# Commodity Recycle and Recovery through Membrane Filtration and Ion Exchange

Recycling commodities utilizing mechanical and ionic technologies is becoming increasingly important to our clients. There is a real value associated with concentrating and dewatering valuable metals and chemistries for more efficient disposal and/or recovery and reuse. This paper endeavors to provide the reader with list of feasible technologies that assist in the recovery as part of a more complex systemization, or as a standalone technology to achieve concentration and recovery. As commodity metals and chemistries become increasingly volatile relative to fluctuations in cost and availability. LT Technologies systems allow for a greater amount of control over compliance and reclamation.


▲ Nanofiltration chemical recovery system

## ECONO Features and Benefits:

- **E** - Efficient design, simple & durable.
- **C** - Cost-effective, long-term solutions. The highest-quality, lowest cost option out there.
- **O** - Options: many ECONO Series RO Systems means we have a system to meet your needs.
- **N** - Never alone: remote and onsite 24-hour service, we are your total solutions vendor.
- **O** - On budget, on-time delivered solutions to meet your product and financial needs.

## Nanofiltration

On the spectrum of separation technologies, is one of the most versatile membrane options, in that it is effective in both the ionic as well as molecular range of filtration. This capability makes it a comprehensive solution for wastes that are more challenging or as a pretreatment insurance policy, designed to always protect a purely ionic system such as Reverse Osmosis.

It is a wonderful staged filtration technology that can increase the lifespan and share the burden on challenging waste streams where the ultimate filtration goal is the removal of dissolved solids for the purposes of making potable water, on the pure water side, or the removal of multivalent metals in the waste waters.

LT Technologies Nanofiltration systems also work extremely well with high oxidizing potential streams, where few membrane options were thought to exist.

As a compliance tool or pure water system protector, our systemizations offer incredible value and a thoughtful, flexible design.

## Applications:

**Low pH wastewater:** Nanofiltration technology will pass acids, and bases while retaining metals and returning up to 90% of the process water free of any multi-divalent metals. Due to reduced stream volume, caustic and coagulant usage is reduced treating the concentrate.

**Metal finishing:** Nanofiltration can help close the loop in metal finishing operations by separating soluble metals from acid. Treated acid and process water may be returned to rinse or plating baths while heavy metals are recovered.

**Acid recovery and reuse:** Nanofiltration and reverse osmosis membranes may be used in tandem to treat metal-contaminated acid streams. Nanofiltration clarifies the acid while concentrating the heavy metal stream for efficient recovery. Reverse Osmosis concentrates dilute acid streams and returns clean water for reuse.

**Large volume waste streams:** Nanofiltration improves evaporative processes by concentrating feed streams and vastly improving evaporator efficiency. Similarly, nanofiltration improves crystallizer efficiency by increasing solids concentration. In both cases, the permeate may be discharged, reused in the process or polished with reverse osmosis for water recycling capabilities.

# ELECTROWINNING


▲ Copper Recovery System

The Electrolytic Metal Recovery (EMR) Heavy Metal Recovery System consists of a highly specialized electroplating cell, a rectifier, and auxiliary equipment. Metal bearing rinsewater or a process stream is electrolytically displaced of the dissolved metal ions as it passes through the cell.

The metal ions are deposited, as solid metal, onto a series of high surface area, metal reticulated cathodes. When one of these cathodes is fully loaded, it is easily removed from the cell and replaced with a new cathode. The loaded cathode is a return on investment.

The EMR cell contains a series of DSA dimensionally stable anodes and porous, flow-through, metal cathodes. These cathodes have an active surface area approximately 10 times their geometric area. The extended surface area of these cathodes enables the process to obtain proper current efficiency at high current density and low metal concentrations.

The electrodes are held in place by a series of channels on the inside walls of the open-topped, polypro constructed cell tank. These channels maintain the electrodes in an aligned, spaced, parallel arrangement and facilitate the insertion and removal of the electrodes.

## Applications:

- **Copper Sulfate**
- **Copper Cyanide**
- **Electroless Copper**
- **Cadmium Sulfate**
- **Nickel Sulfamate**
- **Cyanide Destruction (during metal removal)**
- **In combination with ion exchange**

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# SELECTIVE ION EXCHANGE


▲IX Commodity recovery process

The exciting world of kinetic exchange has long been very attractive to LT Technologies as well as our clients. Few technologies are so comprehensive in the way they achieve desired purification with minimal cost and equipment.

The challenge lies in having the sophistication to effectively systemize the technology to be successful in environments with variable contaminant loading, as well as utilizing the correct pretreatment technologies to protect and enhance the resins efficacy in such an environment.

We work hand in hand with the most innovative and highest quality resins for selective Ions such as perchlorate and Arsenic, as well as metal ion bearing waste streams where minimizing waste is so critical to the application environment.

We are proud that our system designs are protecting public health and the environment every day. More recently, LT Technologies innovations have allowed for process improvements in bio fuels production previously unheard of. As an evolving and rapidly expanding technology we are at the forefront of cutting edge design and cost saving measures in our systemizations that allow any manufacturing environment to consider Ion Exchange a feasible option to meet their recycle, compliance and commodity recovery goals.

There are many specialty designed Selective Ion Exchange Resins that remove castion and anions from potable drinking water and industrial wastewater. An example is the removal of soluble heavy metals from groundwater and industrial wastewater. Cations, with a positive charge, are exchanged onto the resin beads while sodium is exchanged off. However, based on the make up of the resin, transitory (heavy) metals are more selective than such cations as calcium and iron.

There are many ion exchange resins ideally suited for the commercial scale removal and/or recovery of pollutants and commodities such as:

1. Arsenic
2. Perchlorate
3. Heavy Metals Such as Copper & Chrome
4. Biofuels
5. Boron

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