Geology, Geophysics & Environment • 2012 • Vol. 38 • No. 4 • 551–552

MATURITY OF MENILITE SHALES FROM POLISH OUTER CARPATHIANS BASED ON VITRINITE REFLECTANCE AND ROCK-EVAL PYROLYSIS DATA

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Maturity of organic matter is one of the most important parameters characterizing the source rock. The maturation process depends on organic matter properties (kinetic parameters of kerogen) and burial history (temperature and time). The vitrinite reflectance measurements and Rock-Eval pyrolysis are widely used to characterize the maturity of organic matter occurring in the source rock. The purpose of the present study is to determine the thermal maturity of organic material present in Oligocene Menilite Shales from Polish Outer Carpathians based on vitrinite reflectance and Rock-Eval pyrolysis data. These organic-rich rocks are considered as a main source of oils accumulated in Outer Carpathian sequence (Kotarba & Koltun 2006).

Analysis has been performed on eleven claystone samples collected from outcrops of Dukla Unit. Part of them was taken in tectonic windows of Dukla Unit within Magura Unit: Świątkowa, Grybów and Ropa. Microscopic analysis of organic matter in reflected white light and fluorescence has been carried out for each sample. Macerals have been characterized and classified according to their optical properties and morphology.

Rock-Eval pyrolysis has been used to determine: a) the amount of free hydrocarbons present in the sample (S_1), b) the amount of residual hydrocarbons generated during pyrolysis of organic matter (S_2), c) the amount of CO_2 generated during pyrolysis of organic matter (S_3), d) the temperature of maximum of S_2 peak (T_{max}), e) the amount of CO_2 received during oxidation of residual, carbon (S_4). Based on received parameters the source-rock indices were calculated: a) total organic carbon $\{TOC = [0.83(S_1 + S_2) + S_4]/10\}$, b) hydrogen index ($HI = 100S_2/TOC$), c) oxygen index ($OI = 100S_3/TOC$), d) production index [$PI = S_1/(S_1 + S_2)$].

Reflected white light optical research methods of organic matter enable to find in each studied sample macerals from vitrinite and inertynite group. Two generation of vitrinite has been noticed during the studies. The first type has been represented by vitrinite *in situ*. The second one has been recognized as a dark, gelified vitrinite, filled in with some mineral or organic association. Inertinite macerals have been represented mostly by detritus material. Macerals from liptynite group have been recognized using fluorescent microscopy. These macerals occur commonly in each sample, what could indicate domination of oil-prone kerogen Type II.

The vitrinite reflectance measurements have been carried out for both types of vitrinite. The random reflectance R_r of organic matter varies between 0.45% and 0.9% for first type of vitrinite and from 0.2% to 0.66% for the second one.

Measurements of reflectance of vitrinite *in situ* have indicated that organic matter has reached the maturation stages of hydrocarbon generation corresponding to *oil window* phase. Values of selected parameters and indices received from Rock-Eval pyrolysis vary: TOC from 1.73 wt. % to 6.4 wt. % (median 4.3 wt. %), HI from 197 mg HC/g TOC to 681 mg HC/g TOC (median 342 mg HC/g TOC) and T_{max} from 421°C to 456°C (median 440°C). These data indicate that analysed samples are rich in organic matter, predominantly of oil-prone kerogen Type II. Rock-Eval T_{max} temperature values correlate well with reflectance of organic matter for vitrinite *in situ*; for dark vitrinite this correlation is not visible.

The research was financed by the AGH University of Science and Technology statutory grant.

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