

CHLORINE DIOXIDE APPLICATIONS WITH ENVIRONMENTAL IMPACT

IPS-4 Integrated Photometric Analyzer

Environmental requirements, coupled with the need to remain competitive in a marketplace that is increasingly demanding, present a formidable challenge to today's papermakers. Pulping and bleaching operation procedures have been affected by environmental concerns, but must also consider productivity, quality, and efficiency requirements.

Significant projects at many mills address environmental concerns. Whether or not a mill has undergone upgrades and/or expansions for this reason, there are several areas where the AMETEK IPS-4 analyzer can help protect the environment and enhance performance.

Brownstock washing

Brownstock washer control is often overlooked or does not receive adequate attention. Variations in the incoming pulp stock are often significant and can be due to several factors, including the wood species mix, the chip quality and moisture content, and overall pulping conditions. The effects of fluctuations in the washing efficiency are felt in both the bleaching and papermaking operations.

The goal of brownstock washing control is to form and maintain a balance between competing requirements, maximizing the washing of the pulp and chemical recovery, and minimizing the load to the evaporators. The environmental impact of brownstock washing should also be considered.

Brownstock washing separates the pulping and bleaching operations and, in most instances, brownstock filtrate is sent to the evaporators while bleach plant effluent must be handled separately. The extent of washing that the pulp undergoes can affect the nature of the bleach plant effluent. If the pulp is not washed sufficiently, then there will be excessive lignin carryover to the bleach plant, which will result in increasing the bleach chemical usage needed to achieve a given brightness target, increasing the potential for chlorinated organics formation, and increasing bleach plant effluent load due to the excess bleach chemicals required.



IPS-4 ANALYZER

Continuous, online analysis with the IPS-4 analyzer allows for the optimization of washer efficiency while minimizing lignin carryover to the bleach plant. The IPS-4 directly measures the dissolved lignin in the brownstock washer filtrate. The ultraviolet (UV) absorption of the lignin in the filtrate provides a means to directly determine the lignin concentration.

The IPS-4 analyzer, with its split beam technology, provides an accurate and reliable signal that can be used for control. Traditional conductivity measurements may not provide the required reliability for the control.

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 have increased.

One area of concern is the emission of chlorine and chlorine dioxide to the atmosphere.

The IPS-4 analyzer provides a reliable measurement to comply with environmental restrictions either in chlorine dioxide generation, or in the bleach plant. Both chlorine dioxide and chlorine vapor emissions can be monitored and recorded with a single analyzer. Chlorine dioxide and chlorine vapors can be measured down to a range of 0 to 5 ppm (± 0.1) and 0 to 500 ppm (± 2), respectively.

Several other chemical species with restricted emission can be monitored with the IPS-4, including: total chlorine, sulfur dioxide, and nitrogen oxides.

Chlorine dioxide residual

An aspect of papermaking undergoing tremendous change is pulp bleaching. For chemical pulp bleaching there is a trend to eliminate or significantly reduce chlorine use. Increasingly higher substitutions of chlorine dioxide in the first bleaching stage are becoming common. Because of increased chlorine dioxide use, many mills are chlorine dioxide limited.

Additional chlorine dioxide generating capacity requires major capital expenditure. However, more efficient use of the current amount of chlorine dioxide produced could allow for a higher chlorine dioxide substitution ratio in the first stage without compromising final pulp brightness.

With online residual chlorine dioxide analysis using the IPS-4 analyzer, it is possible to use the minimum amount of chlorine dioxide to achieve the target residual level. It is no longer necessary to use more chlorine dioxide than is required to ensure the target residual level is maintained. Lab testing for residual levels is no longer necessary and the incidence of dips in the chlorine dioxide residual level below the target value is removed.

When the concentrations of bleach chemicals are known, and the minimum amounts are used, several benefits will be achieved: reduced environmental impact, reduced effluent load, and production of higher and more consistent quality pulp.

Continuous, online residual analysis with the IPS-4 provides a means to use chlorine dioxide most efficiently and to increase the uniformity and overall brightness level of the pulp.

Effluent color

With focus on the environment, local agencies are tightening their requirements on acceptable color levels in effluents. Color measurements may be influenced by turbidity present in the effluent stream, so a reliable and accurate instrument is essential.

The IPS-4 analyzer ensures that the turbidity does not interfere with the color measurement. The modular construction of the analyzer allows for a variety of cell lengths which permit the highest measurement sensitivity. The IPS-4 provides highly sensitive and accurate measurements of color.

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