MERCURY ANALYZER

PE-1000

FULLY AUTOMATED
PETRO-PYROLYSIS
MERCURY ANALYZER

Direct Measurement of
Total Mercury in
Liquid-Hydrocarbons
Matrices

FULLY COMPLY
TO UOP 938-20
TEST METHOD

CE

Determination of Total Mercury in Liquid Hydrocarbons

Just like other heavy metals, Mercury occurs naturally in Crude Oil, in concentration ranging from low parts-per-billion (ppb) to parts-per-million (ppm), varying from its oil fields in different continents. When processing the feedstock (crude oil) to obtain its valuable fractions like LPG, Naphtha, Gasoline, Jet Fuel, Kerosene and etc, Mercury must be prior removed to prevent contamination or carryover into these products.

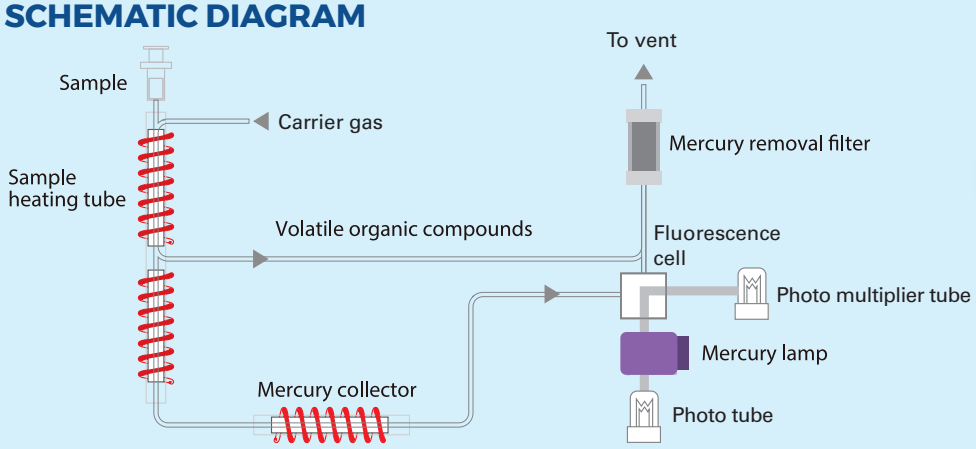
Therefore, a precise measurement of the Mercury content in Crude Oil is crucial and decisive for the control of the refining processes. In addition, product fraction like Naphtha which will be further utilized to crack to produce highly demand polymers, controlling and restricting its Mercury content is more stringent to protect its hydrogenated catalysts which affects the cracking efficiency. Therefore, downstream petro-chemical processes normally want to measure Mercury in its Naphtha feedstock down to low or sub ppb levels accurately.

- **NIC PE-1000 allows direct mercury measurement of all liquid petroleum based samples.**
- **Suitable for petroleum feedstock such as Crude oil and Condensate down to refined fractions like light Naphtha and other liquid products.**
- **No wet chemical pre-treatment needed**
- **Detection limit down to 0.01 ppb in raw petroleum sample.**
- **Accredited and adopted under UOP 938-20 Test Method.**
- **Analysis time - ranging from 8 to 12 minutes.**

15-positions autosampler configuration

How Does It Work?

SCHEMATIC DIAGRAM



- **Direct Combustion**
  Sample is directly injected with highly precise injector and undergoes direct combustion by NIC patented pyrolyzer equipped with precise flow and temperature profile control cycle.

- **Gold Amalgamation**
  Decomposed mercury is concentrated and purified by gold amalgamation with NIC mercury collector tube, eliminating all interference.

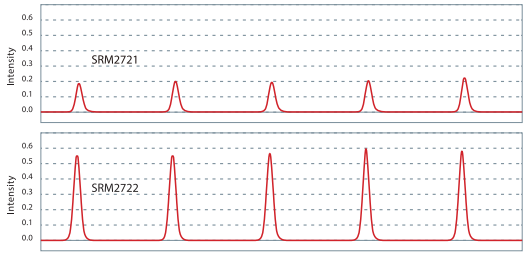
- **Measurement by CVAFS**
  NIC mercury collector tube is heated up to liberate all trapped mercury, transporting it directly to CVAFS detector with argon carrier gas. CVAFS perform measurements with detection limit as low as 0.01ppb.

Keys To Uncompromising Reliable, Accurate & Precision Measurement

(a) Patented Innovative Pre-Concentration/ Combustion Technology – Forget about inconsistency

With NIC patented (JP NO.4226049 & USP NO.8223332) pyrolyzer with real-time temperature control ensuring complete combustion with quick-turnover time on each analysis .

Sufficient high temperature (>800°C) is crucial to ensure complete combustion to all types of hydrocarbons, avoiding formation of carbon soot which accumulates mercury within the system affecting measurement's accuracy and precision.



Sample	N	Certified Conc (ppb)	Measured Conc (ppb)	C.V. (%)
SRM2721	5	0.0360 – 0.0474	0.0401	8.3
SRM2722	5	0.116 – 0.142	0.1209	3.1

(b) Auto-liquid injector – Consistent sample introduction

With no operator intervention and direct injection in a closed-system flow design ensures no loss of volatile analytes, PE-1000 achieves uncompromised precision and consistency on every single measurement.

Syringe needle is Silco-coated to minimize mercury interaction to the needle metal material, improve accuracy and precision for trace level analysis.

121-positions autosampler configuration

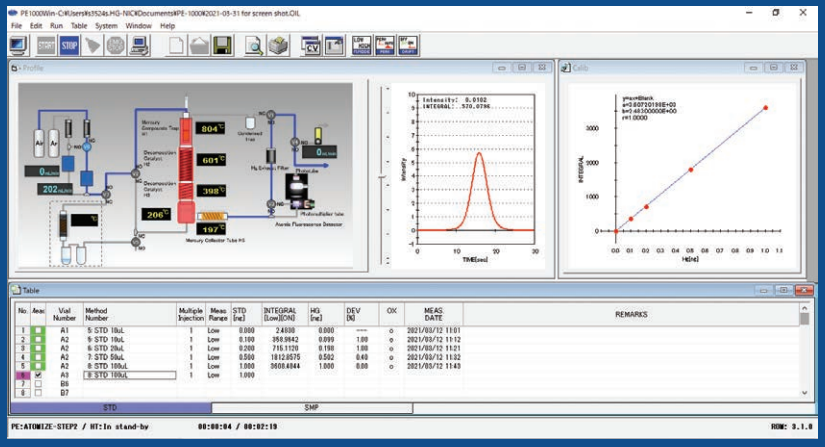
(c) Intact Sample Integrity – No more volatile loss & Excellent homogenity

All samples are placed in 2ml septa-sealed chromatography type vials, which is excellent in preventing volatility loss.

Vortex action creates an effective stirring and mixing effect to allow extraction of a representative aliquot for each measurement.

User-Friendly Software - Results are independent of Users

PE1000Win software is specifically designed for quick-learning and easy operation. Software includes animated graphics that illustrate real time system operations (GUI), spreadsheet-style sequence tables and preset Heat Methods to match analysis for various types of sample matrices.



Different Capacities for Different Laboratories – Pick your Configuration

Manual Injection	Autosampler of 15 positions	Autosampler of 121 Positions (NEW)

Multi-Configurable System for Different Applications – Expanding Versatilities in Laboratory

Expanded Application – For Gaseous Matrices with RH-PE

RH-PE is an optional accessory connecting to PE-1000 to analyze for mercury in gas matrices.

- Serves as a Tube Desorption unit for mercury collector (sampling) tube.
- Suitable to use for ultra-trace level of mercury measurement in hydrocarbon gas matrices.
- Satisfy the measurement principle stated in **ASTM D 6350-14**, **ISO 6879-2**, **JLPGA-S-07** methods.

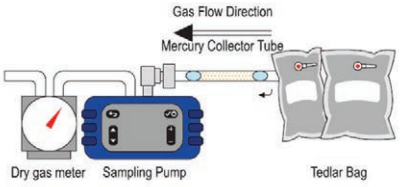
Mercury vapor source (MB-1) for gas calibration

Liberate trapped mercury by thermal desorption

Transfers analytes to PE-1000 for 2nd Gold Amalgamation

Measurement by CVAFS in PE-1000

- **Gas Sampling by Tedlar Bag**
  Hydrocarbon gas collected in Tedlar bag can be easily transferred to mercury collector (sampling) tube using a suction pump and a gas meter to record the sampling volume accurately.



- **Analysis of Mercury Collector (Sampling) Tube**
  The mercury collector tube is inserted into RH-PE Tube Desorption unit to complete the analysis. Typical analysis time is ~ 6 minutes. After analysis, the mercury collector tube is cleaned for re-use to next subsequent sampling.

Alternative Choice of Sampling - Direct Sampling from Pressurized Sources
Direct Amalgam Sampler

NIC Mercury Collector (Sampling) Tube

Direct Amalgam Sampler is a pressure "letdown" device to allow for direct sampling from a pressure sources like pipelines or compressed cylinders.

- Sampler's electrical parts are rated intrinsically-safe.
- Suitable for gaseous or liquefied-gas matrices.
- Commonly deployed for large volume sampling where mercury concentration is in the ultra-trace level of low ng/Nm³.
- The mercury collector (sampling) tube can be analyzed directly in RH-PE with PE-1000.

Product images are for illustrative purposes only and may differ from the actual product.

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