Production of Lithium Sulfate from Spodumene Processing, Does it Make Sense?

M. Page1, P. Mankarious2 and C. Griffith3

1. Hydrometallurgist, ANSTO Minerals, Sydney NSW 2234. Email: michaelp@ansto.gov.au

2. Honours Student, University of NSW, Sydney NSW 2052.

3. Senior Process Chemist, ANSTO Minerals, Sydney NSW 2234.

Keywords: Lithium sulfate, spodumene, lithium refining, economics

# ABSTRACT

Australia is currently the world’s biggest producer of spodumene mineral concentrate, from which is derived >50% of the world’s lithium production. The vast majority of this spodumene is exported (primarily to China), where it is processed through to lithium carbonate or hydroxide for the use in the manufacture of lithium ion batteries.

Currently, only a small fraction of Australia’s spodumene production is refined to lithium hydroxide onshore (i.e., Tianqi in Kwinana and Albemarle at Kemerton since 2022). However, considerable investment in recent years from both the Australian Government and private sector has sought to increase the amount of spodumene refining that is performed in Australia. This has been driven by both economic and security considerations, the arguments for which are outlined in the Australian Government’s Critical Minerals Strategy 2023-2030.

The refining of spodumene to battery grade lithium hydroxide is expensive and technically challenging. For this reason, there has been growing interest from lithium project developers in producing more easily obtained ‘midstream’ lithium chemicals, that contain a higher lithium grade and value compared to the parent spodumene concentrate, and which can be refined to battery grade lithium chemicals elsewhere.

Lithium carbonate is one such midstream lithium chemical widely used in the processing of brines and to a lesser extent hard rock resources. An arguably more suitable midstream lithium chemical from spodumene would be lithium sulfate.

This presentation will discuss what a spodumene to lithium sulfate flowsheet could look like, the pros and cons of this chemical intermediate over alternatives (e.g., Li2CO3 and Li3PO4), and what factors favour the economics of producing lithium sulfate over a business-as-usual spodumene concentrate product.