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Inorganic Geochemistry and Organic Petrographic Properties of the Ayaz Coals (Denizli - Turkey): Evidences for Depositional Environment

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Abstract: Ayaz coals, located at the northern part of Çameli-Acıpayam basin, represents low-rank lignite resource in small volume in Denizli region (SW Turkey). Geochemical and organic petrographic data have been used in order to be evaluate provenance. The total organic carbon (TOC) content of seventeen coal samples varies from 3.9 to 44.0 wt % and have excellent source rock potential. According to the organic petrography investigations, huminite, liptinite, inertinite and mineral matters content of samples range from 27.4-69.8 %, 3.8-18.9 %, 0.3-8.9 % and 2.4-66.4 %, respectively. Quartz, gypsum, thenardite, clay and mica minerals (smecktite, illite, kaolinite and chlorite), opaque minerals (pyrite) are determined in XRD analysis as the mineral matter in coal samples. According to the major oxide results, coal samples have slightly high contents of SiO_2 (7.40-71.50 wt %), CaO (1.04-22.15 wt %), $Fe2O_3$ (1.68-7.30 wt %), MgO (1.10-9.50 wt %), Cr (109.5-588.4 ppm) and Ni (1002.9-2243.9 ppm). Some major and trace element ratios such as $SiO_2/Al2O_3$ (4.58-16.07), $CaO/(Fe2O_3+CaO)$ (0.29-0.85), Th/Sc (0.12-0.39), Ce/Sr (0.53-2.04), Ti/Zr (18.08-29.01), Va/La (9.07-1359.63) and Ni/Co (17.6-49.4) propose a mafic magmatic source in low sedimentary maturated character. In addition, the coal samples show enrichment in Na, Mg, P, K, Ca, Ti, V, Mn, Fe, Ni, Y and Co elements, depletion in Zn, Rb, Sr, Zr, Ba, La, V, Pb, Hf, Th and Cu elements in NASC and PAAS normalized multi element diagrams. Moreover, all samples indicate clear depletions with positive Europium (Eu/Eu*) anomalies (0.20-0.29) in NASC and PAAS normalized REE diagrams. CIA, PIA and CIW values of coal samples (3.18-60.54 %; 2.94-62.9 %, and 91.69-95.16 %, respectively) display slightly weathered source characteristics. As a result, the organic petrography and geochemical results propose that Ayaz coals were probably deposited in a telmatic environments (Inundated marsh, swamp and bog) with medium salinity under humid climatic conditions.

Keywords: Total Organic Carbon (TOC), Organic Petrography, Ayaz coals (Denizli), Geochemistry, Telmatic environment

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