

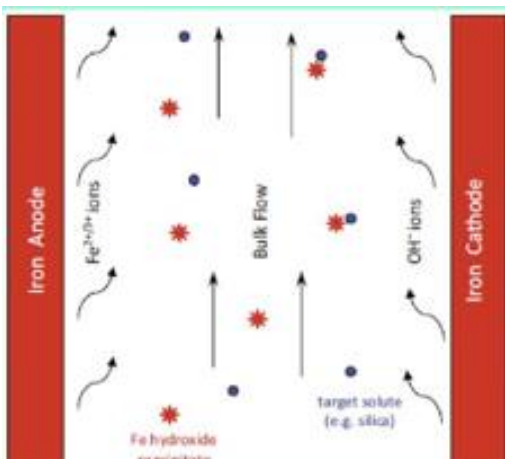
# WINWERKS & POWELL ELECTROCOAGULATION

## The Technology Process Narrative

[www.winwerksipd.com/electrocoagulation-facts](http://www.winwerksipd.com/electrocoagulation-facts)

Electrocoagulation (EC) has been in existence for decades with the first patent issued in 1906. However, it has been only during the past 30 years that the process has been fully commercialized as a result of technological advancements by Powell Water Systems to overcome the deficiencies of previous units.

Electrocoagulation] uses direct current to cause sacrificial electrode ions to remove undesirable contaminants either by chemical reaction and precipitation or by causing colloidal materials to coalesce and then removed by electrolytic flotation. Powell's patented and proven electrochemical system copes with a variety of wastewaters. These waters can originate from coal utility plants, paper pulp mill waste, metal plating, tanneries, canning factories, steel mill effluent, slaughterhouses, or PWWTP. Chromate, boron, arsenic, lead and mercury laden effluents, as well as domestic sewage are treated. These wastewaters will be reduced to clear, clean, odorless and reusable water. In most cases, especially domestic sewage, the treated water effluent will be better than the raw water from which it had originated."<sup>1</sup>



In the Electrocoagulation process, the electrical current is introduced into water via parallel plates constructed of various metals that are selected to optimize the removal process. The two most common plate materials are iron and aluminum. In accordance with Faraday's Law, metal ions will be split off or sacrificed into the liquid medium. These metal ions tend to form metal oxides that electromechanically attract to the contaminants that have been destabilized. The unit also contains an air purge system to fluidize precipitates, polarity reversing to extend blade life and prevent contaminants from coating the blades, and an automated clean-in-place system. The acid solution used in the automated cleaning cycle is recycled and, when exhausted, it is routed through the EC system for final disposal. Frequency, every 4-6 hours, 20-minute cycle or less.

No chemicals are needed for the treatment process. Solids are removed by filters or clarifiers with water available for reuse or discharge.

Scalable to handle small and large flows of multi-million gallons per day  
Mobile Systems

(1) Eckenfelder, W.W. and Cecil, L.K. "Applications of New Concepts of Physical-Chemical Wastewater Treatment." Vanderbilt University; Nashville, TN: Pergamon Press, Inc.

## EC System Footprint

EC Train Options:  
10 GPM - 24' long x 8' wide x 8' high trailer with clarifier  
50 GPM - 7' x 7' x 7' skid  
600 GPM - 17' long x 12' wide x 20' high Mezzanine



# WINWERKS & POWELL ELECTROCOAGULATION

*"30 Years of EFFECTIVE, RELIABLE, SAFE Waste Water Applications"*

Treating wastewater, hydrocarbons & heavy metal streams, COD-BOD, Viruses, storm water and leachate, with Electrocoagulation ("electrocuting dirty water clean") provides a very safe, economical and environmentally qualified water treatment for meeting discharge standards and compliance requirements. Recover water, capital and operating costs by eliminating discharge fees and fines, harvesting water resources for beneficial reuse, and significantly reducing water replacement costs. Design Build , + Operate & P3 Delivery

Contaminants Removed	Percentage of Removal
Radioactive Substances	99%+
BOD	90%+
TSS (Clay, coal, silt, silica, etc.)	99%+
Fats, Oils, Grease	93-99%+
Water From Sludge	50-80%+
Heavy Metals	95-99%+
Phosphates	93%+
Total Coliform	99.99%+



1.5 GPM to 60 M+ GPD



## System Capabilities for Hydrocarbons & Other Wastewater

Removes heavy metals to pass TCLP and MCL  
Dewaters MFT, TFT and FFT 99% dewatered, structurally sound  
Breaks oil emulsions in water  
Removes fats, oil, and grease  
Removes complex organics, endocrine disruptors (EDCs),  
Destroys & removes bacteria, viruses, and cysts  
Processes multiple contaminants, simultaneously  
Flexible to meet changing effluent  
Designed to meet discharge standards  
Reduces energy consumption/ damage to RO membranes

## Facts & Benefits

- Turnkey delivery, single point of responsibility
- Over 150 site installs; consistent and reliable results
- Proven; University & Case Studies, White Papers
- Low operating and maintenance costs
- Low power requirements & minimal operator attention
- No chemical additions
- Handles a wide variation in the waste streams
- Sustainability; reduce sludge, energy and landfill use
- Treats multiple contaminants & pretreats for salts and RO
- Water reuse- resulting in zero discharge

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