

METTLER TOLEDO APPLICATION NOTE

pH Measurement In Flue Gas Washing Plant

BACKGROUND

The world produces millions of tons of disposable waste every year. Separation and recycling is possible only for a small portion of the materials contained in this waste. The disposal of one ton of waste costs approximately \$170 US dollars.

Tons of waste which produce flue gas must be incinerated every year. This reduces the waste to 20% of its original weight. All flue gas from industrial incinerators must be cleaned. This gas will be scrubbed with water at a defined pH value in several steps.

THE PROCESS

Four washing steps clean the waste gas:

- pH 0: Adsorption of HF and HCl at 140 °F
- pH 1: Adsorption of HCl and heavy metals
- pH 4-6: Adsorption (bypass system) of SO₂ and Hg, pH control and neutralization with NaOH.
- pH 8: Outlet

pH measurement at high concentrations of HCl and HF (0.1...0.5 g/l) gives rise to pH values around 0.5. HF (hydrofluoric acid) is used in glass etching, so the membrane of the electrode can easily corrode. Temperatures from 140 °F to 212 °F also place severe demands on the measuring equipment.

INSTRUMENTATION

Because of the harsh conditions of this process, the HF405-DPA and the InTrac® 777-SL housing are recommended. The HF405-DPA electrode is made with a special HF-resistant glass and is filled with a gel electrolyte at an overpressure of 30 psi to ensure the outflow of electrolyte and protect the reference system against contamination. The InTrac 777-SLP housing in PVDF retracts the electrode automatically when no pH measurement is needed, increasing the lifetime of the electrode more than three times. The analyzer recommended for this application is the Model 2100.

PRODUCTS

2100 pH Analyzer

- Detachable front panel and plug-in terminals for ease of installation
- All functions accessible through the keypad for increased ease of use
- Continuous sensor and transmitter diagnostics to monitor performance
- FM certification for Class I, Div 1 & 2 Environments and CSA General Purpose Approval
- 3 year warranty

Model HF405-DPA pH Electrode

- Gel electrolyte eliminates fill requirements to reduce maintenance
- Internal over-pressure ensures gradual electrolyte outflow, efficiently cleaning the diaphragm and preventing influx of process medium into the reference electrolyte
- HF-resistant membrane to minimize the effects of hydrofluoric acid

InTrac[®] 777-SL Retractable Housing

- Rugged 316L SS or PVDF 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.
- Safety interlocks prevent sensor removal from housing while in measuring position
- Manual or pneumatic operation