

**REPROCESSING SPENT CATHODE MATERIAL FROM LITHIUM-ION BATTERIES:  
MODELLING THE AQUEOUS CHEMISTRY OF PRECIPITATION  
(IPSUM CAVE – HIC ESSE DRACONES)**

By

Mike Dry

Arithmetek Inc., Canada

Presenter and Corresponding Author

Mike Dry

**ABSTRACT**

One of the impacts of the drive towards the elimination of fossil fuels from global energy production is a greatly increased need for batteries. The leading contender is the lithium-ion battery, for which the demand for the metals in the active cathode material will strain global supplies of these metals. Over time, as the supply of spent lithium-ion batteries rises, recycling will become important. This paper presents an evaluation of part of the aqueous chemistry relevant to the recycling of cathode metals from spent lithium-ion batteries.

While it is acknowledged that there will be more than one technically viable way of recovering nickel, cobalt, manganese and lithium from spent lithium-ion batteries, this paper addresses the direct precipitation of these cations as sulphides or hydroxides. The approach taken is modelling of the chemistry using software commercially known as OLI Studio. The results indicate that high recoveries and high selectivity are at least theoretically plausible, but a comparison between these results and some published data shows that modelling alone may not be as reliable as some would believe.

*Keywords: Batteries, nickel, cobalt, manganese, lithium, recycling, precipitation*