Researchers realize selective recovery of high-value rare earth elements from waste NdFeB

February 20 2023, by Liu Jia

Credit: Unsplash/CC0 Public Domain

Recycling high-value rare earth elements from NdFeB waste can save

resources, reduce industrial waste, protect the environment and bring considerable economic benefits. However, most traditional recovery methods take a long time to process, have high acid consumption, and low selectivity.

In a study published in *Separation and Purification Technology*, the research group led by Prof. Yang Fan from Fujian Institute of Research on the Structure of Matter of the Chinese Academy of Sciences proposed a new integrated method for recycling permanent magnet waste by betaine hydrochloride ([Hbet]Cl) solution extraction.

The researchers first carried out leaching experiments on fully roasted magnetic clay samples, and selected [Hbet]Cl as the leaching agent.

They found that when leaching temperature was 200° Celsius, leaching time was eight hours, lixiviant [Hbet]Cl concentration was 0.2 mol/L, and solid–liquid ratio was 1:150 g/ml. They were able to get optimum leaching results of 99.81% Pr, 97.05% Nd, 95.51% Gd, 56.24% Ce and 0.20% Fe, and almost all iron oxide remained in the residue.

Compared with methods for common lixiviants, the results of the proposed method showed a better leaching rate and selectivity. And the leaching sequence was in line with established chemical properties.

In addition, the researchers revealed that the new lixiviant ([Hbet]Cl) will not reduce the extraction rate of rare earth materials by N, N-di-2-ethylhexyl diglycolamic acid (D2EHDGAA) extractant, and the extraction rate of D2EHDGAA for Nd in [Hbet]Cl leaching solution is significantly improved.

More information: Chang Du et al, Recovery of high-value rare earth elements from waste NdFeB by the water-soluble ammonium salt [Hbet]cl, *Separation and Purification Technology* (2022). DOI:

10.1016/j.seppur.2022.122946