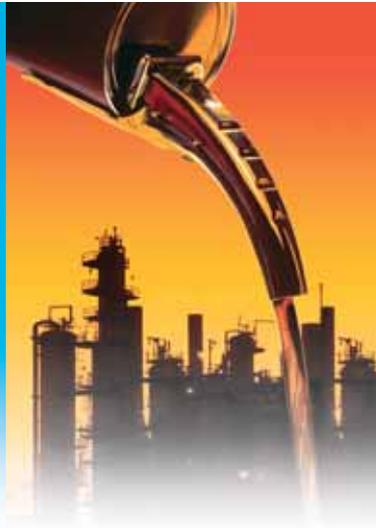


Petrochemicals

Perspectives in Weighing and Analytics



1 News

INGOLD

Leading Process Analytics

Optimized Control of Sour Water With ISM pH Electrode

The installation of a double measuring system – pH combined with conductivity – allowed to control the aggressive sour water on-line without damaging the pH electrodes.

ISM



Sour water damages causes corrosion

Sour water is poisonous to petrochemical plants equipment, because it is responsible for most of any corrosion process in metallic pipes, heater, coolers and columns and it must be treated and neutralized.

An unsatisfying situation

In the past, our customer used a pH measuring system of a competitor to control the sour water and the neutralization treatment. The situation was not satisfying at all because of the contamination of the electrode due to the presence of gasoline, which also passes through the pipe. As the pH electrodes were constantly damaged by the presence of gasoline in the measurement media, the customer stopped per-

forming the on-line analysis and started conducting it in the laboratory.

The solution of METTLER TOLEDO

As a pH measurement is very important to control the chemical addition in order to neutralize the sour water, and to protect the pipe lines and equipment from corrosion, METTLER TOLEDO suggested an innovative solution which made it possible to carry out the on-line pH measurement.

The measurement system included a pH electrode and a conductivity sensor. Following products were installed:

- InPro 4260 i ISM pH electrode
- InPro 7250 inductive conductivity sensor
- M 700 transmitter
- Retractable housing for the pH electrode



METTLER TOLEDO



Conductivity verifies pH measurement

The customer started using the conductivity sensor with the pH electrode in order to protect this last one.

There are two moments in which the pH electrode is retracted:

- When it is washed and
- When gasoline is passing through the pipe

The conductivity sensor is used to verify which substance is passing through the pipe. Since water is salty, its conductivity is very high, whereas the gasoline conductivity, which is very low. When the conductivity drastically decreases, it means that gasoline is passing through the pipe, and therefore the pH electrode must be retracted so it is not damaged.

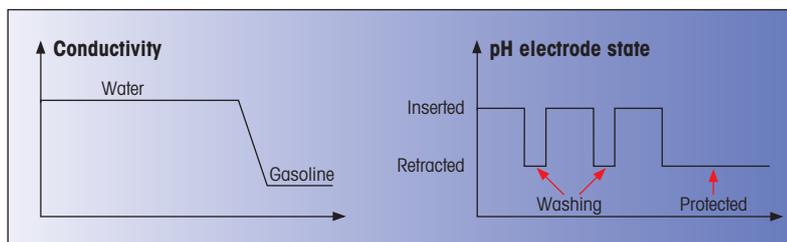


Fig.1: Conductivity sensor protects pH electrode.

Figure 1 illustrates how the pH electrode is protected depending on the conductivity being measured.

Therefore, not only is the conductivity sensor used to verify phase separation, which is a classic application for conductivity sensor, but also this information is used to control the insertion and retraction of the sensor, protecting the sensor from contamination.

Reasons for product selection

□ InPro 4260 iISM

The InPro 4260 iISM electrode was found to be more suitable for this application due to the high concentration of sulfur. As the pH electrode has

the ISM technology, it is possible for the customer to do a much easier maintenance. ISM surpassed the customer's expectations and it was something which differentiates METTLER TOLEDO's sensors from other suppliers.

□ Retractable housing

The retractable housing was chosen due to the importance of the pH electrode automatic cleaning. The use of pneumatic retractable housing allows the automation of cleaning.

□ M 700 transmitter

The M 700 was the choice to send both conductivity and pH signals to the same transmitter.

iSense – a powerful software for ISM sensors

iSense is a very user-friendly and unique software which allows verification and calibration of METTLER TOLEDO digital ISM pH and DO sensors.

With digital ISM® technology into the future

- The new innovative digital METTLER TOLEDO "Intelligent Sensor Management®" concept makes it easier to operate process analytical systems from initial installation to maintenance right through to sensor exchange. ISM technology enables you to lower maintenance costs and reduces the risk of sensor failure while improving process reliability.

What ISM stands for:

- Quick and easy installation thanks to "Plug and Measure"
- Pre-calibration of pH electrodes and oxygen sensors in the laboratory
- Optimized maintenance with sensor wear indicator and adaptive calibration timer

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M 700 transmitter.

On-line versus off-line measurement

The on-line pH measurement is only made possible in conjunction with the conductivity sensor which protects it from gasoline media. The neutralization control by the pH measurement is very important as a way to avoid corrosion in process. Doing this measurement just in the laboratory can be very risky, because the addition of neutralizing agents is carried out manually and contaminated water can already be sent to the pipes before it is neutralized. By doing an on-line measurement with the pH electrode being protected by a conduc-

tivity electrode, it is possible to respond to pH variation automatically and just in time that this sudden changes occur.

Customer's satisfaction

Due to high sulfur concentration, InPro 4260 iISM was chosen and it has been presenting a step ahead in the customer's expectations regarding product performance. Additionally, the ISM concept is making easier the maintenance programming as well as the customer's inventory control.

► www.mt.com/pro-pH



InPro 7250.

InPro 4260 i.

EasyClean Moves pH Measurement Forward

Use of an EasyClean 100 system allowed the user to relocate the pH measurement from the secondary to the primary clarifier, making a dramatic improvement in process control, resulting in a substantial savings in dosing chemicals.

ConocoPhillips – a key player in the world

ConocoPhillips is a leading international integrated energy company, and is the fifth largest refiner worldwide and the second largest in the United States. One particular major refinery in the US processes over 200,000 barrels of oil per day producing gasoline, fuel oils, and a variety of petrochemicals.

Wastewater treatment a challenging task

Many refinery operations consume large amounts of water, resulting in millions of gallons/day of wastewater requiring treatment. Accepting waste from unit operations throughout the refinery presents

a challenge for pH measurement with the wastewater containing oils, residual sulfide and ammonia compounds, and experiencing large incoming pH swings.

ConocoPhillips requested new pH measuring concept to reduce costs

A competitor's pH electrode was being used in an existing application in a secondary clarifier following biological treatment. Solids and film build-up on the sensor required manual cleaning once per week. The treatment plant operator indicated that the ideal location for pH control would be in the upstream primary clarifier. Catching pH excursions earlier in the process would provide more stable read-

ings downstream and minimize chemical costs resulting from overdosing of lime used for pH control.

How METTLER TOLEDO overcame the technical problems

The concern was that the solids concentration in the primary clarifier was substantially higher than in the secondary clarifier, and whether increased maintenance demands would offset any potential benefit in chemical savings.

Mettler-Toledo Ingold has been making steady progress throughout the facility, earning the client's confidence by tackling difficult applications. The local sales representative acknowledged that the condi-



Fig. 1:



Fig. 2:

tions in the primary clarifier were likely too extreme for unassisted pH operation, therefore requiring some type of automated cleaning system.

The selected measuring system

Since the sensor is mounted directly in the open basin, the proposed system would be an EasyClean 100. The sprayhead mounted on the end of an InDip housing directs air bursts at programmed intervals directly at the head of the electrode.

The strong turbulence generated by the air jets prevents solids and films from accumulating at the electrode surface. The timing interval is controlled using the rinse relay contact of the pH 2100e 4-wire transmitter, and has been set for operation every 8 hours.

Completing the system, the InPro 3250 pH electrode was selected with its internal pressurized reference electrolyte, further helping to keep the reference junction clean. (Figure 1)

Benefits due to new installation setup and outlook

Operational results have more than met expectations. Electrode maintenance has been dramatically reduced from once every week to less than once per month, even though the system is now located in a much dirtier installation (see figure 2). Outweighing the maintenance labor savings, the demonstrated chemical cost sav-

ings on the one clarifier has opened the door for additional opportunities on parallel systems. In addition, there is a potential opportunity for turbidity systems being considered to measure suspended solids to provide direct monitoring of the clarification progress.

Fig. 1: Installation of EasyClean 100 and pH 2100e with InDip housing.

Fig. 2: Close-up view of primary clarifier shows cleansing bubbles rising through murky waste.

Cleaning system EasyClean 100

The EasyClean 100 system is designed to provide completely automatic sensor rinsing. It can be used with a stationary InDip housing with a sprayhead for open tank and basin applications. The EasyClean 100 can use either water rinsing or compressed air to create turbulence to prevent stubborn build-up.

pH electrode InPro 3250

The InPro 3250 family is a pre-pressurized, liquid-filled, low-maintenance pH and temperature sensor for in-line measurements in demanding applications. Its durable design is well suited for harsh chemical process conditions. These rugged electrodes lead the industry for fast and precise measurements. It is available with an expanded selection of different pH-sensitive glass membranes.

pH 2100e transmitter

The pH 2100e transmitter is a proven high performance transmitter that can be used in the simplest or most demanding of applications. Available as either 4-wire or 2-wire versions, this enhanced pH transmitter line offers superior performance, advanced sensor and transmitter diagnostics and leading edge functionality.



EasyClean 100.



InPro 3250.



pH 2100e transmitter.

www.mt.com/pro-pH

www.mt.com/cleaning

Optimized Cleaning of pH Electrode Reduces Maintenance Dramatically

The METTLER TOLEDO cleaning and calibration system EasyClean 400 X reduced maintenance dramatically. Due to the increased process availability ROI in less than six months achieved.

China – an expanding market

The majority of world ethylene is used for the production of polyethylene which is the largest volume polymer consumed in the world. The biggest growth in ethylene production is found in the Asian countries, China in particular where the annual production continues to grow and is expected to reach 9 million tons in the coming years.

The process

Ethylene is produced in the petrochemical industry by steam “cracking”. Depending on the feedstock which is used in the cracking process one or more quench towers are required downstream of the cracking furnaces to cool the hot ethylene mixture.

The pH of the quench water circuit is a very critical parameter for efficient operation of these units. A low quench water pH can lead to serious corrosion problems in the tower and a high pH can cause emulsion problems. Usually an amine solution or ammonia is used to control pH in these circuits. The process conditions are harsh (in hazardous area) with 130 °C, fair amounts of quench oil, benzene etc. Proper functioning of the pH measuring system is of the utmost importance.

The problem to be solved

Oil in the water tends to coat the pH electrode and clog the diaphragm. As a result, the measured pH values will drift. To prevent inaccurate measurement values our

customer had to manually clean and recalibrate the electrodes every three days. This caused not only a substantial amount of work for the maintenance department but also unstable measurement values and process variability.

Reliable solution from METTLER TOLEDO

After investigation the situation, to be improved, METTLER TOLEDO suggested installing the automated cleaning and calibration system EasyClean 400 X. METTLER TOLEDO assured the customer that this system would provide the following improvements:

- High accuracy of measured pH values
- Stable pH values
- No manual cleaning of the electrodes
- Automatic calibration according to the program settings
- Precise dosage of pH-stabilizing agents through the DCS guarantees process stability

Customer's satisfaction

The system was exactly what the customer anticipated. After a period of observing the performance, the customer stated that they are completely convinced and has since ordered two systems.

The customer's conclusion was:

- pH electrode life time is 20% longer
- No manual cleaning and calibration of the electrode is required
- Higher stability of measured pH values
- Proper DSC operation is guaranteed and allows less waste of dosages
- Cost savings of about 100,000 US dollars per year!
- ROI in less than 6 months!

► www.mt.com/cleaning



Your advantages of the EC 400 X

- Minimum maintenance costs by fully automatic cleaning and calibration and minimum consumption of buffer and cleaning solution
- Optimal adaptation to the process conditions thanks to diverse program runs
- High flexibility thanks to free choice of individually programmable intervals
- EasyClean 400 X for hazardous areas

New Developments in Process Analytics

METTLER TOLEDO delivers powerful solutions to optimize your processes and reduce maintenance costs. Recently, we introduced new intelligent technologies that allow you to improve handling and optimize maintenance thus addressing your most pressing needs.

ISM – the next generation of intelligent process analytics!

With the groundbreaking ISM technology METTLER TOLEDO provides another milestone in process analytics measurement!

Dissolved oxygen sensors and pH electrodes with integrated preamplifier are using a new technology with “Plug and Measure” and intelligent diagnostics functionalities. The Intelligent Sensor Management (ISM) technology simplifies all maintenance operations of the sensor. Process interruptions are shorter or even avoided, leading to enhanced productivity.

iSense – the key to maximize the benefits of the ISM technology

iSense ISM Asset Suite allows efficient and easy verification and calibration of METTLER TOLEDO digital ISM pH and DO sensors in an instant with an intuitive software application that includes advanced analysis and documentation functionalities to support your sensor management.

Digital transmitter line M300

The digital M300 transmitter represents an easy-to-use version of the M300 transmitter line. Its unique “Plug and Measure” features enable a fast start-up and robust measurements for digital pH/ORP and dissolved oxygen sensors. Its versatility and reliability make this instrument the ideal choice for a wide range of applications.

If you want to take advantage of these advanced products ask your local METTLER TOLEDO representative or visit www.mt.com/ISM.

ISM



iSense
ISM Asset Suite



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