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E·floc®
Wastewater Solutions

**ELECTROLYTIC
WATER TREATMENT**

- Electro – Precipitation (EP)
- Electrocoagulation (EC)
- Electrolytic Oxidation (EOX)
- Electroflotation (w/ Oxidation)

E-FLOC® Wastewater Solutions “The World Leader in Electrolytic Water Treatment”

E-FLOC® leads the world providing electrolytic water treatment equipment and systems used in a variety of water treatment applications. Patented E-FLOC® technology splits emulsions and destabilizes multiple contaminants to remove both dissolved and suspended contaminants including heavy metals, colloidal particulates, FOG and water soluble hydrocarbons (TPH, BTEX). With over 20 years of success in oilfield E&P, refining and environmental services, E-FLOC® can provide custom engineered, turn-key solutions for new construction projects. E-FLOC® systems may be easily installed into an existing infrastructure to improve system performance and meet the most stringent discharge requirements. Portable Treatment Units are available for temporary service offering an immediate solution for an “out of compliance” condition. With increasing costs and demands for water, E-FLOC® Solutions provides the most economical solution for water treatment with dependable, guaranteed results.

Benefits and Advantages

1. Removes Multiple Contaminants in a Single Unit Process:
 - Dissolved Metals
 - Splits Emulsions: FOG / TPH
 - Complexed Anions: SiO₂, PO₄, SO₄
 - Oxidation of Organics : H₂S / BTEX / S⁻ / VOC
 - Bacteria: SRB / Aerobic / Lactic Acid
 - Colloidal Particulates / TSS
 - AFFF: PFOA / PFOS
 - Fluoride
2. Treats Combined Waste Streams - No Segregation of Wastes
3. Considerable Reduction of Residuals for Disposal
4. Residuals pass EPA TCLP
5. Easily Retrofits into Existing Infrastructure
6. Eliminates Hazardous Materials and Reduces HS&E Concerns
7. Produces a Superior Effluent for Tertiary Membrane Systems
8. Reduced O&M Costs compared to Chemical Treatment
9. Reduces and Precipitates Multivalent Metals (Cr⁺⁶ / V / As / Se)

Applications

- Oil & Petrochemical Refining / Process Wastewater
Desalter Effluent / Catalyst Remnants
- Frac Flowback & Produced Oilfield Waters
- Storm Water from Contained Areas
- Cooling Tower / Boiler Blowdown
- Pretreatment for RO / DI Other Tertiary Systems
- Pretreatment to Biological Treatment Systems
- Groundwater Treatment Systems
(BTEX / TPH / AFFF / PFOA / PFOS / M⁺⁺)

Products and Services

- Electrolytic Reactors for Precipitation (EC & EP)
- Electrolytic Reactors for Oxidation (EOX)
- Electro – Flotation DAF Clarifiers
- Custom Engineering / Turn-Key / Design and Build Services
- Portable Treatment Units Available for Immediate Response
- Treatability Bench Studies (On-Site or In-House)
- On-Site Feasibility / Pilot Studies
- Installation, Commissioning and Operator Training Available
- Service and Maintenance Programs Available
- Rental / Lease to Own Options

Ancillary Equipment

- Inclined Plate Clarifiers
- Gravity Sludge Thickeners
- Plate & Frame Filter Presses
- MF / UF / RO / DI
- Sand Filters / Bag Filters, etc.
- Control Panels with PLC / HMI

Patented Technologies

- Electro – Precipitation (EP)
- Electro – Oxidation (EOX)
- Electro – Disinfection (ED)
- Electro – Coagulation (EC)
- Electro – Flotation (E-Float)
- Electro – Fenton Oxidation

Silicon Carbide Membrane Filtration from Liqtech, Intl.
(MF / UF / NF / RO)

Patented, E - FLOC® Technologies

Electro - Precipitation (EP) and Electro - Coagulation (EC) utilize a low Voltage direct current to sacrifice metallic ions (Fe, Al, Zn, Mg) into solution and neutralize ionic charges while simultaneously liberating hydrogen and oxygen gas. Contaminates present in the wastewater react with the sacrificial ions, gases and subsequent products such that they are adsorbed and co-precipitated from solution in the form of acid resistant, metallic oxide complexes. Once precipitated, these materials are removed from the water by typical liquid-solids separation methodologies such as gravity settlement, flotation and/or filtration. Ecolotron patented E-FLOC® technology adds only cationic species without anionic enrichment considerably reducing sludge volume and associated disposal costs. Iron is sacrificed from the electrodes in the ferrous oxidation state and hydrolyzes to the ferric state where it precipitates as ferrous / ferric oxide-hydroxides. Dissolved and suspended contaminants adsorb to the oxy-hydroxide floccules and are thus co-precipitated by occlusion within the resulting sludge. The process is particularly advantageous for the simultaneous reduction & precipitation of multivalent metals such as Cr+6 / Va / Co / As / Se, etc.

Electrolytic Oxidation (EOX) occurs via two pathways, Direct and Indirect. **Direct Anodic Oxidation** occurs within the E-FLOC® Cell as electrons are transferred from the organic contaminate directly to the Anode surfaces. **Indirect or Mediated Oxidation** occurs as the organic contaminants are destroyed by reaction with Secondary Chemical Oxidants that are formed within the E-FLOC® Cell. Secondary Oxidants are generated by redox reactions within the cell and include the Hydroxyl Radical (OH°), Cl₂↑, H₂O₂ OCl⁻, O°, O₃, etc. **Electro-Fenton Oxidation (EFO)** combines sacrificial Iron Anodes to introduce ferrous ions with H₂O₂ liberating Cathodes to generate the Hydroxyl Radical OH°.

Electro – Flotation (E – FLOAT) incorporates the electrolytic reactor within the recirculation / repressurization loop of a DAF clarifier to liberate off gases that are used for flotation mechanics in the body of the clarifier. The reactor may include different types of electrode configurations depending on contaminants present in the wastewater and the desired treatment goals. Most applications incorporate Dimensionally Stable Electrodes (DSE) that do not sacrifice material into solution, but liberate Secondary Oxidants for simultaneous treatment of organics and destruction of Bacteria. The E – FLOAT, Electro – Flotation Clarifier removes TSS / FOG / Bacteria / H₂S / S⁻ / Fe and other dissolved Metals in a single unit process.

Electro – Disinfection utilizes Dimensionally Stable Electrodes to generate a variety of Mixed Oxidants for the destruction of organic contaminants, H₂S, bacteria, viruses and algae. Mixed Oxidants are dispersed through a submersible device to treat bodies of water, ponds, lagoons, etc.

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The logo features the text 'E·floc' in a large, blue, sans-serif font. The 'E' is a solid blue block letter, followed by a small blue dot, then 'floc' in a lowercase, blue, sans-serif font. The 'o' in 'floc' is replaced by a stylized blue wave icon. To the right of 'floc' is a registered trademark symbol (®). Below the main logo, the words 'Wastewater Solutions' are written in a smaller, blue, sans-serif font.

US Patent No. 6,719,894 b2
US Patent No. 7,087,176
Mexican Patent No. 261,817
European Patent No. 1575875



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