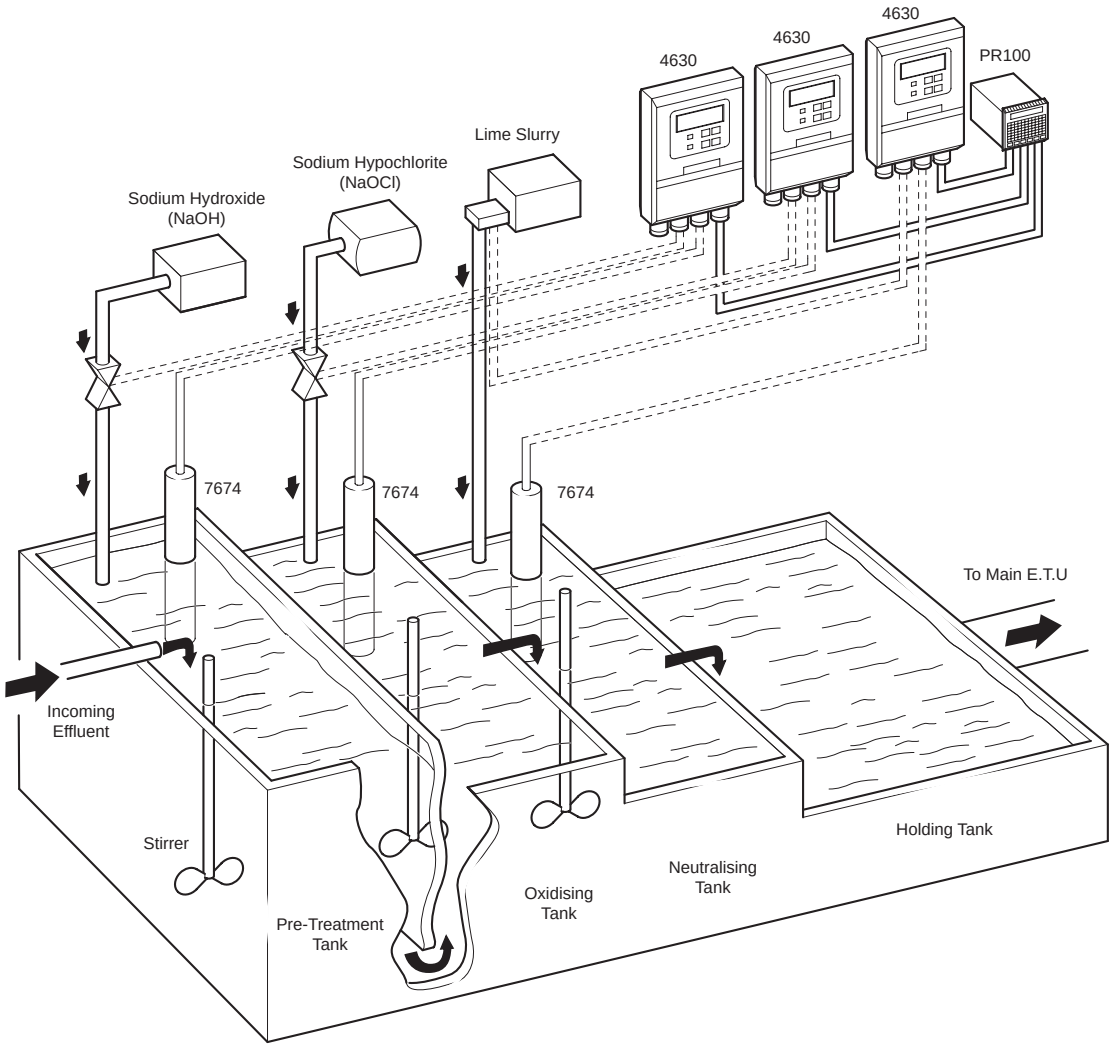
Application Guide

pH and Redox (ORP) Control of Cyanide in Wastewater for Effluent Discharge



In the illustration above, the incoming cyanide effluent is first held in a tank to buffer out any violent swings in the level of cyanide. It is then transferred to a stirred mixing tank where the pH is increased to pH11 by dosing with sodium hydroxide via an on/off solenoid valve under the control of a pH meter. This is the pH level at which the rate of the hydrolysis of cyanogen chloride to cyanate ion is optimised. The dip electrode system containing the combination pH sensor is fitted in this tank at the outflow to the next tank.

Next, the effluent is passed to a second dosing tank where it is dosed with sodium hypochlorite via an on/off solenoid valve, under the control of a redox meter/controller. The setpoint for this reaction (oxidation of cyanide to cyanogen chloride) is 400 to 450mV. The sensing electrode is a platinum combination electrode. The treated effluent is then transferred to a large holding tank, to allow hydrated metal oxides to precipitate out and allow the hydrolysis of the cyanogen chloride to approach completion. The holding time is normally 20 minutes, but can be as much as two hours.

ABB Instrumentation

Why use pH/redox for the destruction of cyanide ?

The customer needs:

To ensure that the oxidation of cyanide by chlorine under alkaline conditions to destroy the cyanide is achieved.

To meet the local discharge consent limits.

To use the minimum quantity of chemicals and keep costs to a minimum.

To produce continuous records of the pH final discharge to effluent.

Why use ABB Instrumentation ?

Rugged, virtually maintenance-free sensor system minimises risk of damage and keeps maintenance to an absolute minimum.

Advanced sensor technology – provides industrialised sensor system to minimize the risk of physical damage.

Easy to fit sensors and simplified maintenance – eliminates the need for skilled technicians.

Low operating costs – long life sensor designed to minimise risk of damage.

Replaceable liquid junction – extends the life of the sensor and provides the opportunity to replenish KCI electrolyte to further increase sensor life.

Easy to use 4600 Series instruments designed to be used by operators with virtually no experience of measurement.

Back-lit LCD provides easy to read display in all environments.

Simple automated calibration procedure – avoids the risk of operator error.

Automatic buffer recognition – eliminates operator error.

IP66/NEMA 4X case – protects instrument in corrosive atmosphere.

Multi-lingual software – switchable for use throughout the world.

Programmable current output for customer flexibility, choice of:

- 0 to 10mA,
- 0 to 20mA
- 4 to 20mA .

Security level protection – prevents unauthorised tampering.

pH/Redox (ORP) programmable – same instrument is used for pH and redox.

Two alarm relays/setpoints – provide all the control features necessary for the addition of chemical reagents.

Automatic temperature compensation – eliminates errors caused by temperature fluctuations.

Wide range of recorder options provides single source supply – one stop shopping.

What ABB products are Suitable ?

Model 4630/500 wall-mounted pH/Redox transmitter/controller,

or:

Model 4635/500 panel-mounted pH/Redox transmitter/controller.

Model 7674/000 multi-dip pH system.

Model 7674/000 multi-dip redox system.

Associated Applications

Temperature measurement of process liquids.

Liquid level control of the treatment/reagent tanks.

Installation

It is essential to site the sensor system where the true effect of the chemical dosing can be measured, e.g. avoid positioning the sensor too close to the dosing reagent to ensure true mixing of the reagent.

Ensure that the sensor is never left in air and is always immersed in solution.

Emphasise the importance of agitation of the sample to encourage mixing of the sample and reagent.

Ensure all extension leads are watertight and use IP65 minimum junction box with silica gel driers.

Ensure there is sufficient excess connection cable to remove systems from the tank for easy buffering routines.

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