

Enhanced Ore Leaching With In-line pH Control



Background

The chief source of precious and commodity metals and mineral are through the mining of natural occurring ores. Such ores vary extremely in composition and can contain many different species, several of which are of interest and many that are not of value. For reasons of economy, the process of separating the valuable species of interest takes place on a large scale and consumes significant amounts of chemicals. The first step in this process is the leaching of the ore with a leaching liquor.

Process

Leaching is where the ore is treated with chemicals (leaching liquor) to selectively convert the valuable species in the solid ore into soluble species that can be removed.

One of the most common types of leaching is tank leaching using an acid. For acid tank leaching, the ore must first be crushed into a fine grind that allows for fluidization. The leaching rate of reactions is highly dependent on the concentration of strong acids that are in contact with the surface of ore fines, so good mixing is crucial to facilitating mass transfer. Thus, the tank is fitted with an agitator and also commonly baffles to increase the turbulence and ensure a homogenous fluidized slurry. To achieve maximal leaching, this is commonly a continuous process with numerous stages. As the leaching progresses, the strength of the leaching liquor will drop and make up liquor must be added. In acid leaching, pH is the best control parameter for leaching efficiency.



InPro 4281 i pH Sensor

- Unbreakable titanium body
- Clog-free open junction
- Abrasion-resistant flat membrane

M400 pH transmitter

- Dual touchscreen and tactile soft-button interface
- Full digital ISM compatibility
- Rugged build

If the liquor is not strong enough, the valuable species will not be leached and process yield will suffer. In recirculation, make up liquor can be added as the pH begins to drift, ensuring leaching strength, while not wasting valuable leaching liquor with overdosing. As the leaching mixture is a combination of solids, liquid and slurry, the process is very aggressive to delicate glass pH probes. The high levels of turbulence and agitation required for leaching is also damaging to instrumentation. This is a major risk with glass pH electrodes, which can fail suddenly under such stress. Further, the challenges of solid build-up in the reference junction limit the lifetime of many standard electrodes.

METTLER TOLEDO solution

The InPro® 4281 i pH sensor is the perfect solution for such applications. It has a unique, flat, pH-sensitive membrane that withstands abrasion far better than round or bulb-shaped membranes. The flat membrane is further protected by a PEEK shield. The main structural body of the probe is titanium; therefore, the sensor can be placed in the heaviest, most aggressive flows without any chance of breaking. This is a unique solution in the 12 mm form of pH sensors. To remedy against clogging, a solid no-flow electrolyte allows for an open junction, which will not permanently clog like similar liquid-flow electrolyte probes with ceramic junctions. Regular sensor cleaning is facilitated with an EasyClean™ automatic cleaning system. Cleaning and calibration scheduling is made much simpler with Intelligent Sensor Management (ISM®) technology. Sensors with ISM self-diagnose their condition to predict exactly when calibration, maintenance, or replacement will be needed. The entire system can be controlled with an M400 transmitter and its easy-to-use touchscreen interface.

For more information, visit:

► www.mt.com/pH

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Process Analytics

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