

Monitoring Real-time Ammonia/Ammonium Levels in Brine in the Chlor-alkali Industry



In the chemical industry, the chlor-alkali process encompasses the production of various chemicals derived from the electrolysis of sodium chloride solutions. These chemicals —including chlorine, sodium carbonate (soda) and sodium hydroxide (caustic potash), sodium chlorate and trichloroisocyanuric acid (TCCA) — are used in the treatment and disinfection for a wide range of processes.

Brine is one of the raw materials needed to produce some of these chemical derivatives. The brine is prepared from either solid sodium chloride (NaCl) that is dissolved in water or it is obtained as a residual from other processes and reused as a raw material. Whatever the source of the brine, water containing NaCl must be treated to control and remove ammonia because the presence of ammonia in combination with chlorine in cells during the electrolysis process can produce nitrogen trichloride which is highly explosive.

Given the importance of controlling the presence of ammonia/ammonium in generated brine, the use of an online analyzer is necessary to understand levels in real-time. However, all online analyzers are not created equal and the high concentrations of NaCl in the sample (anywhere from 80 g/L up to even 300 g/L), as well as the corrosive environment can hinder the functionality of some measuring equipment. Monitoring ammonia/ammonium levels in real-time with a reliable and accurate online water quality analyzer is integral to maintaining safety in the chlor-alkali process.

AMS' online Instran™ analyzer is effective at measuring ammonia and ammonium in brines above 80 g/L, protecting the operation and life of the system's mechanical elements. It ensures plant optimization by allowing real-time and accurate monitoring, despite the difficulties presented by a high concentration of NaCl in the sample.

Applications

In Spain, two of the leading companies in the chlor-alkali industry are Ercros SA and Electroquímica de Hernani. Both companies are members of the European chlor-alkali association Euro Chlor and the SCSG (Sodium Chlorate Sector Group), as two of the five sodium chlorate manufacturers in Europe.

Ercros SA, at its Sabiñanigo plant, is focused on products such as TCCA, the reuse of brine as a raw material to manufacture sodium chlorate and the electrolysis of chlorine-soda. Ercros SA purchased the online Instran™ analyzer in May 2018 to monitor in real time the concentration of ammonia, critical in the process, in an 85 g/L brine up to values above 10 ppm. Since installation, the durable Instran™ analyzer has been resistant to the harsh plant environment and is working without complications.

Electroquímica de Hernani has a business model like Ercros SA; however, they obtain brines with concentrations of 100 g/L and up to 300 g/L of NaCl for reuse. In October 2019, the online Instran™ analyzer was installed in the first sample stream to control ammonium to values above 2 ppm. Subsequently, in 2021, the Instran™ analyzer was used to control ammonium in the 300 g/L NaCl sample process. Since May 2021, the analyzer has been working without problems and perfectly fulfilling the specifications sought by Electroquímica de Hernani.

Instran™ Online Analyzer

The robust Instran™ online inorganic water quality analyzers provide accurate, rapid, real-time, reliable and multi-stream analysis of inorganic contaminants such as ammonia, fluoride, phosphate and nitrate. The analyzer provides high frequency real-time data with a sensitivity of 10 ppb or 0.01 mg/L and a measurement time of approximately 10 minutes to support sustainable, accurate control of industrial water and wastewater treatment processes. The fully automated online analyzer can operate reliably regardless of sample matrix conditions, a unique attribute of this innovative technology.



Ercros SA and Electroquímica de Hernani are two of the leading companies in the chlor-alkali industry in Spain. Both companies installed the Instran™ analyzer to monitor in real-time ammonia/ ammonium levels in brine.

