Utilizing task-specific ionic liquids for selective leaching and refining of REEs from Bauxite Residue

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The application of ionic liquids, as innovative, durable and environmentally friendly solvents, is expanding into various fields including hydrometallurgy. Many ionic liquids have been utilized to dissolve REEs such as Sc from the BR. The ionic liquid betainium bistriflimide, [Hbet][Tf2N], presents great interest as leaching agent, utilizing its selectivity against dissolving silica, iron, titanium oxides. In this study, optimization of the overall leaching process is achieved by adjusted acidic stripping, where Sc in the final aqueous solution is up-concentrated 14 times from the initial leachate and the ionic liquid is regenerated for re-use. Moreover, a new carboxyl-based specific ionic liquid, similar with [Hbet][Tf2N] with a modified ions structure is investigated. The new ionic liquid is evaluated for its main properties, compared to [Hbet][Tf2N]. The final results indicate that the newly tested ionic liquid is a promising alternative for BR leaching, presenting extremely lower solubility levels in aqueous phases (and therefore less IL losses in each leaching cycle), with similar Sc concentration values, compared to [Hbet][Tf2N].

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