

METTLER TOLEDO APPLICATION NOTES

Batch Neutralization Of Acid/Alkaline Industrial Waste

BACKGROUND

Increasingly, local environmental authorities are requiring some form of waste pretreatment prior to discharge into municipal sewage systems. Raw industrial waste streams, especially those low in pH, could damage sewage system piping as well as the micro-organisms in the sewage treatment plant itself. For the small industrial user, a simple batch neutralization system effectively treats low-volume, variable-strength spent acid or alkali.

THE PROCESS

A typical batch neutralization system for spent acid (Figure 1) works as follows: a level controller opens the inlet valve of the empty reaction tank to admit acid waste and closes the valve when the tank is full. While the tank fills, the pH of the waste is being elevated. A submersion sensor measures the pH of the waste and an analyzer/controller with high/low alarm contacts opens the alkaline reagent valve whenever the pH falls just below the setpoint. The level controller and transmitter are interlocked, so the discharge valve of the tank does not open until the tank is full and the proper pH has been achieved.

Problem of "Overshoot"

The pH scale is logarithmic. As an acid solution approaches neutrality (pH 7), a small addition of alkaline reagent can result in a large change in pH. If the tank is large and the sensor is located far from the point where alkaline reagent enters, the sensor may continue to call for reagent after enough reagent has been added to achieve neutralization. This situation will cause overshoot – too much reagent which will result in a pH value higher than desired. To prevent overshoot, a timer is often introduced into the system. The timer might be set, for example, to limit reagent input to one minute, after which there would be a one minute delay before more could be added, regardless of apparent pH value. Such a system allows time for mixing and chemical reaction so that the sensor provides a true pH value.

Note: The system described and shown is for neutralizing acidic waste. For an alkaline waste, the high and low alarm settings would be reversed, and an acid reagent used.

INSTRUMENTATION

The instrumentation appropriate for this application is the InPro[®] 4500 Xerolyt[®] solid polymer pH electrode and the 2100 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® 4500 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

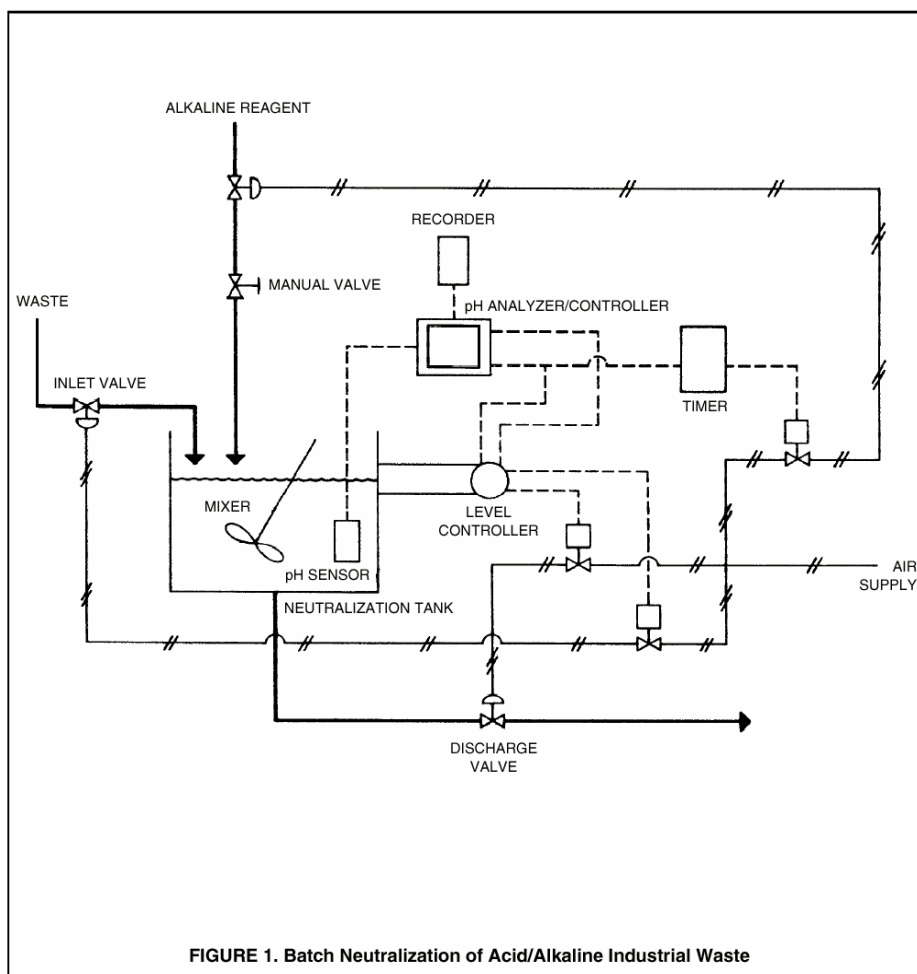


FIGURE 1. Batch Neutralization of Acid/Alkaline Industrial Waste

Ref: RA ADS 2800-05