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RISING DEMAND SETS CHALLENGES FOR INNOVATION IN NICKEL SULFATE CRYSTALLISATION

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ABSTRACT

The cost of storing energy in batteries has fallen by half in the space of two years. Short term storage of renewable energy is now affordable. Electric vehicles offer long range and compelling performance at prices which have seen sales increase by 27% in 2020 to reach 2.7 million units sold.

What has driven these changes? What challenges lie ahead for battery chemicals as demand continues to grow? And what innovations are required to meet these challenges?

In this paper we seek to answer these questions from the perspective of industrial scale crystallisation of nickel sulphate hexahydrate. Three challenges are identified as a consequence of increased end-user engagement in battery chemical supply: higher purity, greater sustainability and increased value. These challenges influence the approach to crystalliser design and help frame a road map for innovation. We describe a series of design developments which have enabled the enhancement of purity achieved by a crystalliser to be increased from a ratio of ten to forty times; and preview future developments which could increase it to one hundred times. These future developments open the possibility of achieving “five nines” product purity.

We also consider the implications of having to achieve greater sustainability while providing increased value. The need to lower the carbon footprint and reduce the water requirements of the supply chain for battery chemicals will tend to favour technology such as Mechanical Vapour Recompression which can use renewable energy sources and recover water.

Keywords: Nickel sulphate, crystallisation, product purity, sustainability, battery.

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