



WATER



SALT



ELECTRICITY

THE EVOLUTION OF ELECTRO-CHEMICAL ACTIVATION TECHNOLOGY AND ITS PRACTICAL APPLICATION

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English scientist Michael Faraday first defined the laws of electrolysis in the 1830s when his research findings were published. His experimentation proved that materials could be separated by passing a direct electric current through an ionic substance that is either molten or dissolved in a suitable solvent such as water. Forty years later it was discovered that minerals could be extracted in this manner and electrolysis began to be used commercially to refine copper, zinc and nickel.

In the 1890s, the development of the Chloralkali process enabled the production of chlorine and sodium hydroxide from sodium chloride on an industrial scale. This process is still used today to make concentrated caustic soda, NaOH and chlorine gas, Cl₂.

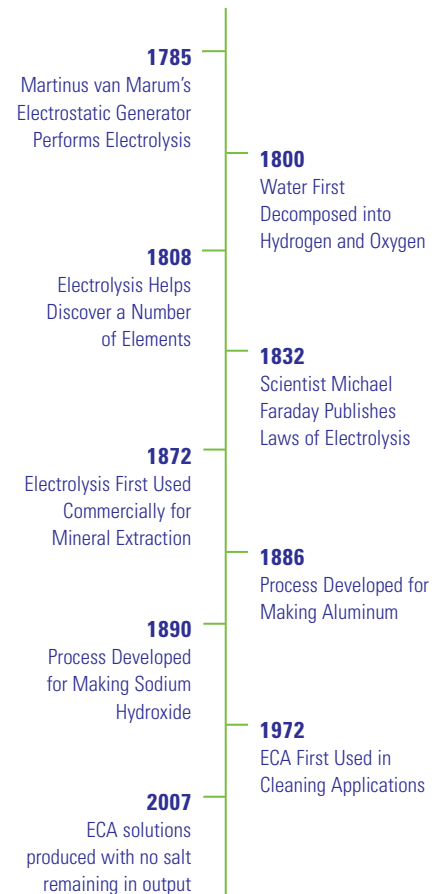
In the mid-1970s, electrolytic technology was first used to create ready-to-use sodium hydroxide cleaners and hypochlorous acid sanitizers that didn't require dilution. This technology, now referred to as Electro-Chemical Activation (ECA), still required the use of large generators in order to produce the solutions cost-effectively.

These early devices were the first step toward the development of safe, compact equipment to produce cleaning and sanitizing chemicals in lower quantities cost-effectively.

In recent years, with the advancements in the efficiency and size of electric power sources, ECA technology has evolved to the point where it can be used in smaller equipment and installed in industrial and commercial facilities to produce cleaning solutions.

ECA technology continues to evolve and improve. The life span of electrolytic cells is increasing and the shelf-life of ECA solutions is longer. The most recent advances in ECA technology enable the production of salt-free solutions, which are suitable for use in more operations.

ELECTROLYSIS/ECA TIMELINE



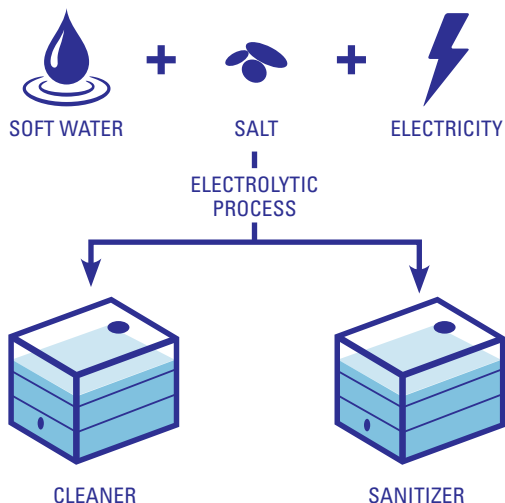
WHAT IS ECA?

ECA processes go by many names: electrolyzed water, electro-activated water, electrolyzed oxidizing water and electro-chemically activated solutions. All these names describe a similar process. An electrochemical cell uses electricity, high-purity salt and soft tap water to produce two solutions – a cleaner and a sanitizer – or a single sanitizing solution. The cleaning solution is an alkaline solution that both cleans and degreases surfaces. The sanitizer is a strong oxidizer with powerful antimicrobial activity. ECA type systems can also be used to generate bleach (sodium hypochlorite).

On-site use of ECA technology has not achieved widespread market adoption because most equipment can't fully utilize the salt in their input streams. Most of the salt is converted during the electrolytic process but traces remain in the output solutions. The salt can lead to corrosion when the solutions are used for cleaning or sanitizing metal surfaces.

However, one manufacturer has developed a patented technology that separates the salt source from the liquid flow path in the electrolytic cell via a charge-specific ion-exchange membrane. This technology produces a pure, salt-free output and should result in wider market use of on-site generation systems.

HOW IT WORKS?



WHAT ARE ADVANTAGES TO USING ECA TECHNOLOGY?

Users of on-site generation equipment can expect to experience advantages in five main areas:



POWERFUL AND EFFECTIVE

- Traditional chemicals contain high levels of active ingredients to ensure effectiveness even when stored for long periods of time. Because ECA solutions are produced on-site and, when used promptly, are at full potency, they can eliminate micro-organisms despite containing low levels of active chemicals
- The hypochlorous acid sanitizer is as effective as twice the concentration of bleach. Example: 200 ppm of sanitizer does the work of 400 ppm of bleach
- The most advanced ECA system produce salt-free solutions which eliminates the risk of salt corrosion when used on metal surfaces



COST EFFECTIVE

- With ECA equipment on site, facilities produce cleaners and sanitizers in ready-to-use concentrations on demand. No dilution or mixing is required and waste of costly chemicals is eliminated. In addition, the need to order, store and dispose of chemical containers is eliminated
- The cost of ECA equipment varies, as does the cost of the solutions produced. Some manufacturer's state that on-site generation of ECA solutions results in savings between 20-30% compared to the use of traditional chemicals





SAFE FOR WORKERS

- The risk of chemical burns or toxic fume inhalation is eliminated since workers are no longer tasked with diluting chemicals
- Protective gear is no longer required for workers using non-toxic ECA solutions. ECA solutions are non-irritating to eyes and skin and fragrance-free



SUSTAINABLE

- ECA solutions have lower levels of active ingredients since they are produced on-site for prompt use. As a result, the disposal waste stream is less harmful and requires no special treatment
- Pollution associated with the delivery and removal of chemicals, often referred to as “grey energy”, is eliminated
- Since ECA solutions are produced on-site, disposal of chemical containers is eliminated



RELIABLE

- On-site production of ECA solutions is relatively new, but ECA technology is not. It has been in use for more than a century. ECA system inputs are simple – high-purity salt, water and electricity – and the process is dependable. The variable in ECA systems is the cell design. Cell dependability and service life can differ from system to system

ECA APPLICATIONS

As ECA technology has matured over the years, more commercial and industrial facilities are using ECA on-site generation systems to produce cleaners and sanitizers. The newest generation of ECA technology produces salt-free solutions and utilizes improved cell technology for extended wear life. Hatcheries, dairies, bakeries, tanker truck cleaning facilities and other food and beverage processors are using on-site generation of ECA solution for equipment cleaning with great success. Users report cleaning results comparable to or better than traditional chemicals, happier and more productive employees and cost savings.

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