Chemical

Perspectives in Liquid Process Analytics

12 News

INGOLD

Leading Process Analytics

Oxygen Measurement in Waste Gas
for Effective Explosion Protection

Real-time monitoring of the oxygen concentration in waste gas plays a key role in explosion prevention. Using amperometric oxygen electrodes there is above all no need for complex and costly sample handling systems!

About the company

The Langelsheim plant in Germany is the largest and most diversified facility of the Chemetall Group. The product spectrum ranges from specialty chemicals for surface treatment of metals to ultra pure metals and metal compounds of cesium, barium, titanium and zirconium. Production at the Langelsheim site includes 20 facilities of different types and sizes from which the majority is under the German Federal Emission Control Act.

Identification of potential explosion hazards.

Complying with the "Technical Guidance for Air Quality Control" a new waste gas incnerator was built. As safety has top priority at all Chemetall sites, the unit was equipped with two METTLER TOLEDO oxygen analyzers which main purpose is to identify possible explosion hazards. When burning process off-gases, oxygen content in the feedstock must at all times be lower than 1 % by volume in order to rule out any risk of explosion or fire. Being intrinsically safe the oxygen electrodes were directly installed in two collector lines. With a lower range limit of 0,1 vol.-%, any ingress of air is detected in the earliest stage. If the oxygen level exceeds the threshold value, nitrogen is automatically fed to the system thereby diluting the flow and keeping safety uncompromised. Since oxygen could only enter the system due to leakage at certain valves, the cause of the problem can be located easily and countermeasures can be taken rapidly.

METTLER TOLEDO

Ease of Maintenance

In contrast to common alternative analytical methods for this application, the METTLER TOLEDO solution with InPro 6800 Gas electrodes does not require any sample conditioning, despite a process temperature of up to 60 °C (140 °F) and pressures down to –100 mbarg! This has resulted in significantly lower installation costs and maintenance requirements. Calibration of the electrodes is carried out using normal air and is completed in a matter of minutes. The rugged design guarantees longevity, also under tough conditions.

With all components being certified for use in hazardous area, the system is very compact and allows for field mounting. The transmitter is even equipped with a flash memory card for audit trail purposes recording events with time and date and registering calibration data.

Outlook

At the end of 2008 our new transmitter M420 will be released. This next generation transmitter will be fully compatible with our ISM® range of sensors. ISM® (Intelligent Sensor Management) offers full diagnostics, plug and measure functionality and truly enables preventive maintenance. For further details please contact your METTLER TOLEDO representative.

Basic features of InPro 6800 Gas

- Service in seconds with "Quick Disconnect" system
- Long life membrane
- Certified for use in hazardous area
- Measurement is not affected by moisture and most organic solvents

Oxygen sensor InPro 6800 Gas.

Transmitter O_2 4220X.

Transmitter M420.

www.mt.com/inpro6800gas

www.mt.com/DO

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M400 – the Versatile Transmitter
for Advanced Process Measurements

The new flexible M400 transmitter is designed for demanding applications and features ISM® technology with a new unique Dynamic Lifetime Indicator. It covers pH/ORP, oxygen and conductivity measurements, and accepts analog as well as ISM sensors.

M400 – the multi-parameter transmitter for more flexibility

Transmitters have to be convenient in handling, versatile in use and cost saving regarding process optimization and maintenance. The new M400 transmitter from METTLER TOLEDO fulfills all these requirements. The M400 is a single-channel, multi-parameter unit and can handle the parameters

- pH/ORP,
- oxygen or
- conductivity.

As the M400 accepts any analog or innovative digital ISM® sensor ("Intelligent Sensor Management") the highest possible flexibility is granted.

Real-time status information with ISM® technology

ISM makes it much easier to operate process analytical systems from initial installation to maintenance right through to sensor replacement. ISM is available for all key analytical measurement parameters. Real-time status information from the ISM sensor allows true predictive maintenance:

- Time for sensor replacement with Dynamic Lifetime Indicator (DLI)
- Time to next calibration is monitored with Adaptive Calibration Timer (ACT)
- Electronic documentation of calibration history

Plug and Measure™ feature minimizes maintenance costs

Plug and Measure allows the user to start measuring within seconds:

- Minimized risk of installation troubles thanks to simplified commissioning
- Up-to-date calibration data are stored in ISM sensors and sent directly to the transmitter

High reliability even in advanced process applications

Whereas the M300 transmitter is designed for basic process applications, the M400 transmitter is the choice for critical applications in the Chemical Industry.

In addition, the unique iSense Asset Suite for pH and DO (to be released in Q4/2008) offers a reliable control calibration in a QA Lab and ensures a fully traceable documentation for each sensor over its lifetime.

www.mt.com/m400

www.mt.com/ISM

The multi-parameter transmitter M400 is compatible with ISM® electrodes and sensors.

iSense is a very user-friendly and unique software. Just connect your sensor via a USB port to your computer.

EasyClean 200 Keeps pH Electrodes Running in Harsh Environment

A well concerted measuring system with a cleaning system EasyClean 200 outpaced its competitor in a harsh soybean process. Measurement accuracy, process reliability and short response time were decisive for the customer.

Linyi Shansong Biological Products, China

Linyi Shansong Biological Products Co., Ltd. located in Linyi in the south of China's Shandong Province, is a high-tech enterprise producing natural, nutritional and functional foods and food ingredients with modern biological techniques. All the company's major equipment and apparatus were imported completely from France, Japan and Germany. Now available in the company are ten modern soy protein isolates production lines with an annual production capacity of 50,000 tons of soy protein isolates, 2,000 tons of soy oligosaccharide and 90,000 tons of soybean flakes respectively. The company obtained the state's sanitation approval for exporting soy protein isolates and soy oligosaccharide and passed the ISO 9001: 2000 Quality System certification.

The processes

At the plant in Linyi the company produces Soybean Protein Isolates (SPI) using defatted soy flakes as raw materials. SPI is a natural vegetable protein being most similar, in structure, to the essential amino acids in the human body. It can be added to meat, dairy and many other products to raise their nutritional value and improve taste.

The yield of protein from bean pulp depends on water, temperature, pH and steeping time. As shown in the flow chart (Fig. 1) pH and conductivity are measured at different process stages:

- pH: Dissolving of bean pulp in caustic soda
- pH: Precipitation of bean protein with hydrochloric acid
- Conductivity: cooling water recycling

Dissolving of bean pulp in caustic soda (NaOH)

The solubility of bean protein is best in an alkaline environment. Therefore, bean pulp is dissolved in a NaOH solution with pH 9 and adjusted at a pH between 7.5 ~ 7.8. The optimum temperature is 50 °C (122 °F).

Deposition of bean protein with hydrochloric acid (HCl)

After the separation of the bean pomace the dissolved protein has to be precipitated out of the solution. As bean protein has its lowest solubility at the isoelectric point (pH 3.3 to 5.6) addition of HCl is added to initiate the precipitation.

Control of cooling water recycling process (not further discussed in this article)

Water coming out of this process will be recycled. After dilution (1:7 to 8) conductivity measurements should be between 0 to 100 µs/cm.

Customer's problem

Linyi was using five measuring systems of a competitor. The systems were installed through a ball valve for isolation purposes. Although they were using an automated cleaning system the pH measurements were not reliable. As pH measurements are important to optimize the yield of Soybean proteins, Linyi was looking for a long term solution.

METTLER TOLEDO solution

After investigation of the situation METTLER TOLEDO recognized that the sensors were not fully immersed and that the automatic cleaning system was not working properly. Furthermore, the highly viscous protein was sticking on the membrane of the electrode and the diaphragm was clogged by small granules. To improve the accuracy of the measurements and to shorten the response time the following measuring system was suggested:

- pH electrode InPro 4250 with open junction
- Housing InTrac 777 e
- Transmitter pH 2100 e
- Cleaning system EasyClean 200 e

Five systems of METTLER TOLEDO were installed parallel to five of the competitor. The direct comparison is clearly in favor of our installations (benefits described on the next page), and as a result, the customer ordered and installed an additional five systems from METTLER TOLEDO.

Customer's benefits

This well balanced and tailor made set up of measuring equipment was responsible for a number of benefits in one of the largest Soybean producers in China:

- Enhanced process safety due to reliable measurements
- Minimal interruption time of pH signal for highest operational availability
- More precise dosage saves NaOH and HCI
- Less expenses for consumables because of prolonged lifetime of the electrodes
- Low maintenance due to on-line cleaning and calibration without downtime
- Easy interaction with transmitter saves time and avoids manual mistakes
- Chemical cleaning in harsh environments prevents clogging of electrode

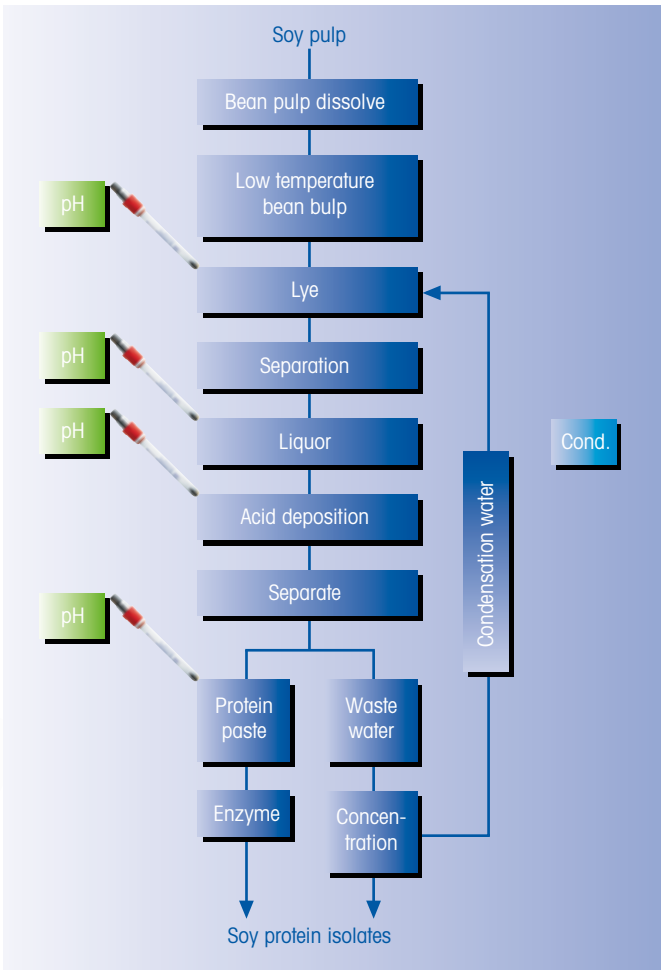

Fig 1: pH and conductivity (cond) measurements in the production of soybean protein isolates.

pH electrode InPro 4250.

Retractable housing InTrac 777 e.

Cleaning system EasyClean 200 e.

www.mt.com/pro-pH

www.mt.com/easyclean

Turbidity Measurement Controls Quality in Biodiesel Production

Filtration is an extremely important step in biodiesel manufacturing. Using an in-line turbidimeter with forward scattered light technology, filter performance is monitored and consistently high quality biodiesel is guaranteed.

The biodiesel market in Brazil

The biodiesel segment experiences rapid growth in Brazil, mainly because this renewable fuel pollutes considerably less than conventional diesel and because it is CO_2 neutral. Bio fuels already go back a long time in Brazil and the use of bioethanol is very common. With biodiesel Brazil further decreases its dependency on petroleum. Today seven companies are heavily investing in biodiesel projects. The entire production capacity will be almost 2 billion liters in 2008, 180 % higher than previous year.

Multiple processes controlled with turbidimeters

Purification is important throughout the production process of biodiesel. In one of the first steps an acidic water wash does the first cleaning. The removal of wash water is carried out through simple phase separation, a process that is completely controlled by measuring turbidity. A more complex application however is the measurement of the product turbidity after the last filtration step, just before the biodiesel is filled into storage tanks.

As a product of natural origin, contaminants such a proteins, fibers and bacteria occur. Since modern car engines require high quality fuels, all these contaminants need to be completely removed in order to avoid engine fouling, corrosion and loss of performance. Thanks to absolute confidence in our products and services, our customer, a global company in agricultural products processing, has decided to monitor the most important filtration operation with a METTLER TOLEDO turbidimeter.

Our technicians took samples of the biodiesel and recognized the extremely low turbidity levels. In order to sustain the same very high quality level our recommendation was to install an in-line turbidimeter that uses forward scattered light technology to monitor the final filtration performance.

METTLER TOLEDO solution

The system installed in this application consisted of:

- InPro 8400 turbidity sensor
- Trb 8300 F/S transmitter

Turbidity sensor InPro 8400

This factory-calibrated turbidimeter comes as a spool piece equipped with sapphire optics. Simultaneous measurement of direct and scattered light compensates for color changes and aging of the light source.

Turbidity transmitter Trb 8300 F/S

The METTLER TOLEDO Trb 8300 transmitter series provide detailed information on sensor performance, easy setup of the instrument and require very low maintenance.

Customer feedback

Measuring turbidity of the filtrate is a typical application that will help to optimize the filtration process and improve both quality and yield. Having an in-line turbidity analysis has drastically reduced product downtime.

After the implementation of the first system, the customer was very impressed with its performance and its user friendliness. New installations are currently evaluated.

Turbidity sensor InPro 8400.

Turbidity transmitter Trb 8300 F/S.

www.mt.com/turbidity

Real-Time pH Monitoring Reduces Failures and Maximizes Process Efficiency

Electrode consumption was reduced by 50 % after changing to the InPro 4250 SG. Even further savings will be obtained when the new ISM® technology with real-time electrode information is implemented.

The company

Johnson Matthey is a specialty chemicals company focused on its core skills in catalysts for chemical processes, fine chemicals, chemical catalysts and active pharmaceutical ingredients and the marketing, refining, and fabrication of precious metals.

Lack of diagnostics resulted in electrode failure

The Process Technologies Catalyst business of Johnson Matthey, based in Clitheroe, Lancashire, UK was looking to monitor pH and conductivity during a critical stage in the production of one of its catalysts. At this point in the process it is a thick slurry that can block the electrode reference junction and result in an electrode failure. The previous pH measurement installation provided little diagnostic information on the state of the electrode, and consequently electrode failure was largely unpredictable.

pH electrode InPro 4250 SG.

Newest ISM® technology allowed real-time electrode monitoring

Changing to the pH electrode InPro 4250 SG with its open junctions reduced the likelihood of blockages forming in the reference junction. By using the easy to interpret, advanced diagnostics functionality of the M700 transmitter, combined with the "Intelligent Sensor Management" (ISM®) features of the electrode, Johnson Matthey operators were able to get real-time information on the condition of their pH electrode. This allowed maintenance operations to be performed pro-actively, thereby reducing the number of unexpected failures and hence helping to maximize process efficiency.

ISM

> "Since moving to the M700 and InPro 4250 SG we have managed to reduce our pH electrode consumption by around 50 %"!

Customer feedback

Technical Manager Bilal Tai explains: "The pH tolerances on our products are tight; therefore we need to be confident that our pH measurement is accurate at all times. With our old system, we did not have the diagnostic data available to confirm that our pH electrodes remained in good working condition between calibrations. If problems did occur, it was often the case that they were not detected within a timescale conducive to the high standards at which we operate our plants. Since moving to the M700 and InPro 4250 SG we have managed to reduce our pH electrode consumption by around 50 %. The diagnostic information available on the M700 transmitter gives us confidence that our pH electrodes are working correctly between calibrations. If any problems do occur, the Sensor Network Diagram allows operators to quickly locate the source and take appropriate action".

Multi-parameter transmitter M700.

Latest electrode generation with ISM feature: InPro 4260 i.

www.mt.com/ISM

www.mt.com/pro-pH

Process Analytics Product Catalog
New Edition 08/09 Available

Get an overview of the latest INGOLD and THORNTON products available for your process application with the new product catalog 08/09.

The catalog offers comprehensive overview on product features and specifications, benefits and recommended application areas, order details and much more for process analytics measurement solutions.

The product catalog covers complete measuring solutions for the parameters:

- pH
- Dissolved oxygen and O_2 in gases
- Ozone
- Dissolved CO_2
- Conductivity
- Turbidity
- TOC
- Flow

The featured product range includes:

- Electrodes / sensors
- Housings
- Process connections
- Transmitters / analyzers
- Cleaning and Calibration systems
- Cables
- Accessories

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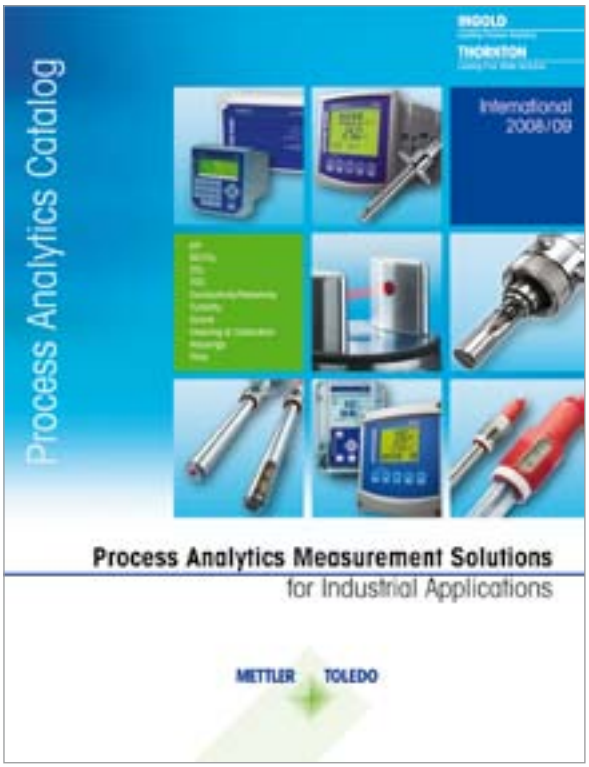

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