

General geochemical characteristics of dump samples from Mini Maritsa Iztok EAD (Bulgaria)

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Dump materials from open-pit lignite mining are complex, very inhomogeneous mixture of anthropogenic genesis. Dumps main feature is the huge volumes of reworked and re-deposited sediments free heaped in hilly, uneven areas. In subsurface environment, the dump materials suffer variety of weathering processes as oxygenation, water leaching/ wash-out, etc. The study aims at general complex characteristics of carbonaceous dump samples.

Seven surface samples from three dump sites of Mini Maritsa Istok EAD (Bulgaria) with more than 15 years period of re-deposition are studied by XRD, ICP-MS and GC-MS. In a hand specimen, all dump samples are variegated mudstones, with coaly impurities. They are not compacted, porous, and often loose and wet. XRD data depict clay (montmorillonite, I/Sm, illite and kaolinite) minerals, feldspars and quartz as main constituents, and pyrite, gypsum, iron hydroxides and carbonates in addition.

The bulk samples show elevated content of Cd, Sn, V, As, Mo, Yb and W, and their water leachates are enriched in Li, Be, Al, Mg, Ca, Mn, Fe, Ni, Cu, Sr and S. It is important to underline that there is no or negative correlation of pH values and elements extracted, i.e. the elements and values extracted depend not only on pH but on other factors, e.g. water soluble hydrocarbons and electric conductivity.

Dump samples TOC varies in the range 1.2-2.4 %. Rock Eval data classify the dump OM as Type II and Type III. Yields of chloroform extracts vary from 0.08 to 1.62 %, and are composed mainly of polar components. *n*-Alkane distributions are bimodal with a broad span and short-chain homologs prevalence. CPI values are >1. GC separations are strongly dominated by 16 α (H)-Phyllocladane. Pr/Ph ratio range is 0.59-1.18. A set of acyclic hydrocarbons has been tracked: diterpenoids, hopanes (incl. neohopenes) and rarely steranes. Future efforts will be directed in a study of organic compounds in the dump water leachates.

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