The article entitled "Acid leaching of mixed spent Li-ion batteries" by Nayl et al, Arabian Journal of Chemistry, 2017, 10, S3632-S3639 also describes a leaching method for lithium batteries, in which diluted sulphuric acid and hydrogen peroxide are used. It has been found that the degree of leaching initially increases with an increasing concentration of sulphuric acid and then declines from 3 M. The highest examined concentration is 4 M.

Summary

According to a first aspect, the present disclosure refers to a method for recycling lithium batteries containing the steps:

(a) digesting comminuted material (10), which contains comminuted components of electrodes of lithium batteries, using concentrated sulphuric acid (12) at a digestion temperature (T_A) of at least 100°C, in particular at least 140°C, so that waste gas (14) and a digestion material (16) are produced,

(b) discharging the waste gas (14) and

(c) the wet chemical extraction of at least one metallic component of the digestion material (16).

According to another aspect, the present disclosure refers to a recycling installation (36) for processing lithium batteries with

(a) a comminution unit (118) for comminuting the lithium batteries (110) such that shredded material (124) is obtained,

(b) a deactivation unit (126) for deactivating the batteries (124) such that shredded material (10) is obtained,

(c) a reactor (40), especially a heated forced action mixer or rotary kiln, for digesting comminuted material (10), which contains components of electrodes of the lithium batteries, with concentrated sulphuric acid (12) at a digestion temperature (T_A) of at least 100°C,

(d) a sulphuric acid supply device (43) for adding sulphuric acid (12) to the comminuted material (10) and

(e) a discharge device (44) which is arranged to discharge waste gas (14) out of the reactor (40).

Description

The invention aims to improve the recovery of lithium batteries.

The invention solves the problem by way of a method for recycling lithium batteries containing the steps (a) digesting comminuted material, which contains comminuted components of electrodes of lithium batteries, using sulphuric acid, especially concentrated sulphuric acid, so that waste gas and a digestion material are produced, (b) discharging the waste gas and (c) the wet chemical extraction of at least one metallic component of the digestion material, especially of at least one metallic component (preferably two, three, four or more metallic components) from the list containing cobalt, lithium, manganese, nickel and titanium.

Digestion preferably occurs at a digestion temperature of at least 100°C, preferably at least 120°C, especially preferably at least 140°C. However, it is also possible that the digestion temperature is below 100°C.

According to a second aspect, the invention solves the problem by way of a recycling installation for processing lithium batteries, especially used lithium batteries, with (a) a reactor for digesting comminuted material, which contains comminuted components of electrodes of the lithium batteries, with concentrated sulphuric acid at a digestion temperature of at least 100°C, (b) a sulphuric acid supply device for adding sulphuric acid to the comminuted material and (c) a discharge device, which is arranged to discharge waste gas out of the reactor. In particular, the discharge device is designed in such a way that it is hydrogen fluoride-proof. In other words, hydrogen fluoride cannot escape into the surrounding environment.