Environmentally friendly procedure developed for extracting silver

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Silver can now be extracted ecologically and more efficiently than before. Researchers at Lappeenranta University of Technology (LUT) extracted silver from a process stream using an environmentally friendly ion exchange technique. The technique and process are challenging, but researchers managed to extract silver that was 72 percent pure.

LUT and technology company Outotec tested silver extraction from a concentrated chloride solution using an ion exchange technique. Using the method developed by the researchers, a silver solution was obtained which had a purity level of 72 percent. The quantity of silver obtained was also good; greater than with some of the traditional methods. This was all done ecologically because the ion exchange technique requires less energy and does not release gas emissions into the air.

The outcome is especially good considering that the research proposal was a challenging one. The aim of the research was to study whether silver can be extracted from a copper production process solution by using an ion exchange technique. The solution in question was a concentrated and acidic saline solution generated during copper leaching, and it contains a thousand times as much copper as silver, and also smaller quantities of other metals. Both the presence of many other metals in the solution and also the high quantity of copper makes the extraction of the silver more challenging than normal, but the solution nevertheless contains so much silver that its extraction is profitable.

LUT's research is possibly the first instance of an ion exchange

technique being applied to the extraction of silver from a solution used in the production of copper. The method itself is not new in terms of metal refining in general, since the principle behind it has been in use since the 1950s. Industrial applications of the procedure, however, have been relatively few. For this reason, the LUT researchers develop both new ion exchange materials as well as new extraction process design tools. LUT Post-Doctoral Researcher Sami Virolainen believes that these can be used in particular to solve problems related to metal extraction when valuable metals present in low percentages are extracted as a side product.

The utilisation of similar chloride solutions for metal extraction is becoming more common throughout the world. The method works well with concentrated saline solutions, with which metals can be extracted even in small quantities from a large quantity of other metals. In future, these kinds of hydrometallurgical methods, in which metals are extracted from an aqueous solution, will be increasingly made use of because of their environmental benefits. Their use will also increase because the purity and quantity of the extracted metal is greater than that obtained using traditional methods. Furthermore, these so-called hydrometallurgical separation methods also work better with low-grade and complex raw materials.

More information: "Ion exchange recovery of silver from concentrated base metal-chloride solutions." Sami Virolainena, Mikko Tystera, Mika Haapalainenb, Tuomo Sainioa, *Hydrometallurgy*, Volume 152, February 2015, Pages 100–106 www.sciencedirect.com/science/ … ii/S0304386X14002837.

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