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Performance of geopolymers for direct immobilization of solvent extraction liquids: Metakaolin/LIX-84 formulations

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Highlights

- Formulations of MK-geopolymer with at least 8% LIX-84 have been well developed.
- Compressive strengths were more than twice the waste acceptance criteria.
- Pre-saturated LIX-84 with Cu^{2+} was trapped even under the sever acidic attacks.
- Wash-offs were the controlling leaching mechanisms of Cu^{2+} .
- The physico-chemical analyses assured the good performance of the formulations.

Abstract

Direct immobilization of organic wastes, such as solvent extraction liquids, is an imperative demand in the nuclear sector. This demand has been met in the present study through the development of typical metakaolin-based geopolymeric formulations containing 8% LIX-84 (8LIXGP45) which were pre-saturated with Cu^{2+} . They were completely homogeneous at very young ages and had 28-day compressive strength values of twice the waste acceptance criteria. Effect of 0.1 M of nitric, hydrochloric or sulfuric acids on the leaching of Cu^{2+} were studied in comparison to de-mineralized water. All formulations performed well where most of Cu^{2+} was not easily removed and the wash-offs were the controlling leaching mechanisms. Characterization of 8LIXGP45 formulations, at the end of the leaching tests, assessed that the Cu^{2+} -saturated LIX-84 did not moved out of the matrices, even under sever acidic attacks. This was obvious via the presence of copper in the elemental analyses which was associated by cuprite and chloromenite minerals in phase analyses. Fourier transform

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