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# XVII ICC
## ISTANBUL 2022
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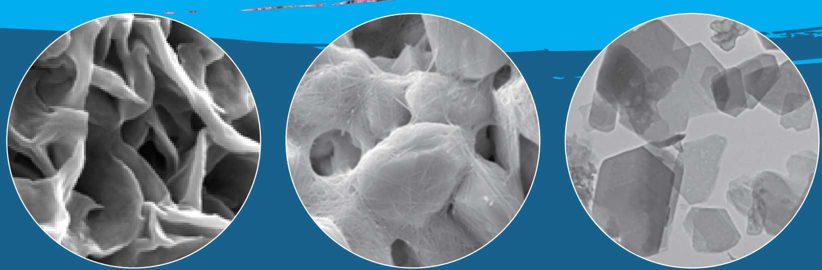
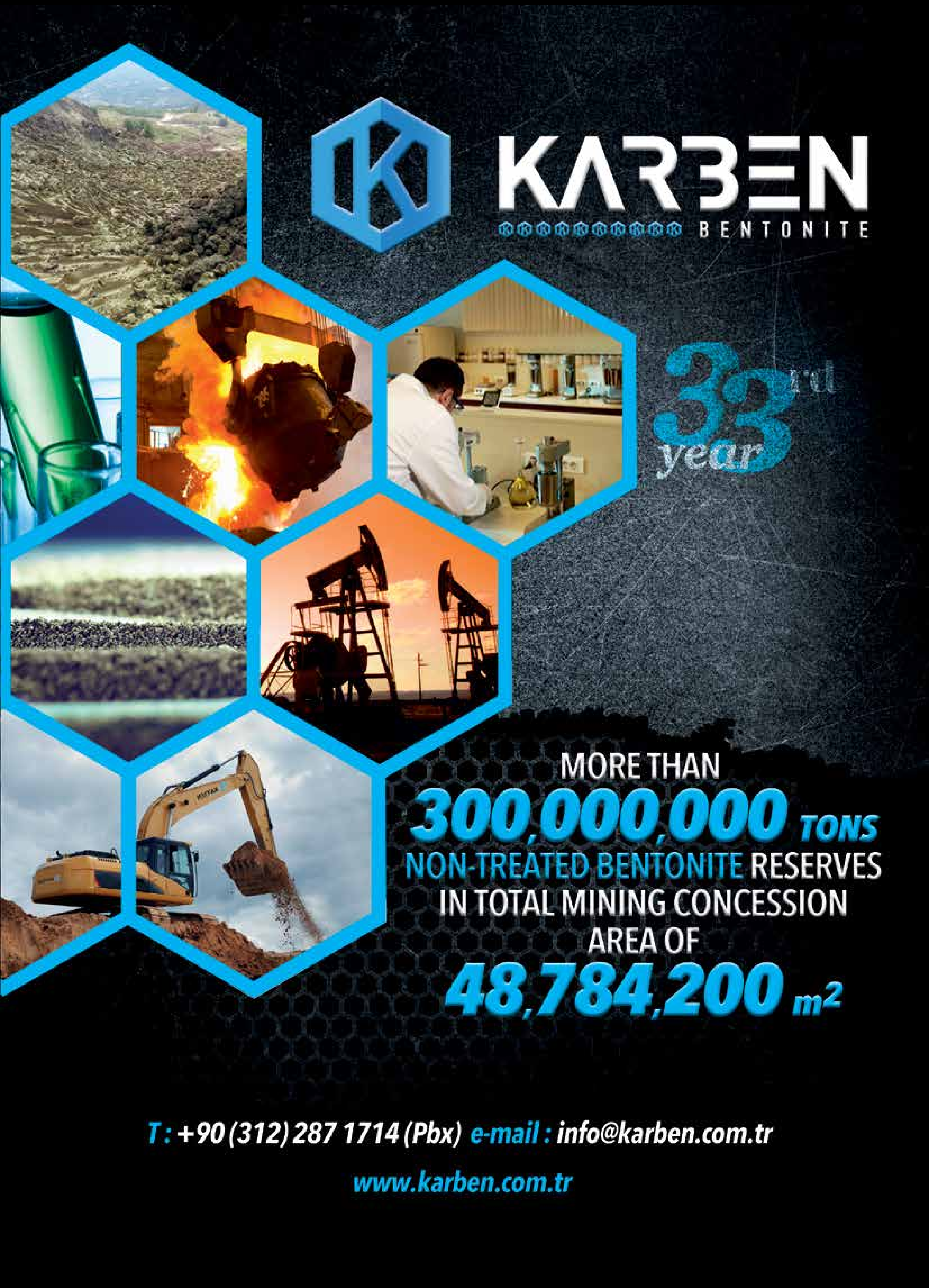
Clay Minerals Society

*New Interfaces Bridging Continents and Cultures with Clays*



## SCIENTIFIC RESEARCH
# ABSTRACTS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## HILTON MASLAK ISTANBUL, TURKEY

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# LDH-containing materials derived from minerals: from technical aspects of synthesis to the application in As(V) removal

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Layered double hydroxides (LDH) are considered as promising materials for the removal of anionic forms of pollutants. However, their application on an industrial scale may be limited by the cost of production (Rybka et al., 2021). The final cost of the material obtained with co-precipitation is determined by the price of chemical reagents used as substrates as well as the energy and time expenditure. Therefore, the goal of this work was to (i) substitute the chemical reagents with widely available and relatively cheap minerals as sources of metals building the LDH structure, (ii) optimize the co-precipitation synthesis methodology in terms of time and energy reduction, and (iii) compare their adsorption efficiency toward As(V).

Magnesite (M) and dolomite (D) were used as divalent metal ($M^{II}$) sources, and halloysite (Hall) and hematite (Hem) were used as trivalent metal ($M^{III}$) sources. Prior to the LDH co-precipitation, the extraction of the metals was performed by the dissolution of mineral substrates. No pretreatment was necessary, and no interactions occurred between the substrates. Therefore, the extraction step can be limited to one stage. Because the dissolution of substrates was incomplete, two approaches were considered. In the first one, the formed solution was separated from the undissolved residues (-C). In the second one, the suspension of residues in the solution was further used (-UC). This was followed by co-precipitation with NaOH.

Both procedures led to precipitation of the LDH phase in all samples. Some of the -C samples exhibited admixtures, while undissolved residues were present in the -UC samples. The materials showed structural and chemical differences in terms of the interlayer anion arrangement and chemical composition. Despite that, the materials showed high efficiency, which was found in the range of 614.7±11.4 to 1633.5±11.7 mmol/kg. As compared to similar LDH-containing materials obtained from industrial wastes or minerals, the studied materials showed similar or better performance.

Rybka K., Matusik J., Slaný M. (2021) Technical aspects of selected minerals transformation to LDH-containing materials: The structure, chemistry and affinity towards As(V). *Journal of Environmental Chemical Engineering*, 9, 106792
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