Development of Cobalt Recovery Process from Waste Lithium-ion Batteries

Li, Amy

With the booming technological improvements in electronics market, whether it be consumer electronics and/ or electronic vehicles, the advantageous qualities of lithium-ion batteries (LIB) make them extremely suitable as sources of power. They are light in weight and have high energy density mainly due to its cathode material, which is usually comprised of $LiCoO_2$. As a result, LIBs have been manufactured world-wide at an increasing rate and have urgently necessitated the recycling of LIBs in order to sustain a healthy environment from waste battery toxins and prevent resource depletion. In this work, $LiCoO_2$ was leached in a nitric acid and hydrogen peroxide solution. After leached filtrate was adjusted to appropriate pH, Na_2HPO_4 was precipitated as $Co_3(PO_4)_2 \cdot 8H_2O$. Under optimized conditions of 50°C, 0.375 M Na_2HPO_4, and a Co^{2+} ion to $(PO_4)^{3-}$ ion ratio of 3 to 7, the experimental study indicates that 99.6% of the mass fraction of cobalt composition can be recovered. This recovery method proves to be efficient in percentage of recovery and time, as it took only 10 minutes for a complete and stable to precipitate to form.

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