CNSolution™

Automated Cyanide Analyzer

- Performs available cyanide analysis without a 2-hour acid distillation step using a ligand-exchange, gas diffusion technique.
- Performs total cyanide analysis without a 2-hour acid distillation step using a UV-digestion, gas diffusion technique.
- Runs USEPA-approved Method OIA-1677 for available cyanide in drinking water and wastewater.
- Supports USEPA Method 335.4 with an optional photometric detector and Midi-distillation system.

Principal Applications

- Drinking Water
- Wastewater
- Surface water
- Soil extracts
- Industrial and Solid Waste
- Industrial Process Solutions
- Homeland Security
- Food Safety Testing
- ASTM Aquatic Free Cyanide
- Combustion and Stationary Air Sources

Methods

- USEPA Method OIA-1677 (Available CN^-/CATC/WAD)
- ASTM Methods (D6888-04, D7237-06, D7295-06)
- USEPA Method 335.4
- ISO-14403:2002
- SW846-9010

Description and Function

The CNSolution™ Cyanide Analyzer is a compact, modular system for performing flow injection cyanide analysis on drinking water samples and wastewater samples from mining, metal plating, and other industrial operations. The CNSolution consists of a 90-position random access X-Y-Z autosampler, a multi-channel precision pump, an electrically-actuated sample injection valve, a VersaChem reaction manifold, and an amperometric detector.

The CNSolution measures available cyanide by a ligand-exchange, gas diffusion technique coupled with high sensitivity amperometric detection in accordance with USEPA method OIA-1677 and ASTM D6888-04.

An optional in-line UV Digestion module allows total cyanide analysis to be performed without a separate distillation step, reducing analysis time from hours to minutes.

The CNSolution can be equipped with a photometric detector for laboratories measuring total cyanide in post-distillation samples by USEPA method 335.4. This configuration can be supplied with a Midi-distillation system for simultaneous distillation of up to 10 samples.

Operating Principle

For available cyanide measurement, samples are treated manually with ligand exchange reagents to liberate cyanide ion (CN^-). The CNSolution automatically injects each sample into a carrier stream. Under acidic conditions, CN^- converts to HCN. HCN diffuses across a hydrophobic membrane into a basic acceptor solution, where it converts back to CN^-. CN^- is then detected amperometrically in the flowcell. WinFLOW software collects and processes the data for analysis and reporting.

For total cyanide measurement, samples pass through an in-line UV digestion module to break down metal-cyano complexes to HCN. Cyanide ions are then detected amperometrically in the same manner as available cyanide.

For post-distillation cyanide analysis, the CNSolution injects pretreated samples into a carrier stream. Cyanide in the sample reacts with color reagents under continuous flow conditions. The photometric detector measures the concentration of the resulting colored complex.

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CNSolution Configurations

System Component	Analysis Method		
	Available Cyanide USEPA OIA-1677 ASTM D6888-04	Total Cyanide UV Digestion OIA-1678	Total Cyanide Post-distillation USEPA 335.4
Autosampler	✓	✓	✓
Injection Valve	✓	✓	✓
Amperometric Detector	✓	✓	
Photometric Detector			✓
Pump	✓	✓	✓
UV Digestion Module		✓	
Midi-Distillation System			Optional

Instrument Specifications

Autosampler	XYZ autosampler, 90 samples, 9 bulk standards
Dimensions	25 cm H x 33 cm W x 33 cm D (9.8″ H x 13″ W x 13″ D)
Space Requirements	76 cm H x 71 cm W x 71 cm D (30″ H x 28″ W x 28″ D)
Weight	7.9 kg (17.4 lb)
Analysis Module	
Dimensions	15 cm H x 25 cm W x 38 cm D (6″ H x 10″ W x 15″ D); without autosampler or pump
Weight	6.8 kg (15 lb)
Injection Valve	Six-port switching valve
Detector	Amperometric @ 0.00 V vs. Ag/AgCl
Flowcell	Thin layer design with Ag working electrode, Ag/AgCl reference electrode, stainless steel counter electrode
Pump	8-channel peristaltic pump, variable speed, digital control, RS-232
Dimensions	13 cm H x 17.5 cm W x 22 cm D (5.1″ H x 7″ W x 8.3″ D)
Weight	5.1 kg (12.1 lb)
UV Digestion Module	Long wavelength (>290 mm) for Total Cyanide
Dimensions	9 cm H x 46 cm W x 39 cm D (3.5″ H x 18.25″ W x 15.5″ D)
Weight	4.5 kg (10 lb)

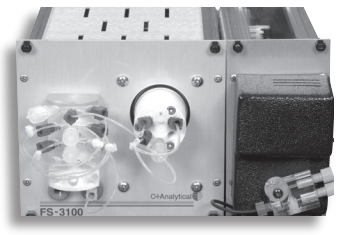
General Specifications

Space Requirements	66 cm L x 76 cm W x 41 cm H (26″ L x 30″ W x 16″ H)
Power Requirements	• 110 (±10%) V_{AC}; 60 Hz • 220 (±10%) V_{AC}; 50 Hz
Computer Requirements	IBM-compatible, 3 GHz, 1 GB RAM, 1 GB free hard disk space, Windows® XP Pro, XGA graphics, CD-ROM drive, available RS-232 port
Operating Software	WinFLOW™; Windows®-based system control, analysis, and data handling software
Warranty	12 months on parts and labor

Analytical Specifications

Application Ranges by Analysis Method	See "CNSolution Configurations" above for the required system components.
Available Cyanide	2–5,000 ppb
Total Cyanide	2–5,000 ppb
Post-distillation Cyanide	5–500 ppb
Sample Size	40–200 µL
Sample Throughput	~30 samples per hour
Sample Preparation	Refer to the Analytical Methodology.
Amperometric Detection	No distillation required.
Photometric Detection	Depends upon method requirements.

UV Digestion module



Post-distillation cyanide injection valve/manifold and photometric detector modules

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