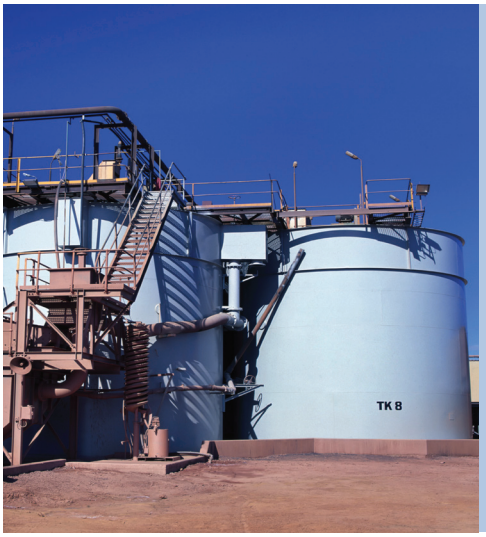

CNSolution™ 9310 On-line Cyanide Analyzer

Product Release Synopsis

I – Product Description/Function

The CNSolution 9310 On-line Cyanide Analyzer is designed to measure and control cyanide used in hydrometallurgical leaching of gold and silver from ores. Most gold occurs at very low concentrations in ores: less than 10 grams/ton (0.001%). Hydrometallurgical extraction is the only economically viable method of extracting gold from such ore. Leaching solutions typically contain cyanide in concentrations ranging from 50 ppm to 2,000 ppm. Figure 1 depicts the cyanidation process and points in the process where CN 9310 analyzers may be deployed. Controlling the cyanide concentration of the leach solution minimizes cyanide consumption and ensures a sufficient concentration is present for efficient extraction of gold. On-line cyanide monitoring enables mill operators to optimize the process and significantly reduce operating costs. A 10 percent decrease in cyanide-related costs (consumption and detoxification) can potentially save an average milling operation hundreds of thousands of dollars per year.

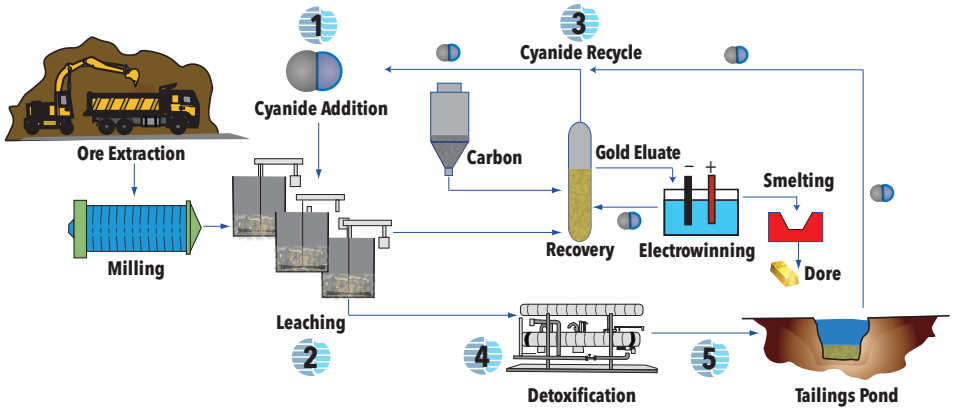

Figure 1. Precious Metal Cyanidation Process

The CNSolution 9310 supports measurement and control of cyanide in multiple cyanidation unit operations.

- Cyanide Addition
- Leaching
- Cyanide Recycle
- Detoxification
- Effluent Discharge / Tailings

Hydrometallurgical gold milling operations have multiple potential applications for CNSolution 9310 cyanide analyzers. Instruments may be deployed in unit operations and locations other than the leaching circuit. A brief description of these applications is provided below.

Laboratory Analysis

Some gold mills will have laboratories on-site or located nearby to help support their operations. The chemical composition of ores is key factor in determining the processing steps and conditions necessary to extract precious metals efficiently and economically. Metallurgists conduct bench top bottle roll tests on milled ore samples to determine the optimum cyanide concentration for recovery of gold. A CNSolution 9310 can be used as a bench top analyzer to perform these tests. Grab samples are also taken on a non-routine basis from the leaching tanks and tested in the laboratory as a process control check.

Detoxification

The International Cyanide Management Code defines good practices and guidelines governing the use, treatment, and disposal of cyanide by hydrometallurgical milling operations. The code set a limit of 50mg/L in tailings solution discharges. To comply with this limit spent cyanide solutions from the leaching process must be detoxified by one of several processes. Detoxification involves the use of strong oxidizing agents to destroy cyanide and reduce its concentration below 50 ppm. The efficiency of the detoxification process can be monitored and controlled by installing CNSolution 9310 analyzers to measure the cyanide concentrations in influent and effluent solutions. Optimization of the detoxification process can significantly reduce the use and associated expense of oxidizing agents in this unit operation.

Tailings

Following detoxification to a concentration below 50ppm tailings solutions are discharged into a tailings impoundment pond. Exposure to natural ultraviolet light further degrades cyanide levels in tailings ponds.

The CNSolution 9310 analyzer is used to measure the cyanide concentration in tailings pond solutions and in cyanide recycle circuits to verify that concentrations are suitable for their intended use. For instance, cyanide recycle solutions that will be used for flotation of copper sulfides (chalcopyrite) must be below 0.5 ppm.

II – Principle of Operation

The CNSolution 9310 (Figure 2) measures free cyanide in precious metal leaching and tailings solutions by the gas-diffusion amperometry technique in U.S. EPA Method OIA-1677 and ASTM D 6888-09. The principle of operation is depicted in Figure 3 and described below. In operation, a filtered sample is drawn into the CNSolution 9310 to fill a fixed volume loop. A base reagent is continuously pumped through one side of a gas diffusion membrane and out through the flow-cell of an amperometric detector. Sample in the loop is injected into an acidic carrier streat. The acidic conditions convert the cyanide ion into hydrogen cyanide which diffuses across the hydrophobic membrane into the base reagent where it converts back to the cyanide ion and enters the flow-cell of the amperometric detector. Cyanide ions react with a silver electrode and generate a current proportional to the cyanide concentration. The detector response for each injection is displayed in real-time as a peak on the touch-screen display and can be output to a Supervisory Control and Data Acquisition (SCADA) system.

Figure 2. CNSolution™ 9310 On-line Cyanide Analyzer

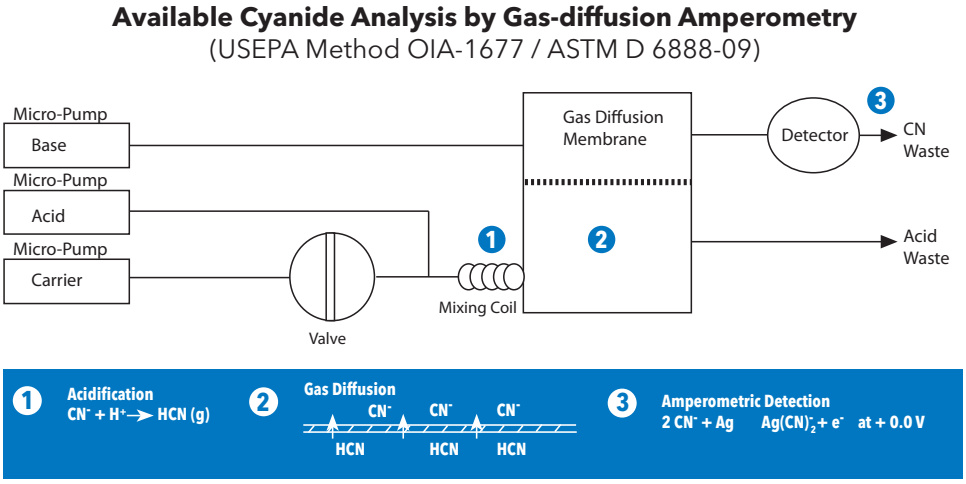

Figure 3. CNSolution™ 9310 Operating Principle

III – Product Specifications

Design and performance characteristics of the CNSolution 9310 On-line Cyanide Analyzer are summarized in Table 1. Three measurement ranges are cited reflecting deployment of the CNSolution 9310 in different locations and applications in the cyanidation process.

Operating Principle	FIA by gas diffusion amperometry
Measurement Technique	Amperometric detection – Silver electrode
Measurent Ranges	0.2 to 50 / 2.0 to 500 / 20 to 2000 ppm CN
Reference Methods	USEPA OIA-1677 / ASTM D 6888-09 (Available CN)
Calibration	2 point calibration
Measurement Accuracy	± 5% at 50-ppm
Sample Introduction	Continous on-line fill-and-spill sampling system
Sampling Interval	User programmable
Analysis Time	< 3 minutes
Operating Environment	5 - 45 ˚C, up to 90% humidity (non-condensing)
Operator Interface	Windows® CE-based, color touch-screen display
Reagents Required	Water, NaOH, HCl, CN-calibration standards
Power Requirements	24 VDC
Output Relays	2 (system alarm, sample alarm)
Analog Output	2 4-20mA (user-configurable concentration)
Data Export	To PC via Ethernet, or using USB memory stick
Instrument Enclosure	NEMA 4X / IEC Class IP-56
External Dimensions	48.3 cm H x 31.1 cm W x 31.1 cm D (19″ H x 12.25″ W x 12.25″ D)
Weight	11 kg (24 lbs)
Certifications	CE

Table 1. CNSolution™ 9310 Specifications

IV – Technical / Competitive Advantages

The CNSolution 9310 was developed to overcome problems and limitations associated with other cyanide measurement techniques (i.e.; titration, electrodes, etc.). Some of the key technical and competitive advantages of the CNSolution 9310 analyzer are noted below.

Superior Accuracy

The gas-diffusion amperometry technique employed in the CNSolution 9310 has been demonstrated to be free of interferences from copper and metallic sulfides in precious metal leaching solutions. Copper complexes with cyanide reducing the cyanide available for leaching. Titration methods commonly used for process control do a poor job of estimating the amount of cyanide available for leaching when copper is present. The CNSolution 9310 responds quantitatively to CN-, plus zinc, copper, cadmium, and silver cyanide complexes over the entire instrument calibration / measurement range (0.2 to 2,000ppm). Measurement accuracy is ± 5% at 50ppm.

Verifiable Results

The automatic calibration function of the CNSolution 9310 and programmed analysis of independent check standards help verify the analyzer is reporting accurate results. Results of on-line measurements obtained with the CNSolution 9310 can also be verified by testing grab samples on a laboratory instrument running the same methodology (OIA-1677 / ASTM D 6888) without applying a correction factor to account for the variance between different analytical techniques / methods.

Multiple Measurement Ranges

The CNSolution 9310 supports three measurement ranges; 0.2 to 50, 2.0 to 500, and 20 to 2,000ppm enabling the analyzer to be deployed in multiple locations and applications in the cyanidation process. These measurement ranges enable continuous monitoring and control of cyanide concentrations in leaching and detoxification operations.

Fast Analysis Time

The gas-diffusion amperometry flow injection analysis technique provides results within two minutes of sample injection. Cyanide concentration and peak traces are displayed in real-time on the CNSolution 9310 color touch-screen display. Fast analysis time and continuous on-line monitoring supports tighter control of cyanide concentration and associated operating costs.

V – Market Opportunity

The target market for the CNSolution 9310 On-line Cyanide Analyzer are facilities that use hydrometallurgical cyanidation to extract gold and silver from ores. There are approximately 875 licensed commercial gold and silver operations worldwide. 460 of these operations use cyanide for gold and silver extraction.

Countries in North and South America reporting gold production levels in excess of tens of thousands of kilograms include; Argentina, Bolivia, Brazil, Canada, Chile, Colombia, Mexico, Peru, and the United States.

Countries in the Asia-Pacific region reporting gold production levels in excess of thousands of kilograms include; Australia, China, Indonesia, Japan, New Zealand, New Guinea, Philippines, and Vietnam.

VI – Product Launch Plan

The official launch of the CNSolution 9310 On-line Cyanide Analyzer will be at two conferences and tradeshows in the first quarter of 2013. The Society of Mining and Metallurgical Engineers Conference and Exhibition (SME 2013) will be held in Denver, February 24 – 27, 2013. The Pittsburgh Conference on Analytical Chemistry (PittCon 2013) will be held March 18 – 21, 2013.

The CNSolution 9310 will be on display at these exhibitions and technical presentations will be delivered in the technical sessions of both conferences.

The first print advertisements for the CNSolution 9310 will appear in the February issue of Mining Engineering magazine and the official program of SME 2013. Additional ads will be placed in Mining Engineering and other appropriate U.S. and International publications going forward.

Product Literature & Sales Tools

An assortment of product literature and sales tools have been prepared to support the sales process. A CNSolution 9310 product brochure with analyzer specifications (Publication # 3765) is available along with an application note (Publication # 3789), Lock-Out Bid Specifications (Publication # 3770), and a FABS – Features, Advantages and Benefits document (Publication # 3771).

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