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THE INFLUENCE OF PYROLYSIS CONDITIONS ON HYDROCARBONS COMPOSITION OF THE SHALE OIL (ALEKSINAC OIL SHALE, SERBIA)

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The amount and the composition of liquid hydrocarbons (HCs) obtained by pyrolysis of oil shale depend on kerogen type, as well as pyrolytic system and conditions [1]. The aim of this study was to compare HCs composition of bitumen isolated from raw oil shale samples (osh) and shale oils obtained by pyrolysis of oil shales in an open system (os) and close system (cs) (Table 1). Investigation has been made on immature outcrop oil shale samples (vitrinite reflectance of 0.41 % Rr) from the Aleksinac deposit (Serbia). Pyrolysis experiments were performed on the two selected samples, which have shown the highest quantity of total organic carbon (TOC > 13 %) and high HCs generation potential (Hydrogen Index, HI > 615 mg HCs/g TOC) in the studied sample set [2].

The HCs composition of the shale oils obtained by open system pyrolysis indicates low maturity. They are similar to distributions of HCs in bitumens isolated from raw (initial) oil shales (Table 1). Therefore open system pyrolysis can be useful for assessment of source and depositional environment of organic matter. On the other head, shale oils obtained by pyrolysis in the close system have distributions of HCs which correspond to higher maturity and they are similar to composition of HCs in crude oil, generated in early stage of “oil window” (Table 1). Therefore, for artificial generation of shale oil (from immature oil shale), having composition comparable to crude oil, the close system pyrolysis is required.

Table 1 – Source and maturity parameters of bitumen isolated from raw oil shale (osh) and shale oil obtained by open (os) and close system (cs) pyrolysis

	Source parameters					Maturity parameters				
Sample	CPI (C_{15}-C_{35})	%C_{27} ααα(R)-sterane	%C_{28} ααα(R)-sterane	%C_{29} ααα(R)-sterane	Steranes/ Hopanes	C_{29} ααα 20S/ (20S+20R)-	C_{29}αββ/(αββ+ ααα)- steranes	Rc (%)	C_{31} αβ 22S/(22S+22R) -hopanes	C_{30} βα/C_{30}αβ-hopanes
D13 osh	1.87	20.07	42.29	37.65	5.29	0.14	/	0.41	0.11	1.93
D16 osh	1.37	32.74	20.80	46.47	0.50	0.07	/	0.36	0.12	0.43
D13 os	1.13	25.96	45.60	28.44	0.33	0.18	/	0.44	0.30	4.25
D16 os	1.08	37.26	25.10	37.65	0.07	0.12	/	0.39	0.23	2.27
D13 cs	1.03	30.20	33.62	36.18	0.31	0.47	0.50	0.76	0.55	0.74
D16 cs	1.06	34.60	30.22	35.18	0.26	0.55	0.57	0.92	0.54	0.27

CPI – Carbon Preference Index, calculated from distributions of *n*-alkanes; Rc – calculated vitrinite reflectance = 0.49 x C_{29}ααα20S/20R + 0.33; / – Not determined due to the absence of C_{29} αββ 20R-sterane in these samples.

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