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**REFLECTANCE OF DISPERSED ORGANIC MATTER PARTICLES IN
SHALES OF THE MAGIEROWA MEMBER IN THE PIENINY KLIPPEN
BELT COMPARED WITH CLAY CRYSTALLINITY AND ISOTOPICAL
DATA**

INTRODUCTION

This paper concerns petrographical and carbon isotopical variations in the organic carbon rich layers of the Magierowa Member. General view on the mineralogy and geochemistry of the Magierowa Member sediments has been presented by Wójcik - Tabol (2000), though no isotopic data on the discussed sediments has been published till now.

The aim of these studies were more detailed petrographical characteristic of the Magierowa Member deposits and its preliminary isotopical description.

MATERIALS AND METHODS

The Magierowa Member occurs in the Pieniny Klippen Belt, which consists a long, narrow, arch – like structure situated between the Inner and the Outer Carpathians (Birkenmajer, 1986). The Magierowa Member sediments consist of alternating beds of laminated black shales and green, bioturbated mudstones. The samples studied were collected from one outcrop called the Magierowa Klippe, which is the *locus typicus* for the Cenomanian Turonian Magierowa Member. This section is located near village Sromowce Niżne, in the eastern part of Polish Pieniny Klippen Belt.

X –ray, thin section, Rock – Eval pyrolysis and ratio ¹²C/¹³C isotope were the main analytical techniques applied.

RESULTS AND DISCUSSION

Mineral composition of both, black and green mudstones of the Magierowa Member was described as follows: clay minerals, quartz and feldspar.

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Major components of clay minerals are: illite (60 – 70 %), kaolinite (19 – 25%) and chlorite (9 - 12%). Clay crystallinity index measured for illite and chlorite is significant and equals 0,4 and 0,2 respectively (Fig. 1).

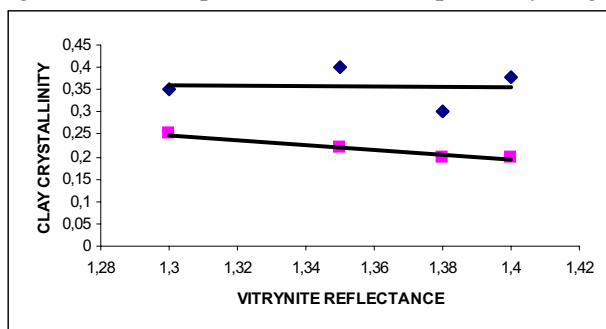


Fig. 1. Clay crystallinity versus vitrinite reflectance.

The colour of dark layers is determined by the presence of organic matter and iron minerals. The TOC are between 0,8 and 1,9 wt. %. The temperature of maximum pyrolysis (T max) values exceed 465 °C. The average values of vitrinite reflectance (R_r) are 1,35%.

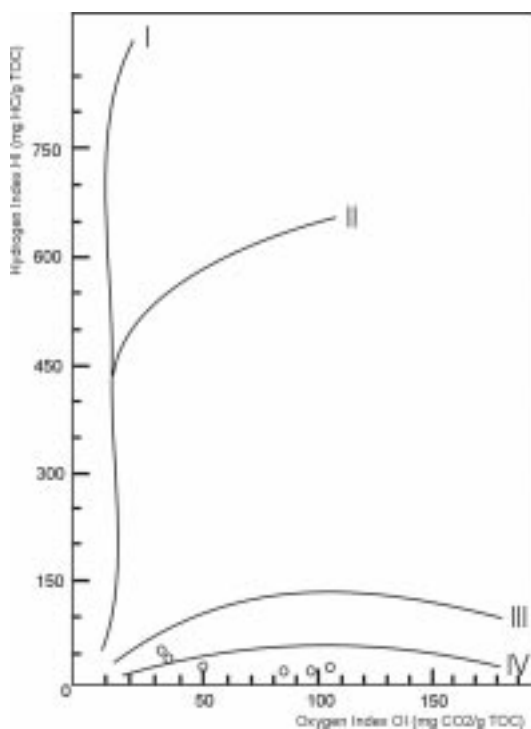


Fig. 2. Diagram based on pyrolysis data; hydrogen index versus oxygen index.

Hydrogen index (HI) versus oxygen index (OI) shows a predominantly type IV of the kerogen in the Magierowa Member (Fig. 2).

Petrographic analysis of the kerogen displays angular fragments with preserved internal cell structures and wispy-shape, amorphous material of the inertynite group of macerals (Fig. 3).

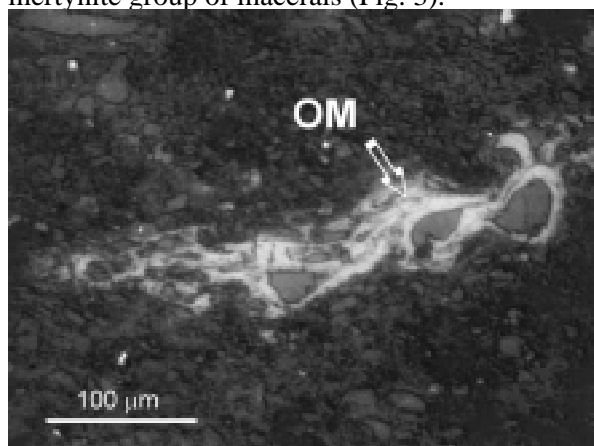


Fig. 3. Organic matter (OM) surrounding mineral grains; RL, 1N.

The $\delta^{13}\text{C}$ value of kerogen varies from 23,9 to 23,59 (n=3). It comprises with the (-18,4 to -26,1) $\delta^{13}\text{C}$ range of the kerogen from the other Cretaceous deposits studied in the Pieniny Formations (Tab. 1).

Tab. 1. The $\delta^{13}\text{C}$ values measured for the organic carbon from various samples of the Cretaceous rock succession in the Pieniny Klippen Belt; TR – Trawne Member, HL – Pomiedznik Formation, GSZT, SZT 9 – Wronin Member, SZT 5 – Kapuśnica Formation, MG – Magierowa Member.

SAMPLES	ORGANIC CARBON $\delta^{13}\text{C}$ (PBD)
TR 1	-18,43
TR 5	-25,23
HL 6	-26,6
GSZT 2	-25,7
SZT 9	-25,89
MG 9	-23,59
MG 15	-23,89
MG 25	-23,6
SZT 5	-26,13

In contrast to the Trawne Member, the Magierowa Member $\delta^{13}\text{C}$ values suggest extremely freshwater origin of the kerogen. The negligible $\delta^{13}\text{C}$ variations are evident highly homogenous conditions of the organic carbon forming, deposition

and others. This is consistent to results of mineralogical and organic petrological investigations.

The high crystallinity index of clay minerals indicates an advanced illitization process. The low (< 10%) frequency of expandable layers within I/S is evident diagenesis temperature range 200 °C and more. Many authors (cf: Weaver, 1989) proposed that the illitization is associated with a precipitation of chlorite, therefore the significant amount of chlorite in clay content of the Magierowa samples might be explained by their strong illitization.

CONCLUSIONS

Characteristic of organic matter in comparison with clay crystallinity allow to recognize that high vitrynite reflectance is related with original maturation of terrigenous kerogens. However, intensive diagenesis processes influenced on the Magierowa Member sediments.

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