

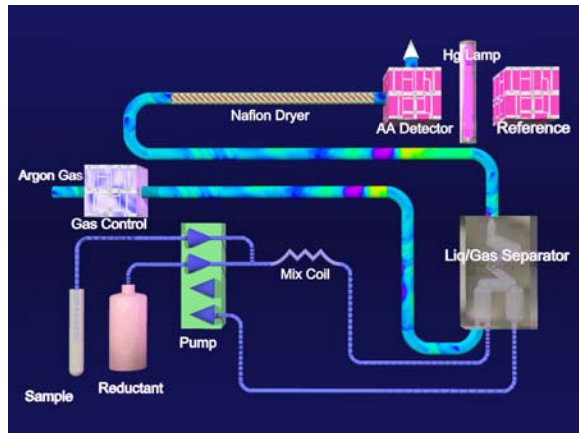
Hydra AA Automated Mercury Analyzer

Questions and Answers



1. ***Is the Hydra AA a cold vapor technique?***
Yes. The Hydra AA is a cold vapor atomic absorption spectrometer (CVAAS) for mercury determinations.
2. ***What is the detection limit for the Hydra AA?***
The instrument detection limit (IDL) is 1-2 part per trillion (ppt).
3. ***What is the Method Detection Limit?***
Hydra AA achieves routinely a MDL of 10-15 ppt.
4. ***How many samples per hour can the Hydra AA run?***
60 samples. A sample throughput of up to 1 minute can be achieved.
5. ***Is the Hydra AA a double beam design?***
Yes. The purpose of a double beam design is to minimize variations due to the mercury lamp. While the optical cell has only one channel, a small section of the light is skimmed off before it enters the optical cell and sent to a separate detector. This detector controls the output of the lamp to ensure that there is minimal fluctuation.
6. ***How long is the optical cell on the Hydra AA?***
30 cm. A long optical cell is important for high sensitivity and stability of measurement.

7. ***Why is the Hydra AA gas/liquid separator innovative?***
 The Hydra AA gas/liquid separator combines the best of all current designs. It provides high throughput for routine sample analysis with excellent analytical recoveries for complex or poorly digested samples and the ability to accommodate difficult foaming samples.
8. ***Does the drying tube on the Hydra AA need to be changed daily?***
 No. The Hydra AA utilizes a Nafion moisture removal tube that will last between 6-12 months.
9. ***How does the moisture removal tube work?***
 The moisture removal tube is sulfonic acid coated Teflon polymer. Sulfonic acid has a very high water-of-hydration; each sulfonic acid group absorbs up to 13 H₂O molecules. Water vapor that enters the tube is absorbed by and moves through the walls of tube evaporating into the surrounding air. The humidity gradient between the inside of the tube and the surrounding air drives the reaction until an equilibrium is achieved. The tube is protected by a polypropylene braiding. The analyte gases are not affected and pass through the tube into the optical cell.
10. ***Can the peak on the Hydra AA be viewed in real time?***
 Yes. A signal setting on the Hydra AA displays the signal as it is being analyzed.
11. ***Does the Hydra AA use a flow injection system or continuous flow?***
 Continuous flow is used. Continuous flow has two important advantages when compared with flow injection systems. First, continuous flow allows the sample introduction to be stopped if the signal indicates the sample is too high in mercury concentration. With flow injection, the entire sample must go through the system and contamination can result in extended periods of cleanup. Second, adjusting sensitivity is achieved by changing pump rate and argon flow in a continuous flow system while the flow injection sample loop hardware must be exchanged.
12. ***How does the Hydra AA sample Cycle work?***
 The sample cycle starts with the rinse signal from the rinse solution which is monitored until a baseline is determined. Next the sipper moves to the sample and reducing agents are mixed. Mercury present in the sample is reduced and carried to the absorption cell. The detector constantly monitors the signal from its inception through the integration period. Finally, the sipper is returned to the rinse solution and the next sample rinse period begins.

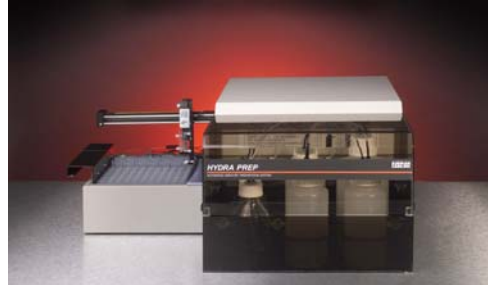


Schematic of the Hydra AA Flow System

13. ***How does the high mercury protection system work?***
The slope of the sample signal is continually measured and if the slope is too steep, the high mercury protection system is initiated. The sample tip is moved to the rinse and the gas flow is increased to flush out the mercury vapor before it can adhere to any internal surfaces. Next, the pump rate doubles to wash rinse solution through the liquid handling areas to remove any remaining mercury sample. The system remains at high gas flow and high pump rate until a stable baseline returns. The high sample is flagged on the report, and then the next sample is analyzed.
14. ***Can Hydra AA be equipped with an autosampler?***
Yes. A Teledyne Leeman Labs random access autosampler controlled by WinHg software can be used. The autosampler holds up to 88 samples, 7 calibration standards and 7 check standards per batch.
15. ***Is WinHg software state-of-the-art?***
Yes. WinHg is designed to run on Windows 95, 98, 2000 ME and NT platforms. It features true multi-tasking capabilities, a standard Windows graphical interface, superior file maintenance capabilities, large capacity of data sets (3000 records) and remote communications capabilities. The basic Hydra AA System is supplied with Windows XP Professional Software.
16. ***Does WinHg provide assistance in tracking maintenance requirements?***
Yes. Audio Visual aids ensure that the consumable items of Hydra AA are replaced at the proper frequency to keep performance at a maximum.
17. ***Does WinHg provide On-Line Audio and Visual Help?***
Yes. An on-line program guides users through all routine operation and maintenance procedures.
18. ***Is Hydra AA compliant with International Standards for Mercury Analysis?***
Yes. Hydra AA is compliant with U.S. EPA Methods 245.1, 245.5, 245.6, 7470A and 7471B, as well as with European Standards EN-1483 and EN-13806. In addition, Hydra AA is compliant with many national standards for mercury determination in drinking water, surface water, sludge, sediments and soils, as well as foodstuff, fish and biological samples, such as tissue, blood and urine.
19. ***Does Hydra AA require the use of gases?***
Yes. 99.999% pure argon or nitrogen is recommended. Alternatively, air can be employed as the carrier gas; however, if air is used it must be free of oil and moisture.
20. ***How much laboratory bench space does Hydra AA require?***
Hydra AA is 45 cm (17.7") wide by 43 cm (17") deep by 33 cm (13") high. The optional autosampler is placed on the left side of the Hydra AA. It adds an additional 31 cm to the width. The computer can be placed on the right side of the Hydra AA and the printer on top. If space is tight, a lap-top computer to be placed on top of the Hydra AA can be used instead.

21. **Does Teledyne Leeman Labs have an automated mercury sample preparation system available to improve our laboratory productivity?**

Yes. The optional Hydra Prep system can be run simultaneously off the same computer as the Hydra AA. Sample racks can be transferred directly from Hydra Prep to Hydra AA.



Leeman Labs Hydra Preparation System

22. **Can Hydra AA analyze sub-ppt concentrations of mercury?**

The Hydra AA has a detection limit of 1-2 ppt. Teledyne Leeman Labs offers as part of the Hydra Series; Hydra AF and Hydra AF Gold Plus Mercury Analyzers. These instruments are based on cold vapor atomic fluorescence spectrometry (CVAFS) and gold amalgamation for pre-concentration of mercury and allow determinations down to the sub ppt and 0.05 ppt concentration levels as required by U.S. EPA Methods 245.7 and 1631 respectively.

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