

Application Note

Measurement of pH of Leachate in Zinc Hydrometallurgy and Air Jet Cleaning to Prevent Scaling

Industry: Chemical, Power

Product: pH/ORP Process Liquid Analyzers

Introduction

Most zinc are produced at hydrometallurgically, where a high-grade zinc product can be obtained and valuable metals mixed in the raw material can be recovered. In the hydrometallurgy, the raw material of zinc concentrate is roasted and then dissolved in sulfuric acid to remove impurities. The process called leaching and pH control of the leachate is important. The leachate contains gypsum and impurities that may cause scaling on electrodes. As a result, it interfered with stable pH measurement and required frequent cleaning at least once a week.

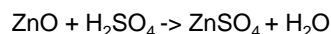
A pH analyzer with air jet cleaning system provides continuous cleaning and therefore can reduce maintenance frequency to once every one or two months.

Expected Benefits

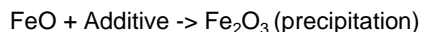
- Ensures stable, continuous pH measurement
- Reduces operating costs
- Eliminates manual cleaning work by hand

Process Overview

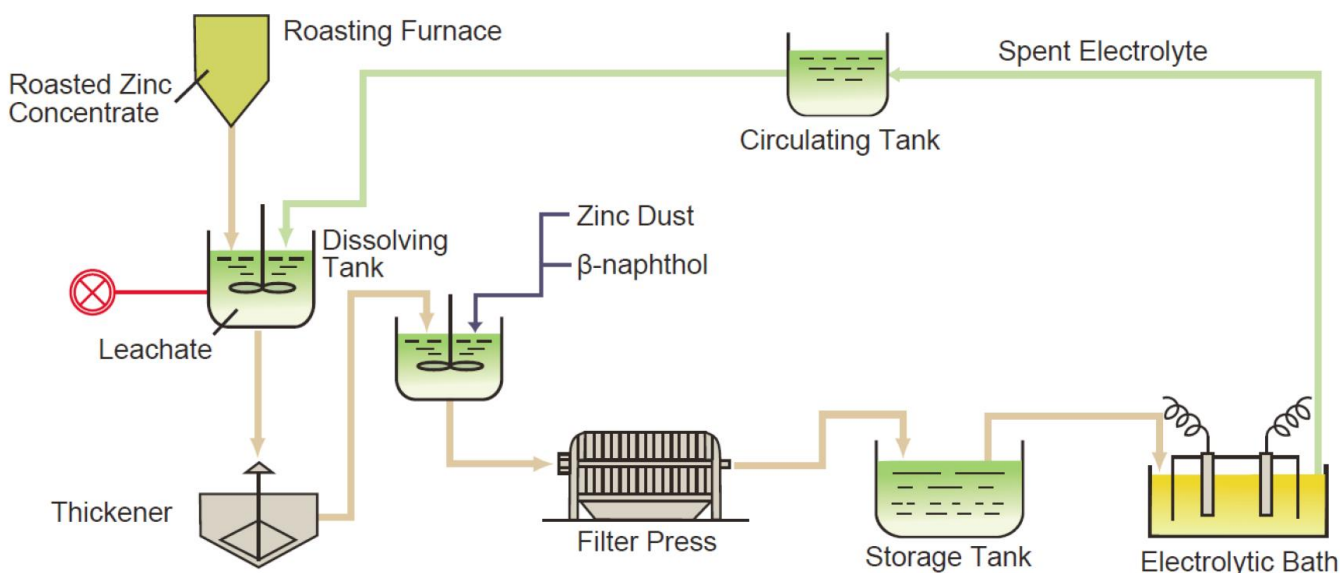
Roasted concentrate sent from a roasting furnace, is dissolved in diluted sulfuric acid (spent electrolyte) in a dissolving tank.



In addition, some iron and other material contained in the calcine are dissolved. Therefore, these impurities are removed by precipitation by adding manganese, lime or other additives.



pH control is important to allow zinc to dissolve fully and impurities to precipitate maximally. The leachate is filtered by a filter press to remove impurities and the filtrate is fed to an electrolytic bath where zinc is electrolytically produced.



⊗ : Measurement Point

Electrolytic Zinc Manufacturing Process

Figure 1.

Solution Details

Field Data

Measurement point:	Leachate in the dissolving tank
Temperature	80°C
pH Value:	pH 1.5 ±0.2
Zinc:	Approx. 160 g/l
Sulfuric acid:	2 to 3 g/l
Lime	Saturated

Before online cleaning systems were introduced, the cleaning work by hand had been required at least once a week. Continuous online cleaning using the submersion holder with cleaning system, has reduced the maintenance frequency to once a month or tow months.

To ensure stable measurement, the pH sensor uses a Teflon liquid junction, where KCL outflow is higher than that of ceramic junction.

Product Recommendations

Measurement System

Process Liquid Analyzer:

- 2-wire FLEXA pH/ORP Analyzer
- 4-wire PH450G pH/ORP Analyzer

Sensor Selection:

Option #1: Jet Cleaning system

Sensors: PH8EFP KCL Filing Type pH Sensor

HOLDERS: PH8HS Submersion Type

Notes:

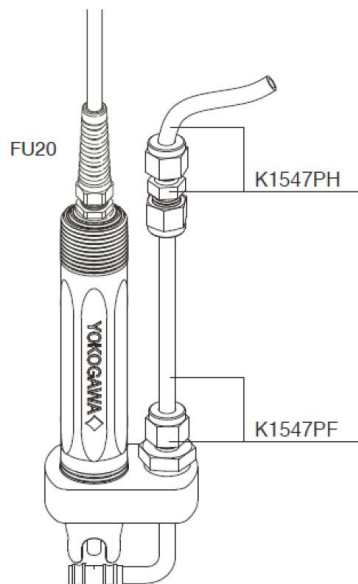
- Continuous air jet cleaning, since the leachate is a strongly acid solution, its pH value is not affected by air cleaning. This allows measurement and cleaning simultaneously.
- Other applications, this cleaning system can be used for other smelting process of copper, manganese, cadmium, etc.



Option #2: Extract AUTO CLEAN system

Sensors: FU20 All-in-One pH/ORP Sensor

Holders: K1547PJ (/HCNF option) Hastelloy Immersion cleaning assembly



Tangible benefit

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

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