A novel process of lithium recovery as lithium ion sieve from the effluent obtained in the process of spent lithium-ion batteries recycling is developed. Through a two-stage precipitation process using Na₂CO₃ and Na₃PO₄ as precipitants, lithium is recovered as raw Li₂CO₃ and pure Li₃PO₄, respectively. Under the best reaction condition (both the amounts of Na₂CO₃ and Li₃PO₄ vs. the theoretical ones are about 1.1), the corresponding recovery rates of lithium (calculated based on the concentration of the previous stage) are 74.72% and 92.21%, respectively. The raw Li₂CO₃ containing the impurity of Na₂CO₃ is used to prepare LiMn₂O₄ as lithium ion sieve, and the tolerant level of sodium on its property is studied through batch tests of adsorption capacity and corrosion resistance. When the weight percentage of Na₂CO₃ in raw Li₂CO₃ is controlled less than 10%, the Mn corrosion percentage of LiMn₂O₄ decreases to 21.07%, and the adsorption capacity can still keep at 40.08 mg g⁻¹. The results reveal that the conventional separation sodium from lithium may be avoided through the application of the raw Li₂CO₃ in the field of lithium ion sieve.
Original language: English
Keywords: Adsorption capacity, Lithium ion sieve, Lithium manganese oxide, Lithium recovery, Spent lithium ion batteries
DOIs: 10.1016/j.jenvman.2017.04.062
Source: FindIt
Source-ID: 2358124084
Research output: Research - peer-review > Journal article – Annual report year: 2017