

Chemstar Redefines Copper Electrowinning Process

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Chemstar has introduced an environmentally friendly polymer smoothing agent to leading copper producers that is making a significant contribution to the efficiency of the copper extraction process. With the use of its HydroStar® product – a field-tested, modified natural polysaccharide polymer – Chemstar is helping to save copper producers time and money by streamlining the copper production, while improving copper cathode quality and significantly adding to the bottom line profits of major copper producers' worldwide.

Finding Purity: An Industry Challenge

Among all the minerals being mined today, copper ores often contain the lowest concentration of metal. Often the mined ore is less than 0.5% copper. Because of this, the milling of copper ore involves several production steps in order to effectively harness the desired concentration levels that all copper producers strive to reach. These steps involve leaching the copper from oxide and sulfide ores, and further processed by solvent extraction and electrowinning.



Within this copper extraction process, a significant amount of focus is invested on technologies that help eliminate impurities. To maintain profitability, copper producers continuously seek more cost-efficient, streamlined methods to process copper ore into pure metal. Copper producers are focusing more and more on improving the copper electrowinning process, considered a critical step to producing a finished copper metal

cathode product that is smooth and dense, resulting in less impurities. And, it is during the electrowinning process that HydroStar contributes its specially designed performance.

HydroStar®: An Innovative Response to Copper Production Challenges

For more than 40 years, Chemstar has applied its advanced chemistry and engineering in natural polymers for a wide variety of industries, including mining and minerals. Chemstar develops polymer products that make improvements to

processes and performance by employing its proprietary polymer technology that specifically modifies chemical composition for the intended application.

During the past four decades, Chemstar has worked with industry leaders to help solve some of their most pressing challenges. It was the company's intense knowledge of the mining and minerals industry that led them to the development of HydroStar.

Chemstar knew that the rapid growth in copper production in recent years had stimulated the need for more innovative technologies for electrowinning. So, in 2002, Chemstar teamed up with one of the world's largest copper producers to develop a natural and cost-effective product to help streamline the copper production process. From this partnership was born HydroStar – a highly effective, modified natural polysaccharide polymer smoothing agent for electroplating and electrowinning operations.



After months of research and production trials, followed by a two-year exclusive agreement with its development partner, Chemstar unveiled HydroStar for commercialization at the Society of Mining and Engineering show in February 2007. Now, HydroStar is available for use by copper producers anywhere in the world.

Field Tested and Proven Efficient

HydroStar has been field tested by several large copper production operations worldwide, solving challenges in copper yield and quality. To learn more about the success of HydroStar, it is important to first understand the electrowinning process and the challenges it presents.



During the electrowinning process, copper ions, which are contained in an EW electrolyte solution, are plated onto stainless steel blank sheets or copper starter sheets. When the stainless steel blank sheets are submerged into tanks filled with an electrolyte solution, copper essentially “grows” on the blanks via electrolysis where the cross current creates a solid, 2-4 inch thick piece of pure copper, or cathode.

The electrowinning process, however, can be prone to irregular growth. For example, cathode nodulation can cause electrical shorts causing reduction in current efficiency and product impurities. However, when HydroStar is added to the electrolyte, nodulation is reduced and a dense, fine-grained and high purity cathode can be produced.

As opposed to synthetic polymers, HydroStar is a modified natural polysaccharide, characterized as a low viscosity, highly soluble polymer. When added during the electrowinning process, the product provides unique properties not found in alternative solutions. Properties that provide a higher grade copper — both in density and smoothness. In fact, it is the polymer chemistry design of HydroStar that takes refined copper to a high-quality pure state much earlier in the refining process than other smoothing agents. This equates to increased profitability, pound-for-pound, and improved efficiencies for copper producers worldwide.

The Last Word in Effective Copper Procurement

After two years in the field, HydroStar has helped make copper production more economical and feasible. Copper producers worldwide have found that HydroStar provides them with a number of benefits, including:

- a highly effective polymer smoothing process for copper electroplating and electrowinning operations;
- growth of dense, fine-grained copper with reduced impurity content;
- a cost-effective, polymer alternative; offering savings over other agents and
- a 100% soluble, low viscosity alternative for high-solution concentrations.

For more information regarding how HydroStar can help your copper production business, please contact Bob Johnson at 1-800-328-5037 or visit www.chemstar.com.