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Extraction and separation of cadmium and nickel from two-phase aqueous systems by the method of liquid extraction, corresponding to the concept of "green chemistry"

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Abstract

Extraction of valuable metals from chemical current sources allows not just to solve the problem of their disposal, but also to prevent environmental pollution. This approach is of particular importance in the case of the presence of toxic metals in chemical current sources, such as cadmium. Cadmium is known to have general toxic, mutagenic and teratogenic effects on living organisms. Nickel can cause allergic reactions and have a general toxic effect. According to some reports, nickel has a carcinogenic and mutagenic effect.

The aim of the work is to obtain data on the extraction and separation of cadmium and nickel during the disposal of chemical current sources by liquid extraction, depending on the process conditions.

The work obtained data on the separation, extraction of cadmium and nickel from Ni–Cd chemical current sources (CCS) using an two-phase aqueous extraction system consisting of polyethylene glycol (PEO-1500), a phase-forming salt of Na_2SO_4 and water. The extraction behavior of metals and their separation into lower and upper phases using an extractant, potassium iodide, was studied. The maximum recovery of Cd (99.2 ± 1)% and Ni (89.4 ± 1)% is achieved by leaching the batteries with HCl under the following conditions: KI concentration of 3 g/l, dilution coefficient of the CCS solution is 35. The liquid extraction method used in this work has been shown to be effective for the separation of the metals in question and has an advantage in terms of environmental safety. This extraction technique corresponds to the concept of "green chemistry".

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