

Applications Focused on Chlorine Dioxide Generation

Chlorine dioxide use has increased dramatically in recent years in response to environmental concerns. Environmental pressures coupled with the need to remain competitive in a marketplace that has become increasingly demanding presents a formidable challenge to today's papermakers. Environmental concerns are challenging the way pulping and bleaching operations are run. Higher chlorine dioxide substitution ratios are common in the initial chlorination stage for example. Although concern for the environment is the driving force behind many of these changes, issues of productivity, quality, and efficiency must not be overlooked.

As more chlorine dioxide is being used in the initial chlorination stage, there is a much greater demand being made on the existing chlorine dioxide supply. On subsequent D_1 and D_2 stages, it is important to use enough chlorine dioxide and even to maintain a finite residual level to ensure that the brightness target is achieved. Thus, as the demand for chlorine dioxide increases, the need to optimize the generation process for maximum efficiency becomes imperative.

Equally important is the need to monitor and control the chlorine dioxide strength at the absorber and at the storage tanks before it goes on to the bleach plant. The issue of monitoring emissions of chlorine and chlorine dioxide from the absorber and scrubber is an important one and should not be overlooked. Additionally, monitoring the chlorine dioxide vapor concentration at the generator and possibly the storage tanks for safety reasons should be considered.

There are a number of applications in the chlorine dioxide generation plant where the AMETEK Model 4000 Photometric Analyzer can work to improve efficiency, increase productivity, and ensure consistent quality product.

Chlorine Dioxide Product Strength

In order to operate the bleach plant with the greatest efficiency, the concentrations of bleach chemicals being used must remain constant. Chlorine dioxide is no exception. With chlorine dioxide in short supply in many mills, it becomes especially important to be able to use it efficiently.

The 4000 can be used either to monitor the chlorine dioxide product strength from the storage tank to the bleach plant or as part of a control loop to regulate the amount going to the bleach plant. In this application, the 4000 allows the operator to regulate the mass flow of chlorine dioxide to the bleach plant. Without the analyzer, control of a given bleaching stage is done through a feedback loop based on changes in brightness or residual which may have, in fact, been caused by fluctuations in the chlorine dioxide product strength.

Chlorine dioxide product strength can be controlled directly with the 4000 placed in a closed-loop control absorber. This ensures that chlorine of optimum strength is prepared at all times. The 4000 controls the chilled water flow rate during normal operation and through production rate changes, enabling more stable chlorine dioxide plant operation and ensuring consistent product strength. During start-up, shutdown, or standby, a secondary loop can be used to recycle weak chlorine dioxide solution back through the absorption tower. This eliminates the need to sewer weak chlorine dioxide solution or vent weak gases to the atmosphere.

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Chlorine Dioxide to Chlorine Ratio

Another way to monitor the efficiency of the chlorine dioxide generator is to determine the ratio of chlorine dioxide to chlorine produced. The chemistry of the particular generation process being used determines the maximum value of the ratio of chlorine dioxide to chlorine produced. An on-line analyzer monitoring this ratio provides continuous information on the efficiency of the generator. Optimization of the generation process could then be done continuously, thereby achieving maximum productivity and increased efficiency.

For some generation processes, there is no significant amount of chlorine produced. The ratio measurement in this case would indicate a problem in the process when chlorine was deflected.

Emission Monitoring

Environmental guidelines and restrictions vary from place to place, but all environmental agencies are moving in the same direction - to further restrict and regulate emissions. Both the number of chemical species and the degree to which each is being restricted has increased. One area of particular concern is the emission of chlorine dioxide to the atmosphere.

The 4000 provides a cost effective way to comply with environmental restrictions either in the chlorine dioxide generation plant or in the bleach plant. Both chlorine dioxide and chlorine vapor emissions can be monitored and recorded with a single analyzer. It is possible to sequence between up to two sample points with the 4000. Chlorine dioxide vapor can be measured down to a range of 0 to 5 ppm ± 0.1 and chlorine vapor to a range of 0 to 100 ppm ± 2 . In addition, the 4000 can be configured to measure the total chlorine being emitted from a scrubber for example. This measurement can be made on up to two sampling points as well.



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