

## **ORGANIC-RICH CONCRETIONS FROM THE PERMIAN SANDSTONES (WEISSLIEGENDES) AT THE FOOTWALL OF THE KUPFERSCHIEFER COPPER DEPOSITS IN POLAND**

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Organic-rich (1-2% TOC) concretions occur in the white-gray Lower Permian sandstones, typically in one horizon, about 1-3 meters below the copper-bearing shales. The leading horizon is characterized by finer grains and higher content of organic matter in comparison with the surrounding sandstones. Concretions (5-30cm big) are usually rounded or elongated but sometimes they can form discontinuous layer. In most cases boundaries between concretions and host rocks are sharp. Three main types of concretions, differing in color, can be distinguished: 1/ primary- black or gray; 2/ secondary- red (in so-called Rote Faule zones); 3/ transitional- gray and red. In black-colored concretions organic matter fills interstices between quartz (and feldspars) grains, often being intimately mixed with clay minerals. Sometimes Cu- and Fe-sulfides form rims around concretions or are dispersed in some of them. In red-colored concretions the organic matter has been replaced by hematite. Content of trace elements (no uranium enrichment!) in concretions is similar to that in host rocks, suggesting that the organic matter has not played significant and active role in their concentration. We suppose that during early diagenesis humic acids from the copper-bearing black shales migrated into the underlying sandstones and were precipitated at favorable pH-Eh centers (nuclei). During later diagenesis the organic matter matured to bitumens and aliphatic-rich kerogen. In the Rote Faule zones long-term action of oxidizing, probably iron-rich, solutions turned organic-rich concretions into hematite-rich ones.