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## DMA-80 Direct Mercury Analyzer



# 8 good reasons to choose the Milestone DMA-80

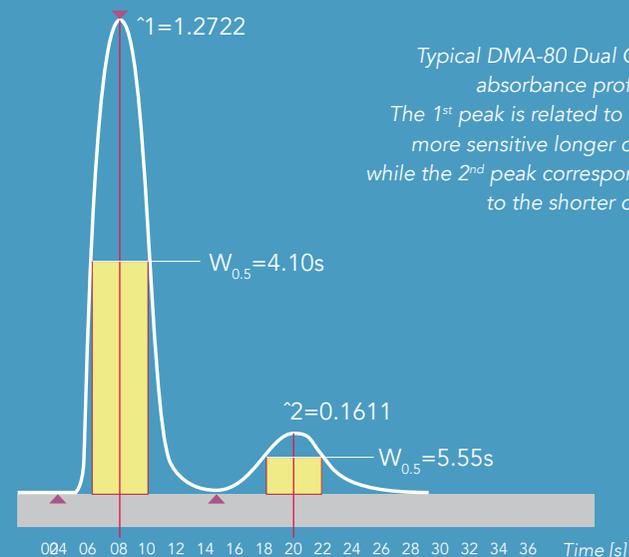
## 1. No sample preparation

The DMA-80 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. Best analytical performance

Combining an innovative mercury measuring system with a unique optical path spectrophotometer, the DMA-80 achieves a detection limit as low as 0,001 nanograms of mercury and is capable of measuring up to 30.000 nanograms of mercury, equivalent to a concentration of 300 mg/kg (300 ppm) on a 100 mg sample analysis.



## 3. Ease of use

Just weigh your sample, load it onto the built-in auto-sampler and press 'start'. The DMA-80 is so simple to use that it can be operated in the field, not only in the analytical laboratory.

## 4. High productivity

The DMA-80 is incredibly fast. A complete analysis -start to finish, takes 5 minutes. Sample weight is automatically transferred from the analytical balance. The dual-tray auto-sampler allows sample loading 'on-the-fly', for a continuous operation of the instrument.

## 5. Lowest cost of analysis

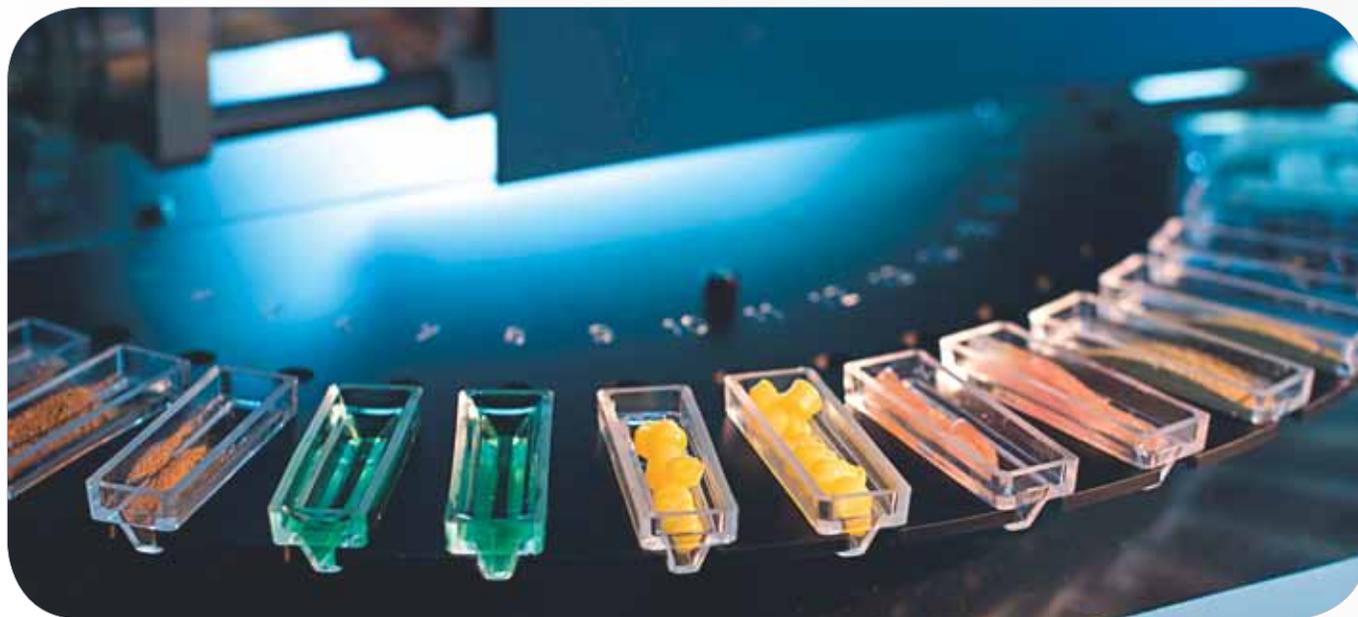
Ease of use, speed of analysis, catalyst and amalgamator long lifetime, sample boats durability and the possibility of using air as combustion and carrier gas minimize the DMA-80 cost of analysis.

## 6. Easy maintenance

All the DMA-80 components, such as the catalytic furnace, amalgamator and spectrophotometer, are easily accessible for routine cleaning and maintenance.

## 7. 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.



## 8. Official methods compliance

The DMA-80 has been used to develop the US EPA method 7473 (Mercury in solids and solutions by thermal decomposition, amalgamation, and atomic absorption spectrophotometry). It is furthermore compliant 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).

# Milestone DMA-80

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The Milestone DMA-80 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-80 is based on the principles of sample thermal decomposition, mercury amalgamation and atomic absorption detection.

With over 1300 units installed in 80 different Countries worldwide, the DMA-80 is the most successful direct mercury analyzer in the market.

The sample is weighed into a quartz or metal boat, and its weight automatically transferred from the analytical balance to the DMA-80.

Sample boats are loaded 'on-the-fly' onto the instrument auto-sampler.

Samples are 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-80 user interface

The DMA-80 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-80 analytical performance

## Accuracy

The DMA-80 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 over 25 mg/kg.

Sample	Certified (µg/kg)	DMA-80 (µg/kg)
NIST 1568a Rice Flour	5,8 ± 0,5	5,9 ± 0,2
BCR-150 Skim Milk Powder	7,7-11,1	9,2 ± 0,2
NIST 1630a Coal	93,8 ± 3,7	93,4 ± 2,4
NIST 1633b Fly Ash	141 ± 19	149 ± 2
BCR-61 Aquatic Plant	210-250	221 ± 3
GSD-10 Stream Sediment	280 ± 40	270 ± 15
BCR-422 Cod Muscle	543-575	558 ± 8
IAEA-086 Human Hair	534-612	574 ± 12
NIST 2711 Soil	6.250 ± 190	6.240 ± 70
BCR-680 Polyethylene	24,3-26,3 mg/kg	25,8 ± 0,5 mg/kg

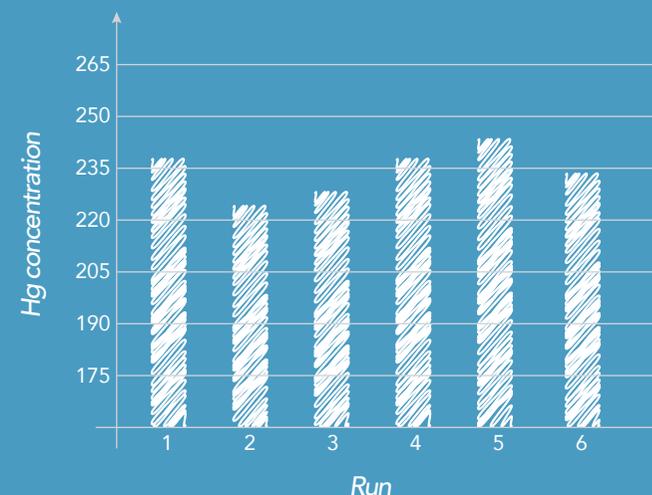
## Sample amount

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.

## Precision

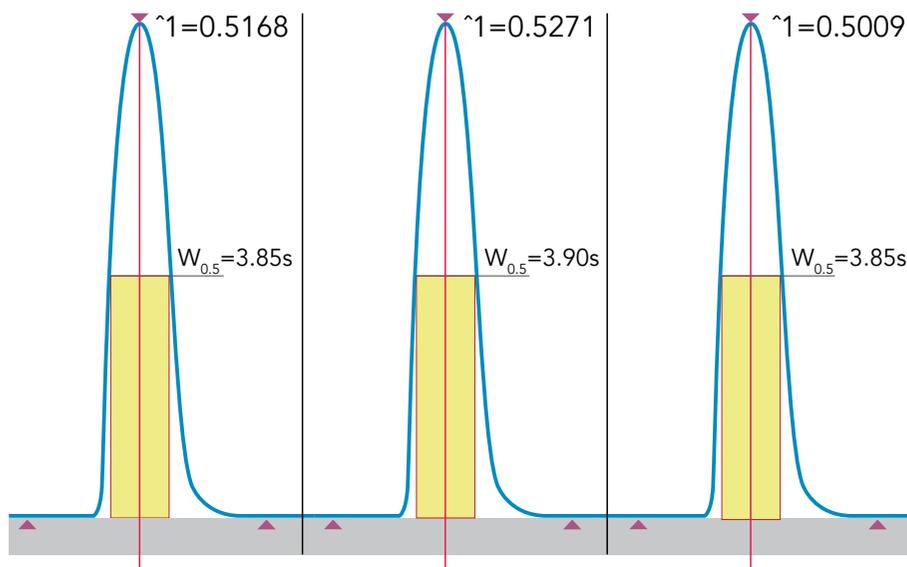
The DMA-80 provides reproducible results over a broad range of samples, such as polymers, food and feed, and biologicals for instance.

*Tuna fish*  
average=235  
sd=5  
RSD=2,2%



## Sample matrix

The DMA-80 produces matrix-independent results. The instrument is calibrated with aqueous standards and analyzes organic and inorganic solid samples. Just one method is used to analyze different matrices making the DMA-80 extremely easy to use. 10 ng of mercury from aqueous mercury standard, NIST 2709 Soil and NIST 1632c Coal, generate the same absorbance peaks.



10 ng of mercury from aqueous mercury standard (left), NIST 2709 Soil (center) and NIST 1632c Coal (right).

## Memory effect

The DMA-80 does not virtually suffer from any memory effect. The instrument software features the 'Autoblack' function, by which the user preset a satisfactory blank level. If that level is exceeded the instrument automatically runs blank cycles until the expected level is reached. This is important when analyzing a series of unknown samples.

## Stability

Results are stable over time. The calibration lasts for months of operation. Here is an example on a certified reference material, NIST 2781 Domestic Sludge, which has a mercury content of  $3.640 \pm 250$ .



# Gas analysis

## Sorbent Traps

Sample the gas, through a dedicated mass flow controller, using the Sorbent Traps, and load them onto the auto-sampler. Total mercury (elemental and oxidized forms) is quantitatively measured in 5 minutes. Sorbent Traps are reusable and extremely easy to use.



## Gas Sampling kit

Samples are introduced using either a syringe or from a gas sampling bag. The Gas Sampling Kit includes an injection block for sampled delivery and a vacuum pump, which pulls the injected gas through the analyzer. Applications include mercury determination in natural gas, biogas, gas processing etc. as well as in the environmental field (workplace monitoring, mercury spills screening). Major benefits are: fast analysis (3 minutes per sample), wide dynamic range (0,01 to 1.500  $\mu\text{g}/\text{m}^3$ ) and ease of use.



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### **MILESTONE Srl**

Via Fatebenefratelli, 1/5 - 24010 Sorisole (BG) - Italy  
Tel: +39 035 573857 - Fax: +39 035 575498  
[www.milestonesrl.com](http://www.milestonesrl.com) - email: [analytical@milestonesrl.com](mailto:analytical@milestonesrl.com)

### **MILESTONE INC.**

25 Controls Drive - Shelton, CT 06484 - USA  
Tel: (203) 925-4240 - Toll-free: (866) 995-5100 - Fax: (203) 925-4241  
[www.milestonesci.com](http://www.milestonesci.com) - email: [mwave@milestonesci.com](mailto:mwave@milestonesci.com)

### **MILESTONE GENERAL K.K.**

KSP, 3-2-1, Sakado - Takatsu-Ku, Kawasaki 213-0012 - Japan  
Tel: +81 (0)44 850 3811 - Fax: +81 (0)44 819 3036  
[www.milestone-general.com](http://www.milestone-general.com) - email: [info@milestone-general.com](mailto:info@milestone-general.com)

### **MLS GmbH**

Auenweg 37 D-88299 Leutkirch im Allgau - Germany  
Tel: +49 (0)7561 9818-0 - Fax: +49 (0)7561 9818-12  
[www.mls-mikrowellen.de](http://www.mls-mikrowellen.de) - email: [mws@mls-mikrowellen.de](mailto:mws@mls-mikrowellen.de)



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