

Application Note

pH Measurement of Wastewater Treatment at Pulp and Paper Plants

Industry: Pulp & Paper
Product: pH Process Liquid Analyzers

Introduction

Pulp and paper plants consume large volumes of water, and the treatment of wastewater from these plants is a serious environmental concern. To treat this wastewater, suspended solids (SS) are separated and precipitated in a precipitation tank using flocculation agents. During this process, the pH value needs to be maintained at the proper level, the status of which is controlled by referring to a pH analyzer. In the past, pH analyzers needed to be cleaned frequently as fibers and coating agents in the wastewater adhered to the electrodes.

We tested a submersion-type holder with an ultrasonic+air-jet cleaner to determine its effectiveness in the continuous cleaning of pH analyzers. Manual maintenance of pH analyzers used to be conducted on a daily basis, but our test results have demonstrated that this submersion type holder can reduce the manual cleaning frequency to just once every one or two months.

Expected Benefits

- Continuously and stably measures pH
- Eliminates the need for frequent manual cleaning
- Enables efficient use of flocculating agents

Process Overview

Wastewater at pulp and paper plants contains effluents from the pulping, bleaching, papermaking, and recycling processes. The treatment of this wastewater involves pH level control, solid-liquid separation, oxidization, and other processes, and depends on such factors as the levels of organic, reducible and suspended matter in the wastewater as well as its chromaticity. For example, most SS are fine substances that do not precipitate easily, so they are removed by applying flocculating agents, which produce a chemical reaction. To detect the end points of these chemical reactions and to manage and control the precipitation tank, the pH of the wastewater tank is measured.

Typical problems

- Coating on the sensor

Remedies

- Frequent sensor cleaning

Tangible benefit

Save down time in cleaning, repeated calibration, improve end product quality.

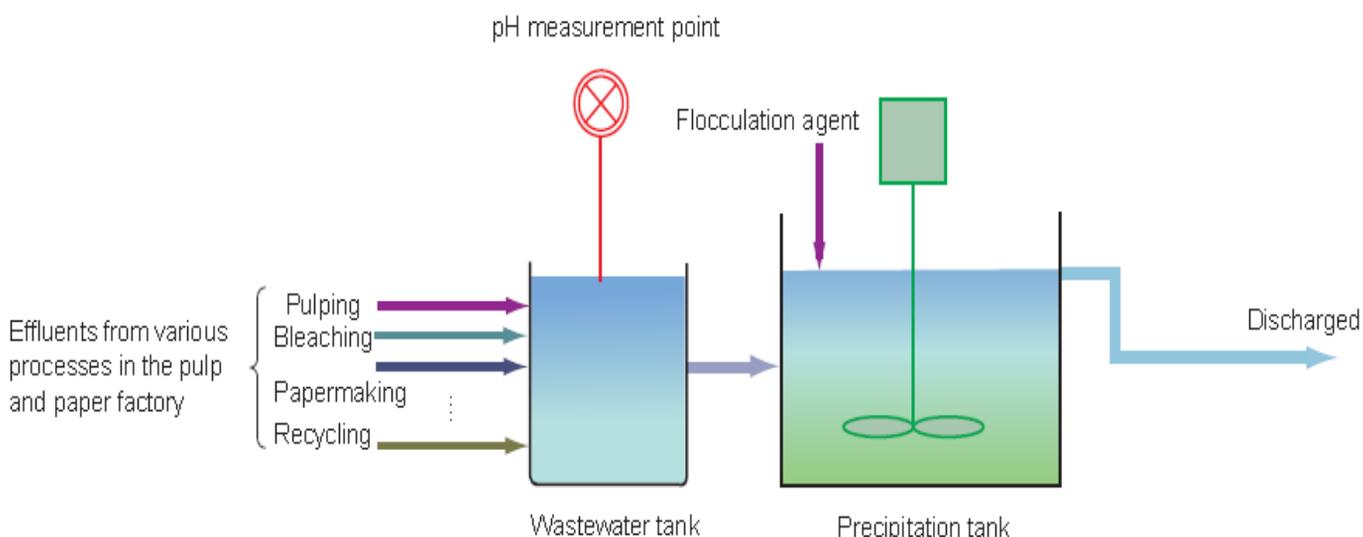


Figure 1. Management and control of the precipitation of suspended solids in the tank

Product Recommendations

Measurement System

Process Liquid Analyzer

- 2-wire FLEXA pH/ORP Analyzer

Features

Dual sensor measurement on 2-wire type analyser
 Indication of sensor wellness

- 4-wire PH450G pH/ORP Analyzer

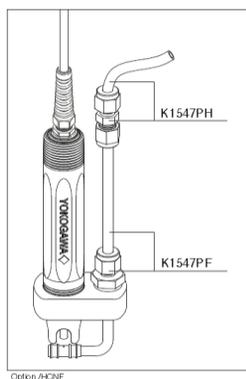
Features

Easy touchscreen operation
 Trending display up to 2 weeks
 Advanced Process Temperature Compensation

Sensor Selection

Option #1: FU20 with “/HCNF” with Cleaning reagent. Alternatively, SENCOM sensor can be used. (FU20F)

Recommended Installation – using immersion fitting



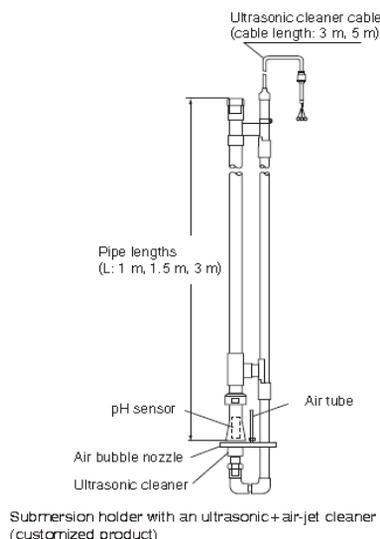
Features:

Long life saturated Ag/AgCl reference system.
 PTFE reference diaphragm to prevent fouling and reduce measurement error.
 Double junction combined with ion-trap to prolong the life of the reference probe even in chemically unfavorable environments.
 Polymerized electrolyte to extend the sensors life time.
 The /HCNF option comes with a hastelloy cleaning nozzle, Stainless steel mounting and ferrules sets and a nylon tube of 10 meters.

Option #2: PH8EFP KCl filling type pH sensor with ultrasonic cleaning

- Submersion holder with an ultrasonic+air-jet cleaner (customized product)
- PH8HS-PP-□□-T-S3-C□*A/Z (Z: option for air bubble nozzle)
- Terminal box (when needed)WTB10-PH3

- Ultrasonic oscillator PUS400G-NN-NN-□-E



Conditions

1. Effectiveness of previous cleaning methods
 Cleaning methods using a standard jet cleaner and a brush were tested. Fibers in the effluents that had attached to the electrode could not be removed using either of these cleaning methods. (Both types of cleaning operations also had to be suspended once a day to conduct manual cleaning of the electrode.)
2. Effects of continuous cleaning using an ultrasonic+air-jet cleaner

The amount of the contaminants on the electrode decreased significantly. Manual cleaning and calibration were found to be required just once every one or two months had to be suspended once a day to conduct manual cleaning of the electrode.)

Test Data from Continuous Cleaning Using an Ultrasonic+Air-jet Cleaner

| Operation period | Drift value | |
|------------------|-----------------------------------|-----------------------------------|
| | Standard pH7 solution measurement | Standard pH4 solution measurement |
| 1 month | -0.19 pH | -0.25 pH |
| 2 months | -0.20 pH | -0.20 pH |

Note: During the test, no manual electrode cleaning and calibration were performed.

3. Effects of continuous cleaning using an ultrasonic+air-jet cleaner

The amount of the contaminants on the electrode decreased significantly. Manual cleaning and calibration were found to be required just once every one or two months

Note: For additional information on this application contact the local Yokogawa Process Liquid Analyzer Department