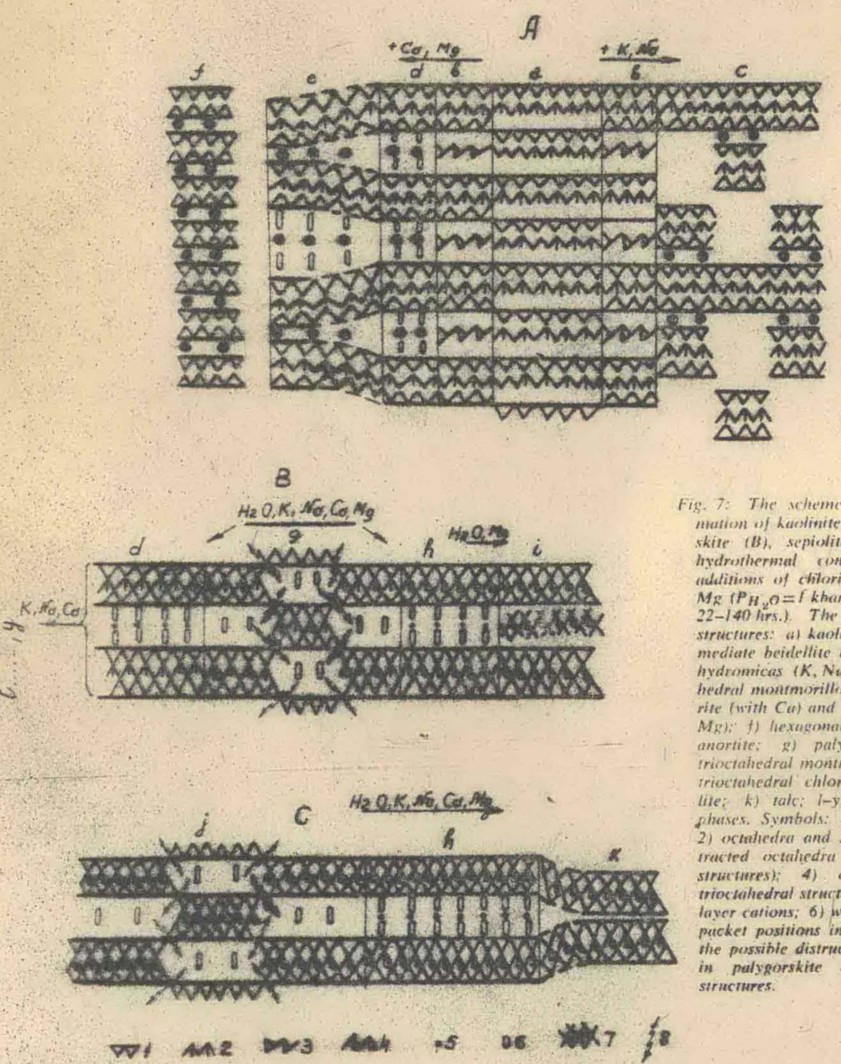

Fig. 7: The scheme of transformation of kaolinite (A), palygorskite (B), sepiolite (C) under hydrothermal conditions with additions of chlorides K,Na,Ca, Mg (P_{H_2O} = 1 kbar, 200–500 °C, 22–140 hrs.). The schemes of structures: a) kaolinite; b) intermediate beidellite like phase; c) hydromicas (K, Na); d) dioctahedral montmorillonite; e) rectorite (with Ca) and tosudite (with Mg); f) hexagonal analogue of anortite; g) palygorskite; h) trioctahedral montmorillonite; i) trioctahedral chlorite; j) sepiolite; k) talc; l–y) non-layered phases. Symbols: 1) tetrahedra; 2) octahedra and 3) partial distracted octahedra (dioctahedral structures); 4) octahedra in trioctahedral structures; 5) interlayer cations; 6) water; 7) interpacket positions in chlorites; 8) the possible distruction positions in palygorskite and sepiolite structures.

montmorillonite type are at first formed, and finally micas of muscovite or paragonite composition are formed. In the presence of Ca and Mg-chlorides, kaolinite changes to an intermediate montmorillonite phase, followed by ordered mixed-layered phases, 1 : 1 of mica-montmorillonite (Ca) type and chlorite-montmorillonite (Mg).

By structural transformations of palygorskite under pressure of H_2O-vapour and also with $MgCl_2$, disordered mixed-layered phases of chlorite-montmorillonite type are formed. The process of transformation, described above and the process of which was discussed before [5,7,8] can be schematically summarized as shown in Table 1.

The principal features of this process are:

1. The varieties of newly formed layered silicates keep their di- and tri-octahedral structural types.

2. Transformations, as a rule, have the intermediate smektite stage (montmorillonite-beidellite type) and their crystallochemical character determines the final phase.
3. Under the hydrothermal conditions and relatively low temperatures, depending on chemical compositions, ordered and disordered mixed-layered phases are formed as intermediate phases.
4. The positions of the fields of smektites, the mixed-layered and stable final phases (Table 1) probably show most common features of structural typomorphous conditions.

Conclusion

It can be said that the above mentioned results can be used for the estimation of some peculiarities of the processes of epigenesis and the first stage of metamorphism. Typical is the transformation mechanism of the process and a wide development of mixed-layered formations. Their nature is principally connected not with thermodynamical parameters (kinetics process), but with the chemistry of the surroundings. Disordered mica-montmorillonite structures are formed by the presence of K and Na in solutions, while Ca and Mg lead to the formation of ordered chlorite-montmorillonite (tosudite) and mica-montmorillonite (rectorite) formation. This process is characterized by the transformation mechanism and the formation of the intermediate smektite phase.

A number of data about the natural metamorphism of clay minerals [21,23,25] all allows to establish many common features with experimental data discussed above. New investigations of metamorphism of natural clay minerals in details and laboratory experimental investigations in this field will allow to define more accurately and concretely the conception of diagenesis and initial metamorphism of sedimentary rocks.

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