

METTLER TOLEDO APPLICATION NOTE

Sour Water Stripper

BACKGROUND

Sour water strippers are used as a first step in the treatment of sour water before its inclusion in final wastewater treatment and discharge. A stream of air is used to force both the hydrogen sulfide (H_2S) and ammonia (NH_3) present in sour water out of solution and into the gas phase for further treatment. (Figure 1) This allows the stripped water to proceed to waste water treatment without creating a burden on the facility.

THE PROCESS

The pH of the sour water is critical to ensuring that both hydrogen sulfide and ammonia are present in the gaseous form. When dissolved in water, both can also react to form ions.

In the case of hydrogen sulfide, a high pH will result in a large fraction of H_2S in the form of ions (HS^- or S^{2-}), as hydrogen sulfide and gas. The stripping process can only remove entrained gas, not dissolved ions. Therefore, stripping of hydrogen sulfide is favored by a low pH to inhibit ion formation and increase stripping efficiency.

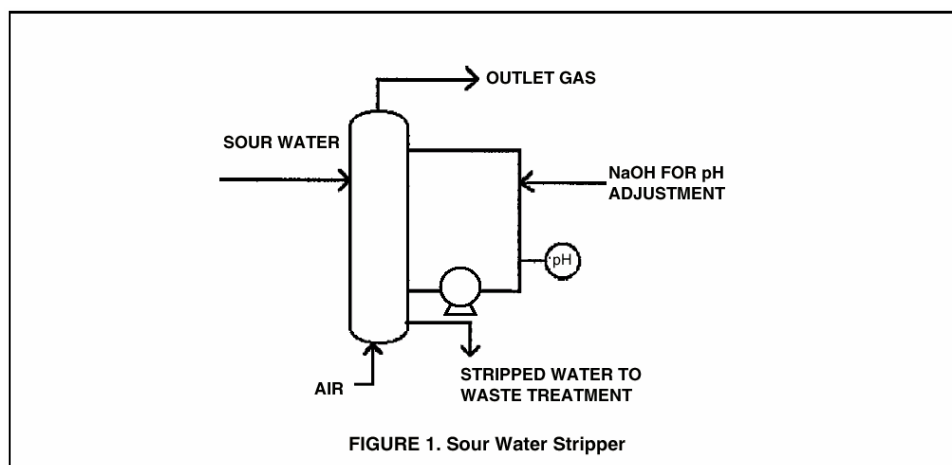
Conversely, high pH favors the formation of free ammonia, which can be stripped, over

ammonium ion, which cannot. Since the ideal pH for stripping ammonia is over 10 and the ideal pH for stripping hydrogen sulfide is under 5, stripping both gases simultaneously can not be conducted at the ideal pH. Therefore, the pH is controlled to between 7 and 8 pH, a compromise between the two extremes which allows both hydrogen sulfide and ammonia to be stripped. The adjustment of the process to between 7 and 8 pH is carried out by pH-controlled caustic addition due to the acidic nature of sour water.

Measuring pH in sour water is not without its risks to the pH sensor. Both hydrogen sulfide and ammonia can affect the reference electrode. Hydrogen sulfide can poison and clog the reference with silver ion precipitates. Ammonia can poison the reference by forming a complex with silver ions. These problems can be so severe in sour water that some types of pH sensors may fail within one day.

INSTRUMENTATION

The sensor of choice for sour water monitoring is the InPro[®] 4500VP pH sensor with its Xerolyt[®] reference system, which has exceptional resistance to clogging and poisoning. The transmitter of choice is the Model 2100/2X pH analyzer.



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

InPro[®] 4500VP Solid Polymer pH Electrode

- Patented Xerolyt[®] solid polymer reference system maintains a stable potential for accurate and repeatable pH measurement and low maintenance
- Open junction eliminates reference clogging and extends sensor life
- High pressure resistance eliminates requirement for pressurizable housing
- Xerolyt solid polymer is particularly suitable for use in emulsions, suspensions, heavily contaminated or sulfide-containing media, and solutions with a high concentration of suspended solids