

CENOMANIAN–TURONIAN BOUNDARY EVENTS IN POLISH PART OF THE PIENINY KLIPPEN BELT IN THE LIGHT OF GEOCHEMICAL DATA

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Geological setting

The Pieniny Klippen Belt (PKB) represents a long and narrow arch-like structure situated in the Paleo-Alpine Accretionary wedge, between the Inner and the Outer Carpathians (cf. BIRKENMAJER, 1986; MISIK, 1997).

Samples

The Cenomanian–Turonian Boundary Events (CTBE) in the Pieniny rock formations is marked as the grey and brownish black layers in marls of the Jaworki Formation. The Magierowa Member (Mg. Mb.) represents dark sediments in the Pieniny Succession. It consists of alternating beds of laminated black shales and bioturbated green mudstones. The Sneznica Member (Sn. Mb.) is equivalent of Magierowa Mb. in the Niedzica Succession. Grey marls with occasional intercalations of turbiditic calcarenites are dominant (GASIŃSKI, 1988; BIRKENMAJER & GASIŃSKI, 1992).

Methods

Total organic carbon (TOC) content, HI/OI ratio and T_{max} were determined the Rock–Eval pyrolysis and LECO combustion – infrared instrumentation.

The major and trace element concentrations were analyzed by INNA and ICP-OES.

Results

The Mg Mb. samples have a hydrogen index (HI) ranging from 27 to 52 mg HC/g TOC, oxygen index (OI) varies between 33 and 97 mg CO₂ /g TOC. The temperatures of maximum pyrolysis (T_{max}) values pass 465 °C. In the Sn Mb. HI and OI values are between 36 and 104, and between 9 and 190, respectively. T values exceed 430 °C except one sample, PSk, with T_{max} below 400 °C, at around 360 °C.

Significant metal enrichment is correlative with high organic carbon content within black sediments and diminish in adjacent, organic-poor layers. The enrichment factors for

particular elements are as follows: Ag, Cd > 10; Cu, Zn, V > 5. V/V + Ni > 0.7 and V/Cr < 2 are associated with negligible low Mn content. Black shales, unlike the Sn. Mb, where they occur as thin intercalation, in the Mg. Mb. comprise prevailing sediments.

Conclusions

Rock-Eval pyrolysis data indicate that organic matter in the Mg Mb samples are represented by mature, gas prone IV type kerogen. The Sn Mb. consist of II and III type kerogen. Maturation degree corresponds to the oil-window stage. Abnormally low value of PSk might be explained by the impregnation of heavy hydrocarbons or asphaltens resulting from oil migration (ESPITALIE, 1993).

Trace metal analyses for the Sn. Mb. suggest that this sequence was deposited in an alternating oxic-anoxic environment. High trace element contents for the Mg. Mb. seem to show its deposition under increasing reductive conditions (anoxic-euxinic) (ALBERDI-GENOLET & TOCCO, 1999)

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