

Copper Electrolyte Purification Systems

For Hydrometallurgical Processes



**Recover Acid and Valuable Byproducts
while Controlling Impurities**



eco-tec

**Advanced Resource Recovery &
Purification Solutions**

Copper Electrolyte Purification Systems

Problem

Controlling the level of impurities is essential to the efficient production of high purity copper in electrorefining and electrowinning operations. The contaminants that are problematic can differ depending upon the composition of the feedstock.

Typical contaminants found in electro-refining and electrowinning operations are:

- Nickel
- Bismuth/Antimony
- Arsenic
- Cobalt

The standard procedure is to continuously or periodically bleed off decopperized electrolyte in order to maintain contaminants at an acceptable level. While this solves the contaminant problem, significant quantities of valuable chemicals are lost. In some cases, highly acidic waste spent electrolyte must be neutralized with sodium hydroxide or calcium hydroxide, resulting in large quantities of waste sludge which must be sent to disposal.

Solution

Eco-Tec Electrolyte Purification Systems cater to each contaminant problem. The Electrolyte Purification Systems include:

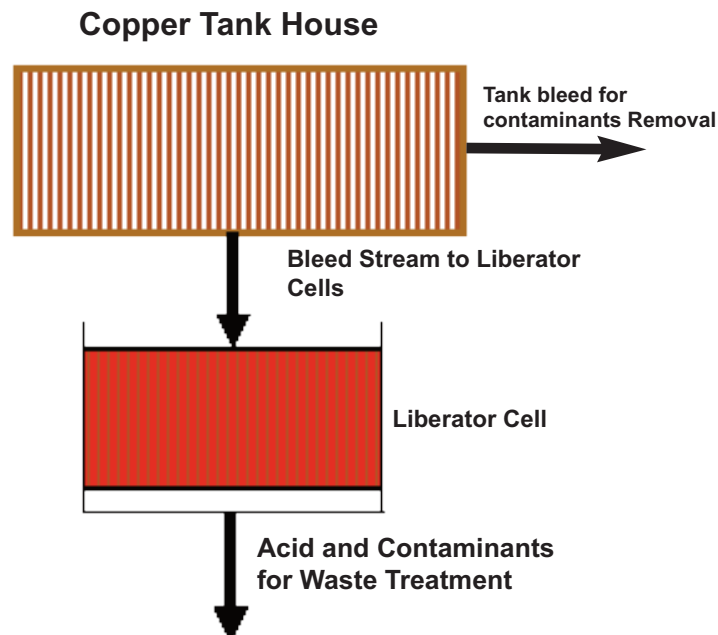
- NiRS - Nickel Recovery System
- Ni/CoRS - Nickel/Cobalt Recovery System
- BARS - Bismuth/Antimony Removal System
- ARS - Arsenic Removal System

These systems remove the contaminants present in the electrolyte bleed in order to recycle the electrolyte. In some cases, the contaminant can be converted into a valuable by-product.

The benefits resulting from Eco-Tec's Electrolyte Purification Systems are:

- Controlling contaminants in the tank house electrolyte
- Increased electrolyte purity (lower contaminant level)
- Higher cathode purity
- Increased electrolytic process efficiency (lower voltage/higher current efficiency)
- Reduced sulfuric acid purchases
- Reduced lime purchases
- Reduced waste treatment costs
- Revenue from sale of valuable byproducts

Typical Copper Electrolyte Treatment for contaminant removal

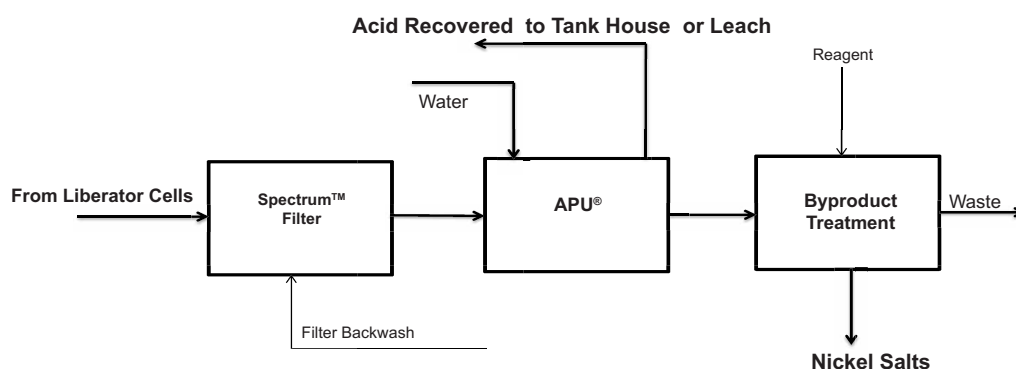


Nickel Recovery System (NiRS)

Electrolyte from the copper liberator cells is directed to the Spectrum™ Filter to remove suspended solids by an automated, backwashable filter with a permanent media.

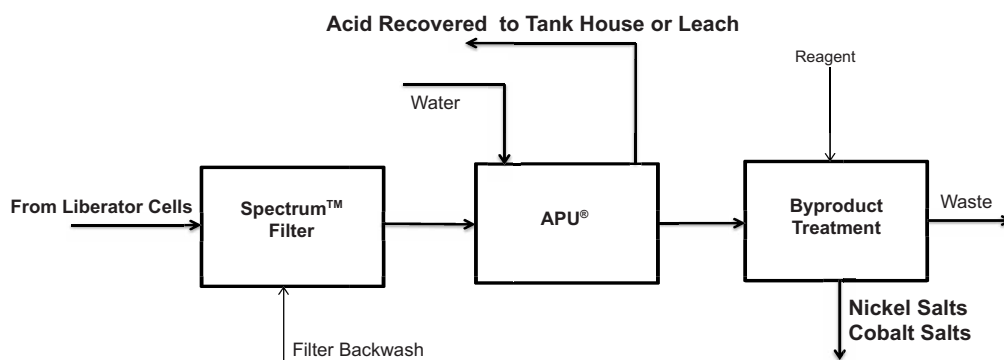
The filtered solution then flows through an Acid Purification Unit (APU®) which consists of a proprietary ion exchange resin column where the electrolyte solution (sulphuric acid) is separated from the metal salts by the resin. A deacidified metal salt stream flows to a treatment tank where chemical reagent is added to precipitate nickel (and other metals) salts. The metal salts are dewatered and washed to produce a saleable nickel salt byproduct.

The APU® is backwashed with water to produce a purified electrolyte stream for recycle to the copper tank house or leach circuit.



Note: For increased purity of recovered nickel, a special Eco-Tec Recoflo® Ion Exchange System for removal of copper from the nickel rich stream can be incorporated on the byproduct stream of the APU®.

Nickel/Cobalt Recovery System (Ni/CoRS)



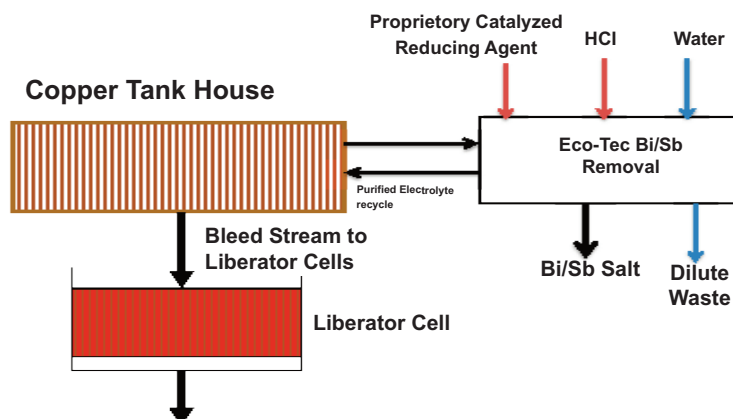
Note : 1) For recovering high purity of nickel & cobalt salts, a special Eco-Tec Recoflo® Ion Exchange System can be incorporated on the byproduct stream of the APU®. This resin is able to separate the nickel and cobalt salts stream.

2) For recovering high purity nickel & cobalt salts, a special Eco-Tec Recoflo® Ion Exchange System for removal of traces of copper can be incorporated on the byproduct stream of the APU®.

Bismuth / Antimony Removal System (BARS)

Bismuth and antimony are often present in copper electrolyte. In certain concentrations, along with arsenic, they produce slimes that may be beneficial for control of impurities in the copper. However, higher concentrations can be problematic.

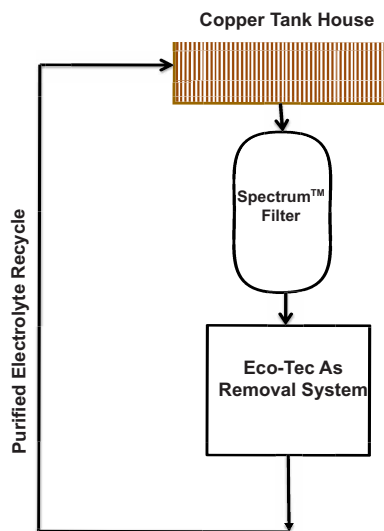
The Bismuth/Antimony Removal System (BARS) uses Recoflo® technology and a selective ion exchange resin for the removal of bismuth and antimony. The resin is regenerated with a small amount of hydrochloric acid (HCl) and a catalyzed reducing agent. Recognizing that chloride can be a contaminant for copper electrolyte, the system is designed to prevent cross-contamination of the electrolyte by the regenerant solution. Upon regeneration of the resin, the bismuth/antimony chloride stream is treated to precipitate salts of bismuth and antimony.



Arsenic Removal System (ARS)

Arsenic is often present in copper electrolyte. In certain concentrations, along with bismuth and antimony, they produce slimes that may be beneficial for control of impurities in the copper. However, higher concentrations can be problematic.

The Arsenic Removal System (ARS) uses Recoflo® technology and a selective ion exchange resin for the removal of arsenic. The purified electrolyte stream is recycled back to the copper tank house while the resin is periodically regenerated to produce a concentrated, dissolved arsenic salt stream.



Offering The Complete Package



Proven Performance

• Eco-Tec has been supplying Recoflo® ion exchange systems for industrial treatment and water purification applications since 1970 with more than 2,000 systems installed in over 64 countries.



Quality Design and Construction

- ISO 9001 registered design and manufacturing facility in Pickering, Ontario
- Built to global industrial standards
- Compact, skid mounted (including resin installation) and wet tested at Eco-Tec's facility



Technical Service and Support

- On-site commissioning supervision, performance demonstration, and operator training
- Performance monitoring and technical support program (Eco-Serv/ Eco-TRAC™/Eco-LINC™)
- 24/7 telephone access to technical services support
- Extensive spare parts inventory for next day shipment of most replacement parts



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