

IRON-BIOCHAR COMPOSITES AS PERSPECTIVE REMEDIATION AGENTS

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Various amendments have been used to immobilize metal(loid)s in waters and soils. Nevertheless, individual materials can have significant disadvantages limiting their field application, e.g., low or no metal(loid) sorption (biochar - BC) or extremely high reactivity with a possible negative impact on the environment or aggregation of individual particles (nano zero-valent iron – nZVI; iron sulfide combined with zero-valent iron - FeS/Fe). A combination of such sorbents may result in a complex and stable material with a wide range of applications. The main objective of this study was to evaluate the sorption properties and stability of BC, nZVI, nZVI/BC and FeS/Fe/BC by batch sorption experiments in artificial aqueous solutions at different pH values and in real mine waters at two different time intervals (1 week, 10 weeks). All necessary parameters (e.g., pH and Eh) and concentrations (e.g., cation, anion and carbon) were measured during individual experiments. Moreover, the changes in morphology of materials before and after experiments were tested using XRD and SEM/EDX analyses that can further describe stability of these materials as well as possible formation of new phases. This comprehensive study made it possible to evaluate the suitability of individual materials by means of their sorption efficiency and stability under various experimental conditions, which is a necessary step before their possible use in real field conditions.