SURFACE MORPHOLOGY AND ELEMENTAL COMPOSITION OF DGTC+PAF ION EXCHANGER: SEM-EDX ANALYSIS

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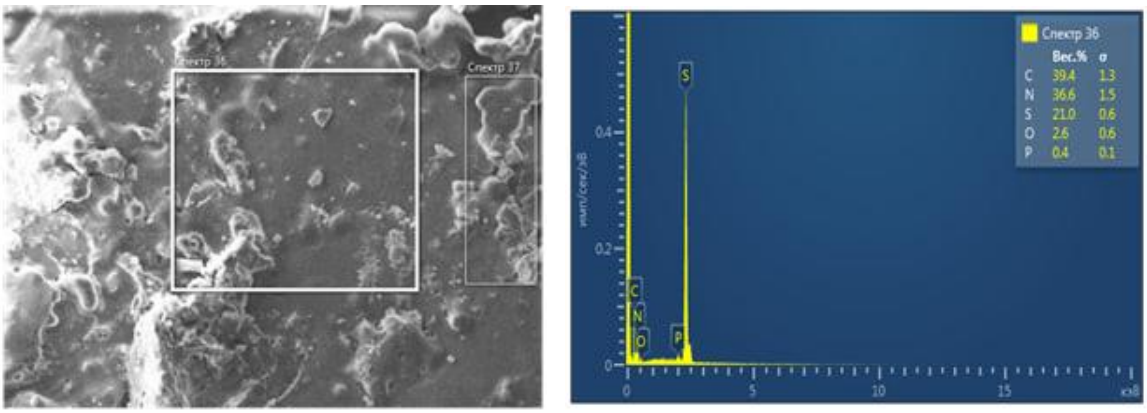
Abstract. This study presents the surface morphology and elemental composition analysis of the DGTC+PAF ion exchanger using Scanning Electron Microscopy (SEM) and Energy Dispersive X-ray Spectroscopy (EDX). The analysis was conducted to assess the structural properties and elemental content that influence the material's efficiency in ion exchange and selective sorption.

Methods. The SEM technique was used to capture high-resolution micrographs of the ion exchanger’s surface. The selected area (Spectrum 36) was analyzed using EDX to determine its elemental composition. This combination of techniques enabled both visual and quantitative characterization of the material's morphology and composition.

Results



The EDX spectrum revealed the following elemental composition (by weight):

- Carbon (C): 39.4%
- Nitrogen (N): 36.6%
- Oxygen (O): 2,6%
- Sulfur (S): 21.0%
- Phosphorus (P): 0.4%

The relatively high sulfur content indicates the presence of sulfur-rich functional groups, which are crucial for the selective binding of heavy metal ions such as mercury (Hg^{2+}). Phosphorus indicates the incorporation of phosphate units. The detected nitrogen and oxygen levels suggest the presence of amine and carbonyl functional groups that enhance complexation capabilities.

Conclusion

The SEM-EDX analysis of the DGTC+PAF ion exchanger demonstrates a structurally complex and chemically rich material. The elemental composition, particularly the high sulfur content, supports its potential use in environmental remediation applications, particularly for the selective removal of toxic heavy metals. The combined presence of functional groups further reinforces the material's capability for efficient ion exchange and stable complex formation.

References:

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