

Can nickel and cobalt be separated by selective dissolution and precipitation?

This is the first time that the separation of nickel and cobalt is reported by selective dissolution and precipitation in lithium-ion battery (LIB) recycling process, offering advantages over conventional solvent-extraction process. In step 1, nickel was selectively dissolved by NH_3 and $(\text{NH}_4)_2\text{C}_2\text{O}_4$.

What is the hydrometallurgical recovery process for waste Ni-based batteries?

The hydrometallurgical recovery process for waste Ni-based batteries includes leaching, filtration, and separation, as shown in Fig. 3. The BM obtained from pretreatment is leached and filtered. Ni, Co, Mn, Zn, REEs, and their compounds are separated by extraction, electrodeposition, cementation, and ion exchange.

Why do nickel and cobalt separate early in adsorption?

Due to the distribution coefficient differences, transition metals nickel and cobalt separate from the rare earth elements lanthanum, cerium, and neodymium early in adsorption. The adsorption order follows the distribution coefficients from largest to smallest. In the elution stage, nitric acid solution desorbed the metals from the fibers.

How to recover metals from waste Ni-based batteries?

Lupi et al. recovered metals from waste Ni-based batteries by extraction method, separating Ni and Co with recovery rates > 91%. Zhang et al. obtained nickel carbonate and cobalt sulfate with purity higher than 99.0% by ion exchange technique, and the recovery rate of each element was nearly 98%.

How to recycle nickel-metal hydride batteries?

Currently, pyrometallurgy and hydrometallurgy are the primary methods for recycling waste nickel-metal hydride batteries. However, most of these processes co-extract transition metals and rare earths, resulting in inefficient separation and recovery.

Can adsorption chromatography extract valuable metals from nickel-metal hydride batteries?

This study accomplished the separation and recovery of five valuable metals- Ni, Co, Ce, La and Nd from spent nickel-metal hydride batteries using adsorption chromatography with ion exchange fibers.

Nickel (Ni) plays a crucial role in the battery industry, but its high concentration in industrial wastewater poses significant health risks, necessitating an efficient removal process. Selective adsorption presents a promising technology for metal recycling from wastewater; however, there is currently no adsorbent that exhibits sufficient ...

In this study, the separation and comprehensive recovery of valuable metallic elements, including Co, Ni, and Li, from spent power LIBs were realized by a hydrometallurgical process of "calcination-leaching-synergistic

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Here, we develop a nucleation-oxidation coupled technology to efficiently recover Ni, Co, and Mn from spent ternary cathodes by forming layered double hydroxides (LDHs) in a micro-liquid ...

Whether pyrometallurgical or hydrometallurgical, an effective pretreatment process is required to recycle waste Ni-based batteries. Physical separation processes, ...

Nickel's role in EV battery technology. Nickel is indispensable in lithium-ion battery production, especially in high-performing cathode chemistries like nickel-cobalt-manganese (NCM) and nickel-cobalt-aluminium (NCA). These chemistries are prized by EV manufacturers for their ability to deliver extended range and performance. According to ...

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Pb-Ac batteries, invented in 1859, are the most mature battery technology and have the advantage of low cost (\$100/kWh). However, their specific energy is low, ranging between 20 and 40Wh/kg. Nickel-based batteries include nickel-iron, nickel-cadmium (Ni-Cd), nickel-zinc, nickel-metal hydride (NiMH), and Ni-H₂. Among them, Ni-Cd batteries ...

This study accomplished the separation and recovery of five valuable metals - Ni, Co, Ce, La and Nd from spent nickel-metal hydride batteries using adsorption chromatography with ion exchange fibers. The static adsorption results aligned with the Langmuir model, signifying monolayer coverage, and quasi-second order kinetics ...

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In this work, we describe a simplified method for separating nickel (Ni) and cobalt (Co) from a type of Ni ore leachate called mixed hydroxide precipitate (MHP) to produce battery materials. The conventional method involves a three-circuit process to separate Ni and Co, while the simplified method is a two-circuit process that can ...

2 ???· Battery Swapping: Battery swapping technology allows EV drivers to exchange their depleted battery for a fully charged one at designated stations. This approach significantly reduces downtime for recharging. Companies like NIO in China have pioneered this system, with over 1,000 battery swap stations in operation as of 2023. Although practical for certain ...

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Whether pyrometallurgical or hydrometallurgical, an effective pretreatment process is required to recycle waste Ni-based batteries. Physical separation processes, including stabilization, comminution, and mechanical separation are often ignored, even though they are an essential part of the recovery process [52].

In this study, the separation and comprehensive recovery of valuable metallic elements, including Co, Ni, and Li, from spent power LIBs were realized by a hydrometallurgical process of "calcination-leaching-synergistic extraction-synthesis". The results showed that, under the optimal conditions, the extraction efficiencies ...

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