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.

Spent Acid Neutralization

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, irrespective of sensor demand. Such a system allows time for mixing and chemical reaction so that the sensor provides a true pH value.

NOTE: The system described in Figure 1 is for air actuated valves for neutralizing acidic waste. For an alkaline waste, the high and low alarm settings would be reversed, and an acid reagent used.

Instrumentation

1056 Dual Input Intelligent Analyzer

- Single or dual input, multi-parameter instrument
- Hart and Profibus DP digital communications
- NEMA 4X (IP65) weatherproof, corrosion-resistant enclosure
- Exclusive Quick Start screens for fast start-up and deployment
- Two Isolated current outputs
- Easy to use intuitive menu structure with advanced diagnostics
- Large display for easy-to-read process measurements

Model 396P pH/ORP TUpH Sensor

- Polypropylene reference junction mean longer sensor life in process solutions containing heavy solids.
- Disposable, one-piece construction is convenient and economical where minimal troubleshooting and maintenance downtime are of prime importance.
- Versatile. Can be used in numerous loop configurations with all Rosemount Analytical and other manufacturers' instruments.

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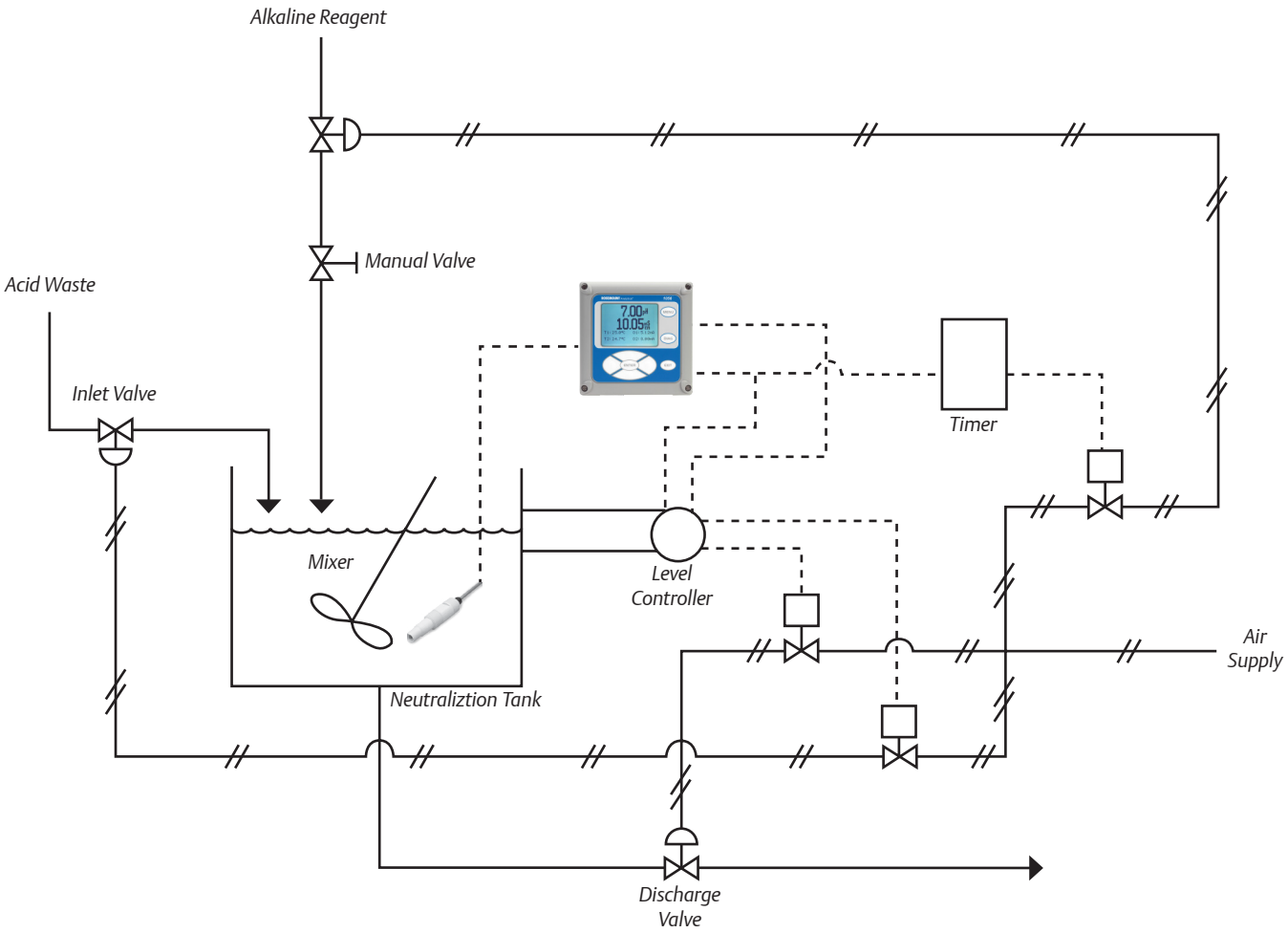
Figure 1 - Batch Neutralization of Acid Waste using Air-Actuated Valves



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