszko, phys. stat. sol. (a) 56 (1979), 467.
2. A. Pietraszko, P.E. Tomaszewski and K. Łukaszewicz, Phase Trans. (1981) no 2, 141.

05.1–13 SYSTEMS OF CRITICAL TEMPERATURE POINTS AND DISCRETE QUANTUM STATES OF SOLIDS By Yu.N. Venevtsev and V.I. Muromtsev, Karpov Institute of Physical Chemistry, Moscow, USSR

Many solids have a whole set of temperature anomalies (T_{cr}). In this report we discuss a comparatively new approach to the problem of multiplicity of T_{cr} in a solid: the data on T_{cr} and various spectroscopic data (including neutron, Raman, Brillouin scattering and other spectra) are first analysed independently and then discussed as a whole on the basis of quantum ideas (Muromtsev, Solov'ev, Venevtsev, Dokl. Akad. Nauk SSSR (1976)227, 1405; Venevtsev, Muromtsev, Solov'ev, Ibid.(1976) 230, 121). Our method includes an empiric stage in which we seek to describe the spectra through transitions between discrete quantum levels in a certain system of possible quantum states. The relativistic part of interactions between electrons and nuclei is also taken into account in this approach. Analysis of experimental data on $SrTiO_3$ and solid He by this method (Muromtsev, Safronov, Spektroskopiya atomov i ionov v rentgenovskoi i ultrafioletovoi oblastyakh. AN SSSR, Nauchnyi Sovet po spektroskopii, Moscow (1982), p. 206) enabled us to make the following conclusions: i. Solids of different nature have an identical subsystem (I) of T_{cr}

$T_{cr} = T_o \cdot N$, where T_o = 12.5 K; N = 1,2,3...

ii. They also have an identical subsystem (II) of discrete quantum states

$E = B\,[J(J+1)-\lambda^2]$, where $B = T_o = 8.7\ cm^{-1}$; $J = 1,2,3...$; $\lambda = \pm1, \pm2,...$ $|\lambda| \leq J$.

iii. Finally, it was inferred that the subsystem (II) determines the subsystem (I).