

Genetic relationship between ore and hydrocarbon deposition and black shale formation

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Black shales are resulted from the geological process including sedimentation with the burial of organic matter, metamorphosis, water manifestation. From geological features there are grounds to believe that ore and hydrocarbons are accumulated within black shales during their development. In this course metals transit from the trace element form into the ore mineralization; a fossilization of organic matter occurs. These observations make one consider the ore-oil forming process as a constituent part built integrally with evolution of black shales. In this connection it is of importance the mechanism by which these rocks were formed.

The concept of the $[2\text{SiO}_3 - \text{OH}_2 - 2\text{M}^{n+}\text{M}^{m+}\text{O}^{4-}]$ ($n=1,2; m\geq 3; \text{O}^- - \text{O}, \text{F}, \text{Cl}, \text{S}$) aquacomplex seems to provide a new insight into the problem. It was shown that this species, representing an universal crystallochemical unit of the mineral matter, mediates its structure-chemical transformations. This implies an energetical view of the process, when the aquacomplex performs the conversion of energy disbalance in the mineral system into the internal chemical energy of newly formed minerals. In terms of this mechanism ore mineralization occurs as the mineral continuum having a structure of the aquacomplex falls on the conditions of its disintegration. Inversion of Ox/Red potential and Ca (Sr, BA) available in the mineral system play the most important role for this. Organic matter stimulates a reaction of hydrocarbon synthesis. This took place when energy excess in transforming sediments reached the magnitude, when it is energetically more beneficial for C to substitute Si in the $[\text{SiO}_4]$ tetrahedra. Reduction of $[\text{CO}_4]$ network triggers C_nH_m synthesis. This mechanism explains structure-textural peculiarities and geochemical specification of black shales and why ore and oil occurrences are spatially distanced within sediment series.