

Monitoring Heavy Metal Mobilisation in Acid Leaching of Coal

Praćenje oslobađanja teških metala pri kiselinskom luženju uglja

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Abstract

Acid leaching was applied to coal samples from the Bogovina basin, located in eastern Serbia, in order to evaluate its effectiveness in reducing sulphur and ash content and to monitor the mobilisation of heavy metals into the leachate. The experiments were conducted under controlled laboratory conditions, with a leaching time of 30 minutes, employing three different temperatures and various acid concentrations. Two acid reagents were tested, and the resulting leachates were analysed for concentrations of heavy metals, including Cr, Cu, Co, and Pb.

The analytical results, obtained using an Atomic Absorption Spectrophotometer (AAS) and Eschka method, showed that acid leaching significantly reduced the sulphur and ash content of the coal while simultaneously mobilising varying amounts of heavy metals into the aqueous phase. The extent of metal mobilisation depended on the type of acid used, indicating that reagent composition plays a key role in determining both desulphurisation efficiency and environmental impact.

This study confirms the presence of toxic heavy metals in coal from the Bogovina region and demonstrates that acid leaching can effectively improve coal quality, although it may increase the mobility of certain metals. These findings highlight the need to balance coal upgrading with appropriate management in order to minimise environmental risks.

Future research will focus on comparing the concentrations and behavior of heavy metals in leachate and sediments from the Bogovina area, to gain a deeper understand of metal distribution and potential pathways within the local environment.

Keywords: acid leaching; coal; desulphurization; deashing; leachate monitoring

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