

Hydrocarbon Potential of the Menilite Formation in Western Ukraine

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ABSTRACT

The Ukrainian Carpathians belong to one of the oldest petroleum provinces in the world. The aim of the study is to characterize the hydrocarbon potential of the Oligocene to Lower Miocene Menilite Formation, the main source rock interval in the region. In Ukraine, the Menilite Formation is traditionally subdivided into Lower (Lower Oligocene), Middle (Upper Oligocene) and Upper (Lower Miocene) sub-formations which are composed of alternating sandstones, claystones and mudstones. The study is based on two profiles in the Skyba nappe of the Eastern Carpathians near the village of Spas. Although micropaleontological data are still missing, the studied sections are attributed to the Lower and Upper Menilite sub-formations. 227 samples were collected from Lower Oligocene (153 samples) and Lower Miocene (74 samples) strata in order to analyse bulk parameters (TOC, Rock-Eval) and biomarkers. The Middle Menilite sub-formation is considered to be organically poor and was therefore not studied. The Lower Oligocene succession is about 340 m thick. It contains a high number of chert beds and turbiditic sandstones in its lower part and thin coccolith limestones in its upper part. The total organic carbon (TOC) content of pelitic rocks frequently exceeds 20 wt.% and averages 7.74 wt.%. HI values in the lower part reach 800 mgHC/gTOC and typically range between 300 and 600 mgHC/gTOC in the rest of the section. Pr/Ph ratios higher than 1.0 argue against strictly anoxic environments. Very high TOC contents are due to abundant landplant input, reflected by relative low HI values (<400 mgHC/gTOC), very high Pr/Ph ratios (up to 5) and landplant-derived biomarkers. Biomarkers for diatoms are abundant in samples with high HI. The Upper Menilite strata are about 1200 m thick and contain thin chert layers near the base and a thick tuff horizon in their upper part. The average TOC content of the Upper Menilite succession is 4.9 wt.% and exceeds 20 wt.% only near its base. Pr/Ph ratios decrease upwards and are generally lower (0.4 – 1.3) than in the Lower Oligocene strata. TOC and Rock-Eval data show that both the Lower Oligocene and the Lower Miocene succession contain highly oil-prone source rocks with an excellent source potential. Tmax measurements show that the organic matter is immature in both sections.