DMA-1 Direct Mercury Analyzer

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8 good reasons to choose the Milestone DMA-1

1. No sample preparation

The DMA-1 does not require any sample preparation or other wet chemistry prior the analysis.
This means ease of use, low running cost and no need for hazardous chemicals to purchase, handle and dispose.

2. Ease of use

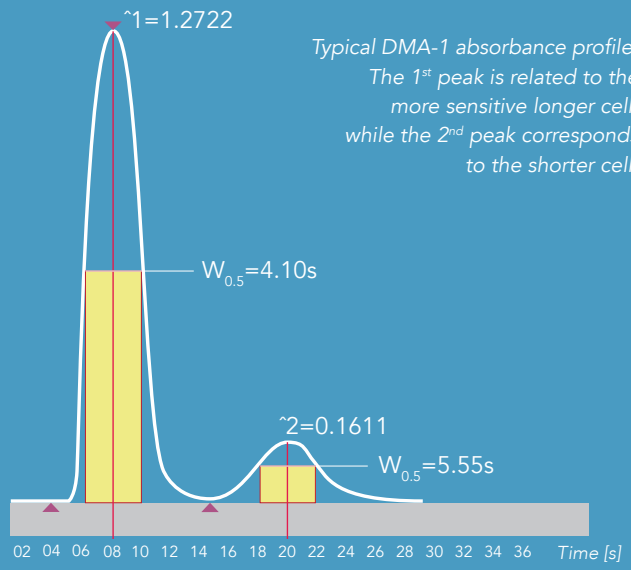
Just weigh your sample, load it onto the instrument and press 'start'.
The DMA-1 is so simple to use that it can be operated in the field, not only in the analytical laboratory.

3. Lowest cost of analysis

Ease of use, speed of analysis, catalyst and amalgamator long lifetime, sample boats durability and the possibility of using air as combustion and carrier gas minimize the DMA-1 cost of analysis.

4. Best analytical performance

Combining an innovative mercury measuring system with a unique optical path spectrophotometer, the DMA-1 achieves a detection limit as low as 0,003 nanograms of mercury and is capable of measuring up to 1.500 nanograms of mercury, equivalent to a concentration of 15 mg/kg (15 ppm) on a 100 mg sample analysis.



Typical DMA-1 absorbance profile. The 1st peak is related to the more sensitive longer cell, while the 2nd peak corresponds to the shorter cell.

5. Official methods compliance

The DMA-1 is compliant with the US EPA method 7473 (Mercury in solids and solutions by thermal decomposition, amalgamation, and atomic absorption spectrophotometry), with ASTM method D-6722-01 (Total mercury in coal and coal combustion residues) and ASTM method D-7623-10 (Total mercury in crude oil).

6. High productivity

The DMA-1 is incredibly fast. Sample weight is automatically transferred from the analytical balance to the instrument, and a complete analysis -start to finish, takes just 5 minutes.

7. Easy maintenance

All the DMA-1 components, such as the catalytic furnace, amalgamator and spectrophotometer, are easily accessible for routine cleaning and maintenance.

8. Largest installed base

With over 1300 units installed in 80 different Countries worldwide, Milestone is the acknowledged market leader in direct mercury determination.
Our extensive experience enables us to provide the highest level of application and service support.

Milestone DMA-1

How it works

The Milestone DMA-1 is a direct mercury analyzer of solid, liquid, and gas samples.
Analysis time is 5 minutes only and no sample preparation is required.
The DMA-1 is based on the principles of sample thermal decomposition, mercury amalgamation and atomic absorption detection.
The DMA-1 shares the same technology of the Milestone DMA-80, the most successful direct mercury analyzer in the market with over 1300 units installed in 80 different Countries worldwide.
The sample is weighed into a quartz vial, and its weight automatically transferred from the analytical balance to the DMA-1.
Sample vial is then loaded onto the instrument.
Sample is dried and then thermally decomposed in an oxygen-rich stream.
Mercury and other combustion products are released and flown through the catalyst, where all interfering substances, such as halogens and nitrogen or sulfur oxides, are eliminated.
Mercury is selectively trapped by gold amalgamation, while other combustion by products are flushed off.
The amalgamation furnace is heated and mercury is rapidly released.
Mercury is finally carried into multiple measuring cells positioned along the optical path of the spectrophotometer, and quantitatively measured by atomic absorption at 253,65 nm.

DMA-1 user interface

The DMA-1 is operated via a compact control terminal with easy-to-read, bright, full-color, touch screen display or, alternatively, by a Windows-based computer.
The terminal is provided with multiple USB and RS-232 ports for direct printouts of methods and runs, and for interfacing the instrument to an external balance.

The terminal runs Milestone's unique EasyCONTROL software, providing simple and intuitive, but extremely flexible and powerful control over the analytical process.
All sample parameters, including furnace temperatures, method profiles, absorbance signals, results, and calibrations are saved.
They can be viewed, easily transferred using a USB memory stick or integrated to LIMS Laboratory Information Management Systems.

EasyCONTROL software includes the unique AutoBLANK feature.
If, following the analysis of a sample with a very high mercury content, the pre-set blank level is exceeded; EasyCONTROL will automatically run blank cycles until the pre-set blank level is achieved.

EasyCONTROL allows the operator to designate certain samples as reference, or QC samples.
Once a sample is designated as a reference, a known concentration value is entered.
If the analysis of that sample yields a concentration outside the acceptable range specified by the operator, EasyCONTROL can be pre-set to either continue, stop, or pause the analysis of the remaining samples.

EasyCONTROL software is fully compliant with FDA regulations 21 CFR Part 11.

Milestone DMA-1 analytical performance

Accuracy

The DMA-1 produces accurate results over a wide dynamic range and on a variety of different matrices.
The results below refer to analyses on solid certified reference materials with a mercury concentration ranging from 5 µg/kg to nearly 5 mg/kg.

Sample	*Certified (µg/kg)*	*DMA-1 (µg/kg)*
NIST 1568a Rice Flour	5,8 ± 0,5	5,9 ± 0,2
BCR-277R Estuarine Sediment	128 ± 17	121 ± 2
DORM-4 Fish Protein	410 ± 55	375 ± 3
NIST 2781 Domestic Sludge	3.640 ± 250	3.757 ± 88
BCR EC 680k Polythene	4.640 ± 220	4.780 ± 94

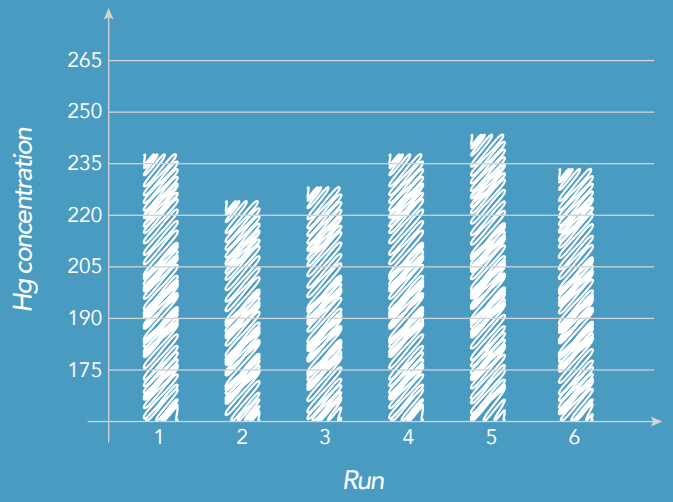
Sample matrix

The DMA-1 produces matrix-independent results.
The instrument is calibrated using aqueous standards and then analyzes organic and inorganic solid samples.
Just one method is used to analyze a variety of different matrices making the DMA-1 extremely easy to use.

Precision

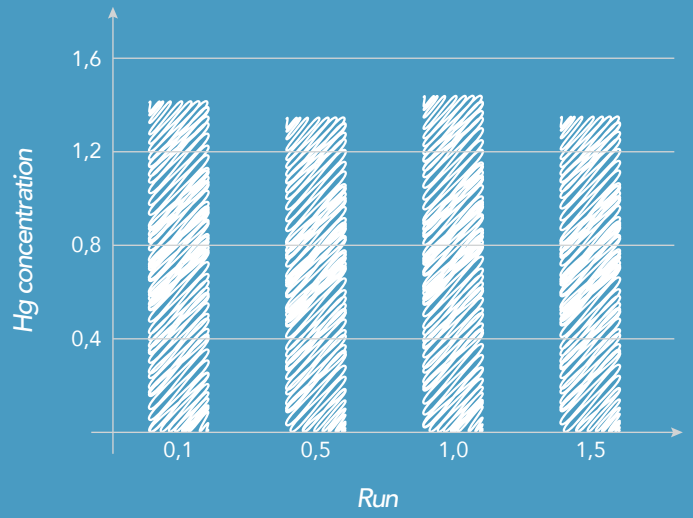
The DMA-1 provides reproducible results over a broad range of samples, such as polymers, food and feed, and oils, for instance.

Crude Oil
average=22,15
sd=0,53
RSD=2,4%



Sample amount

Up to 1,5 grams of solid or 1,5 mL of liquids can be analyzed.
This is particularly important for the analysis of heterogeneous materials or for samples with a very low mercury concentration.
The graphic shows results obtained on NIST 2709 (San Joaquin Soil), a certified reference material with known mercury content of 1.32- 1.48 mg/kg.

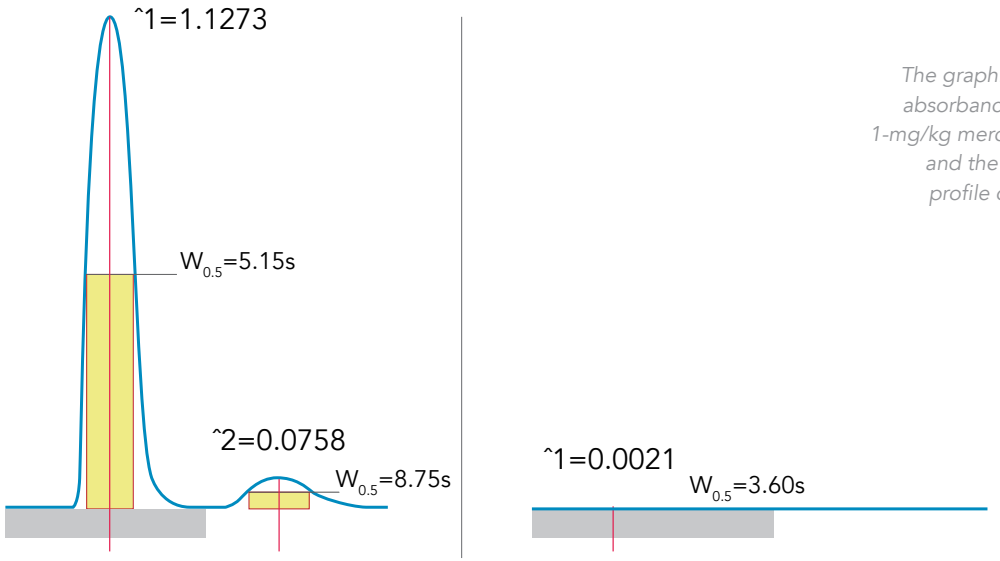


Stability

The instrument calibration lasts for months of operation, and the results are stable over time.

Memory effect

The DMA-1 does not virtually suffer from any memory effect.
The instrument software features the 'Autoblank' function, by which the user preset a satisfactory blank level.
If that level is exceed the instrument automatically runs blank cycles until the expected level is reached.
This is important when analyzing a series of unknown samples.



The graphic shows the absorbance peak for a 1-mg/kg mercury solution and the subsequent profile of blank run.

Gas analysis

Sorbent Traps

Milestone Sorbent Traps expand the capabilities of the DMA-1, enabling the measurement of mercury in gases.
Simply sample the gas, through a dedicated mass flow controller, using the Sorbent Traps, and load them onto the DMA-1.
Total mercury (elemental and oxidized forms) is quantitatively measured in 5 minutes.
Sorbent Traps are reusable and extremely easy to operate.

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