



A measuring station under a bridge



The ATMS Technical Specifications

The ATMS has two cabinets, one with the main electronics and one with the water system. As an option, two of the latter can be connected

Electrode system:	Patented Alloys Silver/Silver Chloride Platinum
Software:	Windows 2000™
Dimensions:	30 x 40 x 21 cm each
Weight:	2 x 10 kg
Power Supply:	230 V AC, Max 10 A
Electrode Connection:	3 x Cable eye (6mm ²)
Polarization:	
Voltage range:	± 5 V
Sweep Types:	Differential Pulse/ Staircase
Sweep Direction:	Anodic/Cathodic
Min. Sweep Step Height:	5/8 mV
Min Sweep Step duration:	10 ms

Measurements	
Input impedance:	> 10 ⁹ Ω
Current ranges:	±2 μA, 20 μA, 200 μA
Power Supply:	230 V AC, Max 10 A
Electrode Connection:	3 X Cable eye (6 mm ²)
Resolution Current measurement:	14-bit
Resolution Feedback:	14-bit

Voltammetry

Linear Scan, CV, Differential Pulse, Square Wave, Anodic/Cathodic Stripping

Communication

Serial: RS232
Communication over Modbus in RTU mode
Mode LAN Data delivery through web services or TCP direct
USB
4- 20 mA
SMS warning



From an integrated measuring station in Poland

Further information:
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ATMS500



The SensAqua Automatic Trace Metal monitoring System for remote, unattended, automatic and continuous monitoring of heavy metals



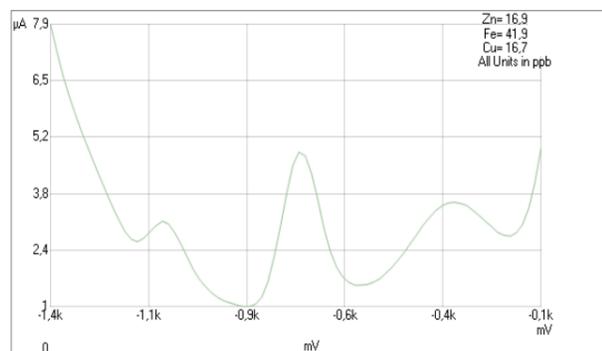
No liquid mercury
No mercury salts
No toxic materials

ATMS500 (wall version)

- Quantification of several different metals using one or two sensors (Zn, Pb, Cd, Ni, Co, Tl, Hg, As etc.)
- Environmental friendly electrodes and chemicals
- High sensitivity, down to 1 ppb (1 μg/L), with typical measuring accuracy ± 10 % at 10 ppb
- Automatic warning via SMS
- Stable over time, typical one month without attendance
- Simple maintenance
- Short time for each analysis (2-5 minutes)
- Almost neglectable operating costs and maintenance
- Compact wall version, but can also be supplied as a complete floor cabinet or as a simplified version for manual use in a laboratory. Integrated automatic systems can also be offered, also to measure pH, TOC, conductivity etc.
- User friendly calibration
- Automated sampling pretreatment and analysis
- Automatic electrochemical cleaning of electrodes
- Quantification of various metal forms (species)
- Small sample volume (35 mL)
- Simple and user friendly software for equipment control and presentation of results
- Real time/on-line data presentation, if wanted on the Internet

Actual groups of users

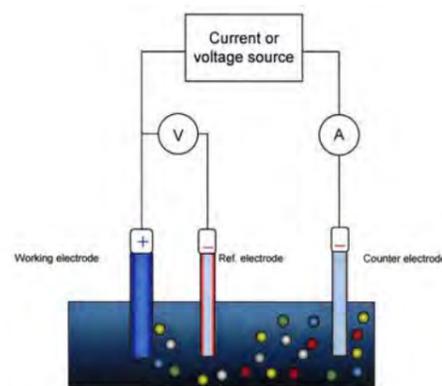
- Private and public institutions – surveillance of quality of municipal drinking water and effluents
- Already established automatic monitoring stations, also to include heavy metals
- Metal and metallurgical industry
- Terminated industrial areas and mines
- Construction work
- Oil and shipping
- Solid waste and incineration plants
- Sea farming
- Fundamental research and laboratory use



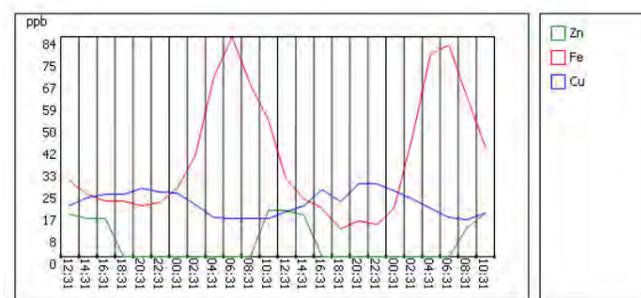
Typical voltammetric curve from a measuring station

Five requirements are needed for making such automatic voltammetric analyses useful:

1. Sufficient high overvoltage to allow the measurements without interferences from hydrogen gas formation
2. Sufficient long term stability without need of maintenance
3. Sufficient sensitivity to allow monitoring of trace pollutants
4. That non-toxic material is used (very important for off-laboratory methods)
5. Not too expensive material needed



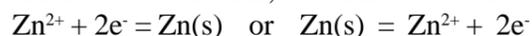
Measuring cell with electrodes



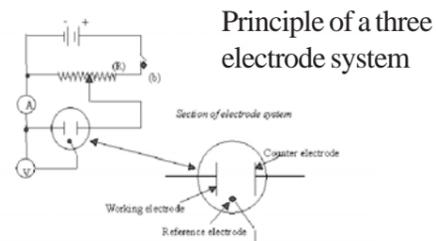
Typical results of measurements over time in a river close to a mining area in Norway

VOLTAMMETRY

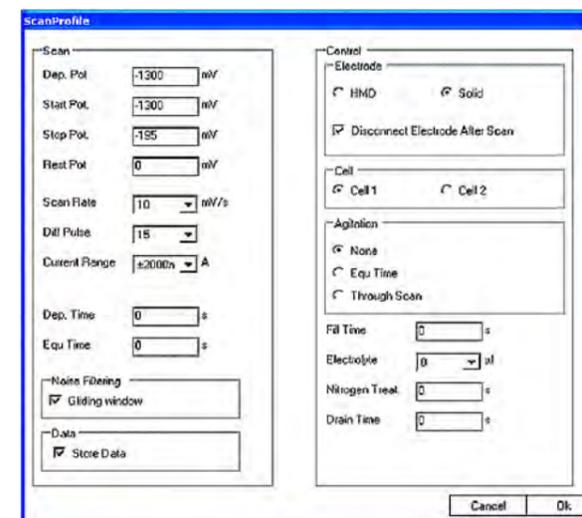
Voltammetry is an electroanalytical method where metals or other species are determined through their redox and diffusion properties, like, for the reduction of zinc metal, or oxidation of solid zinc metal to Zn^{2+} ions:



This is a very sensitive analysis technique that is very suited for the detection of heavy metals for online and automatic monitoring as no other methods can be used for such purposes. Voltammetry is fast, simple and has low analysis costs. The instruments required are also low cost relative to ICP, ICP-MS and chromatographic methods. The method has good sensitivity and a detection limit for the most important heavy metals in the lower ppb region or lower. As a result, the method is suitable for use in analyses of drinking water, industrial processes etc.



Principle of a three electrode system



From the programming panel

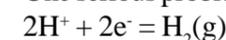


Electrodes

A three-electrode system with a working electrode, a reference electrode and a counter electrode is used. The reference electrode is used to control a given potential over time profile vs. the working electrode at zero current. The current flow is measured between the working electrode and the counter electrode, and a voltage is applied there to obtain the mentioned time profile. There are many different voltammetric techniques, depending upon the given time profile. The most common are Linear Scan Voltammetry, Square Wave Voltammetry and Differential Pulse Voltammetry.

Stripping Voltammetry is amongst the most sensitive procedures when combined with one of the mentioned techniques. Using this method, the metal is initially reduced to the solid metal that is deposited on the surface of the working electrode and thus enriched, followed by an oxidation of that metal. Higher sensitivity can be achieved by increasing the deposition time.

One serious problem in voltammetry is the side reaction:



as this will give an interfering electrical current. This current has traditionally been suppressed by using a measuring electrode of liquid mercury or a mercury film electrode, this in turn being made from a mercury salt. This is because mercury has a very high overpotential relative to hydrogen.

Neither liquid mercury nor a mercury salt can be accepted due to the toxicity, in particular for off-laboratory use. Extensive research has been performed internationally for years to find alternative electrode materials.