

METTLER TOLEDO APPLICATION NOTE

pH In Refineries

BACKGROUND

This application deals with the measurement of pH in waters that have been in contact with hydrocarbons, e.g., quench waters, overhead and desalter waters. The pH is adjusted to avoid corrosion; if the pH value rises, the viscosity of the mix also rises resulting in emulsion. Because of the presence of ammonia in oil, corrosive products form in the cracker; so low pH values are desired.

THE PROCESS

The application conditions are particularly tough: 302 °F and 87 psi overpressure; high H₂S content; oil and tar present. For many years, no satisfying solution could be found. Experiments with different configurations yielded no better results than a pH shift of 2 units within two hours. The problem area in the electrode was identified as the diaphragm. As a result of this, all the piping installations were exchanged every three years as a preventive measure.

INSTRUMENTATION

As a first step, cooling was introduced and the pressure was reduced at the measuring point. A customized Unical system was then employed. The rinsing system was modified to allow up to four different pumping systems to be used (water/ condensate /solvent / HNO₃), depending on the installation.

The recommended pH electrode system is the Model 465-SC pH electrode and InTrac[®] 776 SPR retractable housing. This electrode system will provide more accurate measurements and reduced maintenance, since the electrode lifetimes are significantly increased and periods between calibrations are longer. The liquid electrolyte in the 465-SC provides a more stable, drift-free pH measurement. The recommended transmitter for this system is the Model 2800.

PRODUCTS

Unical

- Fully automatic calibrating and cleaning system
- Intelligent error monitoring
- Operation in hazardous areas

2800 pH/ ORP Analyzer

- Continuous system and sensor diagnostics
- Optional dual pH inputs enables differential measurements
- Menu-driven operation by operator prompting in plain text dialog
- One current output and two additional passive outputs
- Bilateral PI controller
- Unical interface

465-SC Combination pH Electrode

- Liquid electrolyte provides accurate and precise pH measurement
- Silver ion barrier eliminates diaphragm contamination
- Highly accurate and reproducible results in harsh processes
- Choice of electrolyte solution ensures chemical compatibility

InTrac[®] 776-SPR Retractable Housing

- 316L SS, Hastelloy, or Titanium construction for maximum chemical resistance
- Flushing chamber for automatic cleaning and calibration reduces overall system downtime
- Patented immersion tube design isolates the sensor on retraction and guarantees complete separation of the process from the outside environment.
- Can be combined with the fully automatic Unical (calibration) system