

## Synthesis of hydrocarbons in nature

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New insight into the mechanism of hydrocarbon synthesis in the course of geological processes based on the concept of mineral matter transformation via the  $[2\text{SiO}_3 - \text{OH}_2 - 2\text{M}^{n+}\text{M}^{m+}\text{O}_4]$  aquacomplex is proposed.

The aquacomplex was defined as an universal crystallochemical unit responsible for the variability of natural mineral matter, its structural-chemical transformations, conversion of energy within the Earth's crust and metal concentrating.

The concept of the aquacomplex implies, that synthesis of hydrocarbons occurs «in situ», as a result of evolution of mineral matter during sedimentation. This requires: i) the availability of caolinite as a reaction medium, ii) energy excess in the mineral system, when it can't be reduced by the mechanical mode, iii) reductive potential in the medium. The reaction of hydrocarbon synthesis occurs on the caolinite matrix  $\text{Al}_2(\text{OH})_4[\text{Si}_2\text{O}_5]$ , which has an exact stoichiometry of the aquacomplex  $[2\text{SiO}_3 - \text{OH}_2 - 2\text{HAlO}_4]$ . The reaction is triggered by the necessity to convert energy disbalance in the mineral system caused by lithostatic pressure. During this process, known as diagenesis, excess of external energy is converted into the internal chemical energy of newly formed minerals. As this takes place, carbon substitutes silicon in the aluminosilicate matrix, because the energy of C bonding in the oxygen tetrahedra is much more (256 kkal/mol), than this one for Si (190 kkal/mol). The availability of organic matter leads to the reduction of the (C, Al)-oxygen network. This reaction produces silica, water, hydrocarbons and corundum. The reaction products are sulfidized, as in the Ox/Red point arises a free sulfur.

Such reactions are supported by: i) hydrocarbon formation and accumulation in the sedimentary rocks, ii) the evidences of their formation on caolinite, iii) mixing of hydrocarbons with water. This mechanism might help to illuminate the oil and gas origin.