

## COAL QUALITY OF THE MIOCENE MUĞLA-HÜSAMLAR LIGNITE

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### ABSTRACT

The coal-bearing Ören Basin is located close to the eastern coast of the Aegean Sea, in southwestern Anatolia, Turkey. The basement consists of the rocks of the Menderes Massif and Lycian Nappes. The Miocene coal-bearing sequence which unconformably overlies the pre-Neogene basement is subdivided into four formations; Alatepe, Eskihisar, Yatağan and Milet. The Alatepe Formation consists of mainly mudstone with coal layers deposited under paralic conditions and is unconformably overlain by the Eskihisar Formation, which comprises the Turgut and the major coal-bearing Sekköy Members. The Turgut Member consists of alluvial fan deposits at the bottom and fluvial deposits in the upper part, whereas the Sekköy Member includes mudstone, siltstone, marl and limestone deposited under lacustrine conditions. The Eskihisar Formation is conformably overlain by the Yatağan Formation and Milet Formation. The Milet Formation is absent in the Hüsamalar area, where the Alatepe and Eskihisar Formations are covered by Quaternary alluvial fan and fluvial deposits.

The aim of this study is to determine the coal quality and to indicate palaeoenvironmental conditions, which controlled the formation of the coal seam that displays a banded structure consisting of matrix coal and inorganic intercalations in the Hüsamalar Open Pit.

Organic and inorganic samples were collected by applying channel sampling from a 60-m-thick mine profile. On average, total moisture is 20.50 wt. percent and ash yield 20.73 wt. percent (on dry basis), volatile matter and fixed carbon contents 60.71 wt. percent and 39.29 wt. percent (on dry, ash-free basis), respectively. The elemental composition of lignite proved to be as follows (all values in wt. percent, on dry, ash-free basis): C 61.1 wt.%, H 7.7 wt.%, N 1.9 wt.%, S 7.1 wt.% and O 22.2 wt.%. The gross calorific value is around 19.6 MJ/kg (4681kcal/kg) on moist, ash-free basis. Considering the gross calorific values the Hüsamalar coal belongs to the low rank coal B to A.

The lignite samples were examined under the coal-petrography microscope under white incident light and blue-light excitation. Macerals of huminite group are the most abundant, inertinite is rare, whereas liptinite content strongly varies. On the basis of maceral composition the Hüsamalar peat was accumulating in a limnotelmatic environment, in a fen (topogenous mire), under anoxic, mesotrophic conditions. The maceral content indicates that the peat-forming vegetation consisted of both arboreal plants and herbs. Mica and feldspars contribute to the low part of the seam and carbonates are dominant in the upper part, whereas quartz and pyrite are present along the whole coal profile. The sudden transitions of the telmatic to the lacustrine regime and reverse is attributed to tectonic movements that controlled water table levels in the palaeomire which affected surface runoff and hence, clastic deposition.

**Keywords:** Lignite, coal petrology, depositional environment, Hüsamalar, Muğla