Waste Stream Treatment Technologies
Comparing the effectiveness of electrocoagulation to chemical and biological treatment of varying waste stream constituents

Wastewater treatments focus on testing, pumping, exposing, removing sludge and killing microorganisms. A common practice involves using chemicals which are sometimes toxic. While this represents the primary method in treating wastewater, new technological advancements such as electrocoagulation have made the process more cost effective and efficient.

This white paper provides a brief overview of BakerCorp’s Electrocoagulation technology and how it compares to current chemical and biological treatment methods.

BAKERCORP ELECTROCOAGULATION (EC)

What is BakerCorp Electrocoagulation?
BakerCorp’s patented Electrocoagulation (EC) technology utilizes electrical current to significantly reduce contaminants in waste streams - such as heavy metals or suspended solids - that are generally more difficult to treat through traditional filtration or chemical treatment methods.

With this process, untreated wastewater flows through BakerCorp’s patented valve tree and into BakerCorp’s Sur-Flo reactor, which is a fully enclosed unit used for lower flow operations. A series of horizontal electrodes make up the Sur-Flo reactor that cause the EC reaction to occur. BakerCorp has different configurations of the Sur-Flo reactor to allow for different wastewater sources as well as a variety of connectivity options.

Electrocoagulation provides immediate treatment without chemicals
A complete trip through a BakerCorp Sur-Flo reactor takes only 14 seconds (for all but the toughest waste streams), providing immediate waste treatment without chemical reagents (except under special circumstances). This is one of the most beneficial aspects of BakerCorp EC: the process requires no segregation of treatable wastes. It can treat hexavalent chromium simultaneously with other heavy metals, emulsified oils, cyanide (low concentrations), suspended solids, bacteria, viruses and many other contaminants.

BakerCorp EC typically lowers the dissolved solids concentration, making the water more amenable for reuse. EC is most often applied without the use of any chemicals, even acids or bases for pH adjustment. However, it may be necessary to adjust the pH if the waste falls outside a pH range of 5.0 to 8.5 for “normal” wastewater or 2.0 to 8.5 for very dilute wastes.

Smaller treatment footprint
Since BakerCorp EC systems need only a couple basic tanks to manage water flow, the space required for EC is usually much less than for chemical processes, resulting in a smaller treatment system footprint. Chemical treatment methods typically need multiple tanks for segregation of waste streams by type. Also, the tanks associated with EC can be relatively small because the treatment is immediate.
Chemical reagent elimination or reduction
With EC, chemical use for treatment is eliminated in many cases. BakerCorp’s adaptable EC technology allows for modifications to the EC equipment to minimize the need for using any pre- or post-EC chemical reagents. Low or no use of reagents reduces metal concentrations – sodium, sulfates and chlorides – in the effluent as compared with chemical treatment.

While EC is extremely effective in removing suspended solids that contribute to chemical oxygen demand (COD), it is less effective in removing the dissolved organics that also contribute to COD.

CHEMICAL TREATMENT
Chemical treatment processes remove contaminants and impurities from wastewater—often requiring multiple and costly chemical reagents to treat specific contaminants and adjust for pH. When utilizing this wastewater treatment method, the following situations can occur:

• Chemical reagents often become precipitated solids, adding to the volume of sludge generated which in turn lead to higher disposal costs.
• Chemicals may also contribute additional dissolved solids, making the water less suitable for re-use.
• The need to segregate wastes by type adds to the physical space and cost of the systems.
• Because the processes are designed for specific concentrations of specific chemicals, more operator engagement and time is required. Solids separation for chemical or EC processes is nearly the same, but the volume of solids from chemical systems is higher and requires larger equipment, and therefore, a larger footprint.
• Chemical processes are usually not effective in removing organic chemicals unless special clays are used.
• Handling reagent chemicals can present safety hazards or potential injury to the operator.

BIOLOGICAL TREATMENT
Biological systems can be very effective when properly applied and may reduce organic chemical contaminants more effectively than EC or chemical processes. However, many contaminants are poisonous to biological systems and must be removed prior to the process through EC or chemical methods.

Different biological processes are required for different contaminants. For example, anaerobic digestion is favored for high concentrations of nitrates, while it is not effective for non-nitrates such as organics and may require two sub-processes (anaerobic followed by aerobic digestion).

Requires space and time
Biological systems require long residence time, up to 30 days for some waste stream and concentrations. Residence in very active systems, such as sewage, requires days of retention. The physical size of the plant is determined by the length of time required for the biological degradation to be completed. Since retention of many days of waste flow are often required, the plants must be very large.

Following biological treatment, the separated solids include living organisms that add to the volume for disposal. The solids may also contain heavy metals and other contaminants that make them unsuitable for land application.

While biological systems are effective in reducing COD, they are not effective in removing many contaminants such as heavy metals. Furthermore, they create waste that may contain infection hazards; therefore, making disposal a challenge.
NOTE ON CHEMICAL OXYGEN DEMAND (COD)

The Chemical Oxygen Demand (COD) value is often used to measure pollutants in developing countries. This parameter is appropriate for sewage and other household waste, but not appropriate for industrial pollutants. As countries develop their environmental standards, industry-specific parameters are usually developed and applied to various types of non-sewage waste treatment.

The COD of wastewater from an industrial plant can be acceptable even when the plant is discharging toxic and harmful contaminants at a concentration harmful to humans and the environment. Conversely, the COD from an industrial plant may be high simply from oxygen depletion caused by innocuous substances, even when there are no or few harmful contaminants present.

About BakerCorp
BakerCorp is a leading global rental solutions company serving customers in more than 15 industries across the North American and European markets. BakerCorp delivers customized rental equipment solutions designed to improve our customer’s safety, sustainability and profitability in a broad range of industries including wastewater, chemical, manufacturing, refining, construction, municipal, industrial services and environmental remediation. The company maintains a rental fleet consisting of more than 20,000 units including temporary containment tanks, complete filtration systems, industrial pumping systems, and trench shoring equipment.

BakerCorp’s patented Electrocoagulation (EC) technology can significantly reduce heavy metal contaminants from our customer’s waste streams. Unlike other EC processes, BakerCorp’s technology is designed to dynamically adjust to varying concentrations of contaminants across broad applications, whether a mobile treatment need or fixed installation system.

Learn more about BakerCorp’s patented Electrocoagulation technology at www.bakercorp.com