

Monitoring Non-Condensable Gases (TRS) in Kraft Pulp Mills

MOST PULP MILL MANAGERS HAVE serious concerns about the safe incineration of non-condensable gases collected from digesters, reactors and other sources in the pulping process.

Experience has shown that explosions and fires can occur without warning if the concentration of sulfides and other flammable gases entering the incinerator is too high. Besides the risks to personnel, such incidents can damage equipment and result in costly downtime.

Pulp mill operators have also learned that using blowers and venting systems to dilute the gas before incineration is not sufficient to eliminate the risks. The only certain way to guard against fires and explosions is to use continuous flammable gas monitoring.

Background

Non-condensable gases, usually referred to as *Total Reduced Sulfur compounds (TRS)* or *Dilute Vent Gases*, are by-products of the kraft pulp process. These gases, mostly sulfurous, are extremely malodorous and flammable. Because venting non-condensable gases directly into the atmosphere is prohibited for environmental reasons, pulp mills usually collect and incinerate them in a waste or recovery boiler, a lime kiln, or an incinerator.

In the past, continuous sampling and gas monitoring was a problem for three key reasons:

First, the environment of the vent pipe that carries the TRS is dirty and humid. Most gas sensors are quickly impaired by these conditions, leading to unreliable readings.

Second, because most sensors can only operate at ambient, as opposed to process temperatures, they are positioned far away from incinerators, using a snaking pipe arrangement and pumps to cool samples. This convoluted network can lead to many sample delivery and

maintenance problems, particularly when TRS is in a mist state.

Third, and perhaps most critical, most monitoring systems are only able to measure the percent of flammability of a specific gas or narrow family of gases. In pulping applications, however, it is necessary to measure the overall concentration of *all flammable gases and vapors* entering the incinerator.

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Because of its unique construction and operating technology, Control Instruments' PreVEx™ Flammability Analyzer, Model SNR674, provides the optimum system for monitoring non-condensable gases, for five key reasons:

Straight-Through Flow Design Ideal for TRS Mist Samples

The Model SNR674's simple flow system has no capillaries that can clog or pumps that can fail, even with critical TRS samples in a mist state. Because the sensor operates at high temperature, water droplets and mists are maintained in a vapor state throughout the sampling process.

Extremely Fast Response Time

The Model SNR674's high sampling speed dramatically improves response time—an important factor in pulp mill applications. Sample delivery time from the process to the analyzer cell gives the Model SNR674 a total response time as low as one second. This ultra-fast response allows valuable time for operator intervention before TRS is diverted from the incinerator and vented into the atmosphere—clearly a “last resort” safeguard.

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Application Note
H7FTA047
Revision C

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Universal Calibration

Unlike other sensor technologies, the PrevEx, Flammability Analyzer, Model SNR674, is designed to give close-to-linear response to a wide range of flammable gases and vapors, including hydrogen sulfide, dimethyl sulfide, methyl mercaptan, and numerous other compounds found in TRS gases. As a result, the Model SNR674 accurately measures the total concentration of flammable gases present in a TRS sample.

Fail Safe Operation

Control Instruments' proprietary flame temperature technology is 100% reliable. Should a problem of any kind arise—a loss of fuel, air, sample flow or power—the temperature of the sensing flame will reflect the change, alerting the operator immediately. By contrast, other gas monitoring systems can fail yet still register normal operation.

Low Maintenance, Easy Servicing

Because sample condensation is avoided, service is by and large reduced to routine maintenance such as filter changes. The unique block and heated filter design makes access easy, even when the sensor is hot.

For more information regarding NFPA86 and solvent vapor monitoring, please refer to these additional Technical and Application Notes:

Understanding NFPA86

How to select a continuous solvent vapor monitor to meet NFPA86 requirements



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