

BENTONITE AFTER LEAD AND COPPER ADSORPTION: CHARACTERIZATION AND POTENTIAL APPLICATION AS A STARTING RAW MATERIAL- THE CONCEPT OF CIRCULAR ECONOMY



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Introduction

Bentonite is a clay mineral, mainly composed of montmorillonite, which has a high absorption capacity and high surface activity. Due to these properties, it is widely used in wastewater treatment, to remove heavy metals and organic pollutants, as well as in industry in the oil bleaching process, where it acts as an adsorbent to remove impurities and colored compounds. After use, waste bentonite can be reused as a raw material in various industries, thus reducing the ecological footprint of a particular industry and increasing the economic utility of this valuable material.

By means of the 9R principles of the circular economy (according to English, refuse, rethink, reduce, reuse, repair, refurbish, remanufacture, repurpose, recycle, recover), the degree of realization of the circular economy can also be applied to the use of bentonite.

Methods and Results

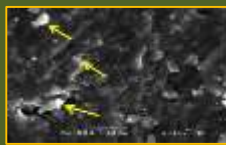
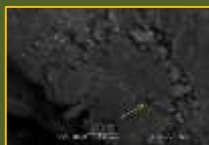


Fig 1. SEM analysis of bentonite before and after adsorption

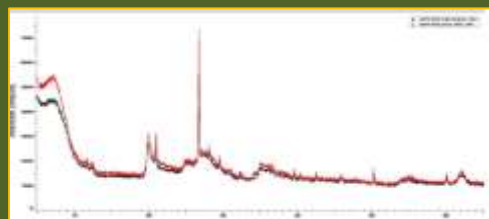


Fig 2. Diffractograms of bentonite before and after adsorption

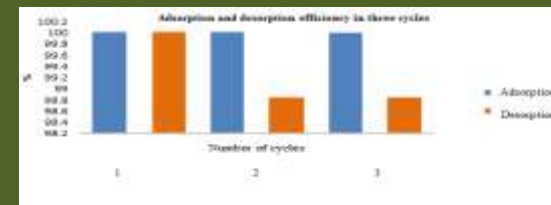


Fig 3. Adsorption and desorption efficiency
a) Cu (II) b) Pb (II) ions

Conclusion

- Reusing waste bentonite is an environmentally and economically viable solution that reduces waste and improves resource utilization;
- The future of waste bentonite processing lies in multidisciplinary research that combines nanotechnology, circular economy principles and materials science innovations.
- Sustainable approaches will focus on regeneration, functionalization and integration into high-value industrial applications, reducing the environmental burden while opening up new technological opportunities.

Literature

1. Von der Leyen U. Statement by President von der Leyen at the joint press conference with President Costa following the EU-Western Balkans Summit. 2024.
2. Potting J, Hekkert MP, Worrell E, Hanemaaijer A. Circular Economy: Measuring innovation in the product chain. Policy Report. The Hague, Netherlands: PBL Netherlands Environmental Assessment Agency. 2017.