

Measuring H₂S in High-Pressure Acid Leaching

Applied Analytics Application Note No. AN-053

Application Summary

Analytes: **Hydrogen sulfide (H₂S)**

Detector: **OMA-300 Process Analyzer**

Process Stream: **High Pressure Acid Leaching Process**

Typical Measurement Range: **0-100 %**

Introduction

The process of High-Pressure Acid Leaching (HPAL) begins with the mining and crushing of metal-containing ore to create a fine material. The fine material is then mixed with water to create a slurry. This slurry is preheated before being sent into an autoclave where it is combined with oxygen and an aqueous acid solution (usually sulfuric acid). Inside the autoclave, the slurry is subjected to high pressure (usually at least 20 atm) and high temperature (usually at least 220 °C). The high temperature and pressure of the closed autoclave vessel improves the solubility rate of the solids and increases the speed of dissolution into the acidic leach solution.

The slurry and the acid solution react in the autoclave for a duration from 30 minutes to 24 hours, depending on the specific application. Upon leaving the autoclave, the slurry is returned to atmospheric conditions via two or more letdown/flash stages. In the case of a metal containing ore, there are various ways to separate the metal from the aqueous leachate solution. When the ore is contacted with sulfuric acid during the leaching process, a metal sulfate will form. One way of separating the metal is to precipitate the aqueous solution of metal sulfate into a metal sulfide. This can be achieved by running H₂S through the aqueous solution. The concentration of H₂S feed used for this process could be anywhere from 10 to 100 % by volume. The metal sulfide precipitant that is produced is then processed further to isolate the metal.

The H₂S feed in this process must be closely monitored to ensure that a high enough concentration of gas is being run through the metal sulfate solution. H₂S may also accumulate in the headspace of the reactor. The H₂S here must be monitored to ensure a safe operation. H₂S has a lower explosive limit of 4%. The OMA-300 Process Analyzer continuously outputs H₂S readings, providing new measurements approximately every 5 seconds.

System Benefits: OMA-300 Process Analyzer

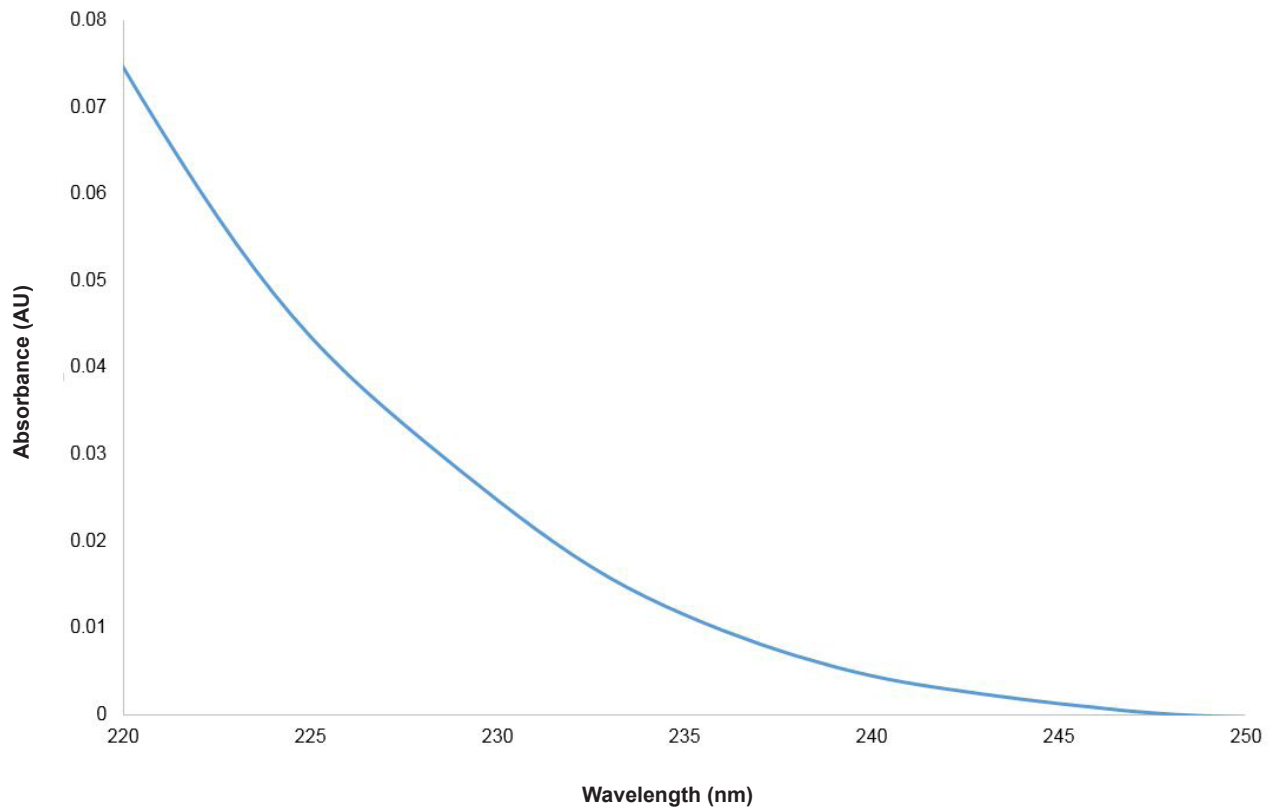
- » Continuously measures H₂S levels using UV-Vis spectrophotometer
- » Totally solid-state build with no moving parts — modern design for low maintenance
- » Additional software benches for up to 4 chemical analytes
- » Ultra-safe fiber optic design with no sample gas inside analyzer unit — world's safest solution for this application

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Absorbance Spectrum of H₂S



This spectrum was taken with the OMA-300 Process Analyzer on a calibration standard mixture of 1% H₂S.



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