

# The Potential for Recycling Batteries

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## **SUMMARY:**

The contents of this study discuss the potential for recycling secondary lithium-ion batteries. This battery medium was chosen because it is the predominant battery used in the mobile phone handsets, which are now in wide-spread use. There are, of course, millions of handsets in the U.K. alone. The study discusses the waste problem which such a prevalent, and at present predominantly untreated waste form, poses to the waste treatment authorities. The basis for a need to deal with this waste is founded upon the impending implementation of the E.U. Batteries Directive which is at present posted for full E.U. implementation by 2011. The intricate details of the extent to which this directive will dictate are still under negotiation with the member states, but it can be expected that this legislation will have a profound effect upon the manner in which batteries are disposed and processed.

A process of hydrometallurgy was chosen as the treatment for the waste battery materials. This was chosen because of its inherent low energy consumption during the processing and also because of its lower emissions in comparison to pyrometallurgical processing. A range of hydrometallurgical processing was used in order to refine the process and the analysis of the solutions was performed by using Induced Coupled Plasma Spectroscopy. It was concluded that a solution of hydrochloric acid at 2M concentration was most efficient in terms of the output at the hydrometallurgical phase.

It was suggested that electrolytic conversion could be used in order to reconstitute the metallic fraction to a solid residue. The electrolysis was not performed in this study but the practical implications are discussed, and reference made to other complementary studies in which a similar process has been performed.

Hydrometallurgical processing of lithium-ion batteries can be used to effectively extract the recyclable metallic fraction held within it. Although the process only extracts around 40% of the mass, it can be suggested that this could be a representative of the actual metallic fraction present, with the remainder made of various polymers.