

ELECTROCOAGULATION

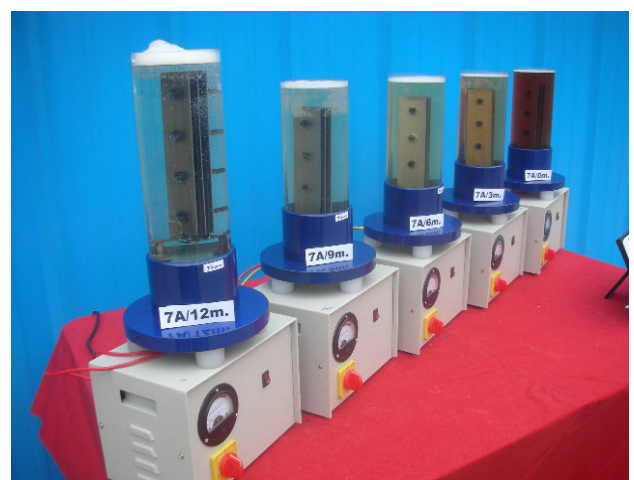
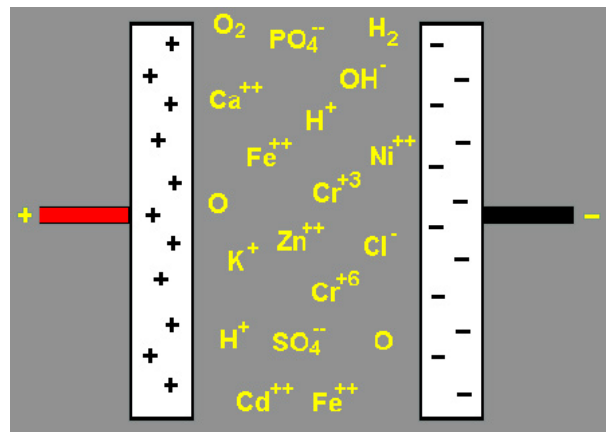
Ti Anode Fabricators Pvt Ltd is an Indian specialist in disinfecting water by electrolysis, has refining the available Electrocoagulation process (Dietrich, patented 1906) by their continuous R & D with unique TITANIUM NOBEL METAL ANODES & patented electrochemical processes, we produce the new millennium **TiECCR** system,

- ✦ to increase removal rates,
- ✦ to lower capital investment, &
- ✦ To reduce operating costs.

Electrocoagulation TiECCR is the process of destabilizing suspended, emulsified or dissolved contaminants in an aqueous medium by introducing an electrical current into the medium. When reactions are driven or forced, the elements or compounds will approach their most stable state. Generally, this state of stability produces a solid that is either less colloidal and less emulsified (or soluble) than the compound at equilibrium values. As this occurs, the contaminants form hydrophobic entities that precipitate out and can easily be removed by a number of secondary separation techniques.

Electrocoagulation can often neutralize ion and particle charges, thereby allowing contaminants to precipitate, reducing the concentration below that possible with chemical precipitation, and can replace and / or reduce the use of expensive chemical agents (metal salts, polymer). These observed reactions may be explained as...

- ➔ **Seeding** resulting from the anode reduction of metal ions that become new centers for larger, stable, insoluble complexes, that precipitate as complex metal oxides;
- ➔ **Emulsion breaking** resulting from the oxygen and hydrogen ions that bond into the water receptor sites of oil molecules creating a water insoluble complex separating water from oil, driller's mud, dyes, inks, etc.;
- ➔ **Halogen complexion** as the metal ions bind themselves to chlorides in a chlorinated hydrocarbon molecule resulting in a large insoluble complex separating water from pesticides, herbicides, chlorinated PCB's, etc.;



- **Bleaching** by the oxygen ions produced in the reaction chamber oxidizes dyes, cyanides, bacteria, viruses, biohazards, etc.;
- **Electron flooding** of the water eliminates the polar effect of the water complex, allowing colloidal materials to precipitate, and the increase of electrons creates an osmotic pressure that ruptures bacteria, cysts, and viruses;
- **Oxidation** - Reduction reactions are forced to their natural end point within the EC chamber which speeds up the natural process of nature that occurs in wet chemistry;
- **EC induced pH** swings toward alkalinity.



BENEFITS

- Capital cost significantly less than alternative technologies.
- Operating cost significantly less than alternative technologies.
- Low power requirements.
- Generally no chemical additions
- Metal oxide formation passing TCLP
- Low maintenance
- Minimal operator attention
- Handles a wide variation in the waste stream
- Consistent and reliable results
- Sludge minimization
- Treats multiple contaminants
- Reduction of Polymer consumption by up to 95%
- Instantaneous Treatment
- Small Space Requirements
- Disinfection/Pathogen Reduction Capability

TiECCR APPLICATIONS

- ◆ Sludge Dewatering
- ◆ Textile and Dye Industry
- ◆ Ground water cleanup
- ◆ Process rinse and wash water
- ◆ Potable water
- ◆ Wastewater treatment, CSO's / SSO's
- ◆ Cooling towers
- ◆ Radioactive isotope removal
- ◆ Pre-treatment for reverse osmosis, ultra filtration, nano-filtration, photo-catalytic
- ◆ Water reuse resulting in zero discharge/closed loop systems

- ◆ Metal recovery
- ◆ Influent quality water control
- ◆ Industrial wastewater
- ◆ Coal Fines and Slurries
- ◆ Pre-treatment of boiler make-up water
- ◆ Recondition anti-freeze
- ◆ Harvest protein; fat and fiber from food processor waste streams
- ◆ Water/wastewater disinfection

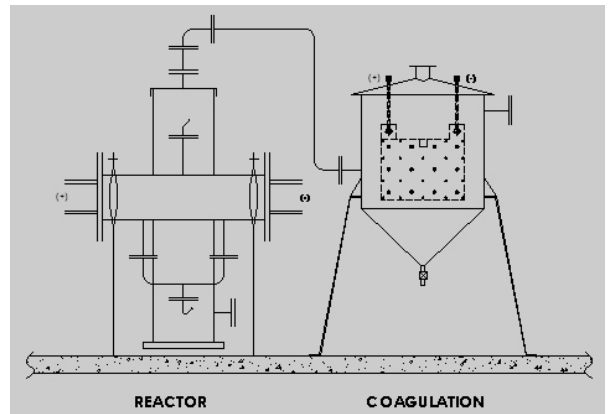
TiECCR CAPABILITIES

- Removes heavy metals as oxides that pass TCLP
- Removes suspended and colloidal solids
- Breaks oil emulsions in water
- Removes fats, oil, and grease
- Removes complex organics
- Destroys & removes bacteria, viruses & cysts
- Processes multiple contaminants
- Treats and disinfects wastewater, i.e. CSO's / SSO's
- Enhances Sludge Dewatering and > 90% polymer reduction

Electrocoagulation has reduced contaminated water volume by 98%; and lowered the treatment cost by 90% for bilge water containing heavy metals and oil emulsions; although electro coagulated water may vary because of the individual chemistry of process waters, a few examples of water treated by electrocoagulation include:

- The reduction of bacteria from 110,000,000 (standard plate count) in wastewater to zero focal count.
- The contaminants in oily waste waters from steam cleaning operations, refineries, rendering plants, and food processors are generally reduced by 95 to 99%;
- Dissolved silica, clays, carbon black, and other suspended materials in water are generally reduced by 98%;

Heavy metals in water such as arsenic, cadmium, chromium, lead, nickel, and zinc are generally reduced by 95 to 99%.



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