Envent
Engineering Ltd.

APPLICATION NOTE

H2S Measurement in Gas from Liquid Scavenger Based Processes

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Application:

Over the last five years Envent Engineering has supplied several hundred lead acetate paper tape analyzers to measure residual H2S in natural gas to and from liquid based scavenger treating processes. Typically, a H2S absorbing liquid is brought in contact with a gas containing as high as a few thousand ppm to 10 ppm H2S. The design normally calls for a residual of **1 ppm or less** of H2S after treatment with the scavenger. In order to monitor at 1 ppm and subsequently control the liquid injection to the process with any degree of accuracy, the H2S analyzer needs to resolve a order of magnitude less than 1 ppm or 100 ppb. This is easily achievable with an Envent tape analyzer. Unlike competitive technologies, lead acetate is **totally specific to H2S**. In addition, the analyzer can be used to measure the inlet H2S concentration by using its inherent multi-stream capability in conjunction with a simple membrane based dilution sample conditioning system.

Other Methods:

Over the years a dozen or more companies have attempted to market other “less costly” technologies for this application. Primarily electrochemical and solid state MOS (metal oxide sensors) designed for personal safety monitoring systems in a back ground of **air and not natural gas**. They invariably supply a sensor designed for ambient monitoring, installed into a sample cell which allows a sample to be passed over the sensor. Various methods are used to compensate for the inherent chemical interferences, temperature sensitivity, and drift associated with these sensors. Some packagers resort to frequent auto calibration which requires calibration gas on site or multiple sensors where the output is voted by on by two or more sensors (the adage, two wrongs do not make a right comes to mind). In our experience, we have yet to find anyone who has has any long term success with this technology, particularly when a constant output of 1-2 ppm is required.

Tape versus Sensors

Maintenance- Contrary to what some people would have you believe, lead acetate tape analyzers require less maintenance than sensor based systems. Tape life for this application is 3-6 months. Tape replacement is a 5 minute job at most. Note there is no acetic acid required since the sample is already water saturated, but even if the humidifier chamber is used, it only takes a minute to top up . A tape analyzer does not drift and does not need regular calibration. A sensor based system needs daily if not hourly calibration to provide anything close to a credible 1 ppm reading and therefore the maintenance cost of checking and replacing or performing calibration checks far out weighs a 3 month tape change. Due to chemical contamination of the sensors, users should budget quarterly sensor change out costs as well as cost of calibration gas and regulators. (note: $70 tape per 3 months or $280/year vs. a $500 sensor and associated cal gas which could easily cost more than $1000/year)

Costs- Tape analyzers may cost more at the time of purchase, typically 12-14 K with samples, but yearly costs for sensor and calibration gas replacement will greatly reduce the gap. Factor in accuracy and confidence in the measurement and the tape analyzer is a better value. The user needs to factor in the cost of a missed shut in or waste of scavenger chemical if false readings occur. **SENSOR BASED MONITORS WILL EVENTUALLY COST THE USER MORE MONEY, PARTICULARLY WHEN THEY ARE REPLACED WITH SOMETHING THAT WORKS!!**

Accuracy: H2S tape analyzers are at least an order of magnitude more accurate than sensors at 1-2 ppm

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