

The thermal maturity of the organic matter in sedimentary rocks in the area of East Herzegovina (Bosnia and Herzegovina)

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East Herzegovina area belongs to the External Dinarides of Bosnia and Herzegovina and is part of a Carbonate platform. The thermal maturity of the organic matter of the Triassic, Jurassic, Cretaceous, Paleogene, and Neogene sequence was studied, using much more samples than in the previous study (Aleksić *et al.*, 2021). Thermal maturity determination was performed using organo-petrographic analyses, including vitrinite reflectance, as well as T_{max} parameter from the Rock-Eval pyrolysis. The Rock-Eval 6 apparatus was used to analyze cca. 100 surface samples. Total of 23 samples were selected for a detailed microscopic analysis and for the vitrinite reflectance measurements. The samples are mainly gray to dark-gray laminated limestone and marl with a high content of kerogen, some free hydrocarbons (bitumen) and coal particles. The petrographic composition is characterized by carbonate and clay minerals with significant content of pyrite, vitrinite, inertinite, lamalginite, bituminite and especially granulated solid bitumen in the cracks.

The HI- T_{max} plot from the Rock-Eval pyrolysis shows that Triassic and Jurassic sedimentary rocks contain kerogen type II and II/III, with T_{max} values from 404 to 460 °C. The analyzed Cretaceous samples mainly contain kerogen type I, with low amount of kerogen type II, and have extremely low T_{max} values - from 397 to 414 °C. The Paleogene rocks contain kerogen type III, with T_{max} values from 410 to 438 °C, while the analyzed Neogene (coal) sample also contain kerogen type III and T_{max} of 411 °C.

The results of vitrinite reflectance, which is a more reliable method for determining the thermal maturity, show that the analyzed Triassic sediments are in the catagenetic stage, with the vitrinite reflectance from 0.58 to 0.78 % Rr. The Jurassic samples with vitrinite reflectance values from 0.58 to 0.65 % Rr also imply early mature stage, as well as the analyzed Cretaceous sediments, whose values are somewhat lower – from 0.53 to 0.54 % Rr. The Paleogene and Neogene samples are characterized by a reflectance of 0.38 and 0.34 % Rr, respectively.

It was interesting that most of the obtained vitrinite reflectance results are not in good correlation with too low T_{max} values. That is probably the consequence of specific kerogen type, but also of the bitumen alteration at surface conditions. It is concluded that altered bitumen does not distill at usual temperature anymore during pyrolysis (300 °C ; peak S1), but at much higher temperatures – thus making significant overlap of S1 and S2 peaks (S2 peaks widening). That leads to the anomalous decrease of the T_{max} values, especially in the Cretaceous samples, and also to certain „increase“ of generative potential (S2) and hydrogen index (HI).

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Aleksić N., Kostić, A & Radonjić, M. 2021. Composition of organic matter and thermal maturity of Mesozoic and Cenozoic sedimentary rocks in East Herzegovina (External Dinarides, Bosnia and Herzegovina). *ASGP Journal*. Vol. 91, pp. 375-388. (doi: <https://doi.org/10.14241/asgp.2021.16>)