

## TIME SAVER MERCURY ANALYSIS SYSTEM "RA"

### 1. Introduction

With a revision of the city water regulations in Japan in 1994 as a turning point, there has been a growing demand for automated high-sensitivity mercury analyzers aimed at improved operational productivity and manpower saving. The general status so far has been that mercury measurement is conducted at many operation sites with existing atomic absorption spectrometers (AAS) by mounting a mercury analysis attachment on them on each occasion. Indeed, some operation sites have been using dedicated mercury analyzers but samples generally have to be measured one by one, and operators are now faced with the problem of handling ever increasing samples.

To cope with such a trend, NIPPON INSTRUMENTS CORPORATION (NIC) has newly developed an automatic sample changer "SC-20" equipped with a 2-line automatic reagent injection mechanism. This system is combined with the NIC's mercury analyzer RA-2 series, which has a record of many installations featuring compactness and high sensitivity. The perfected system is a mercury analyzer "Time Saver System RA".

### 2. Features

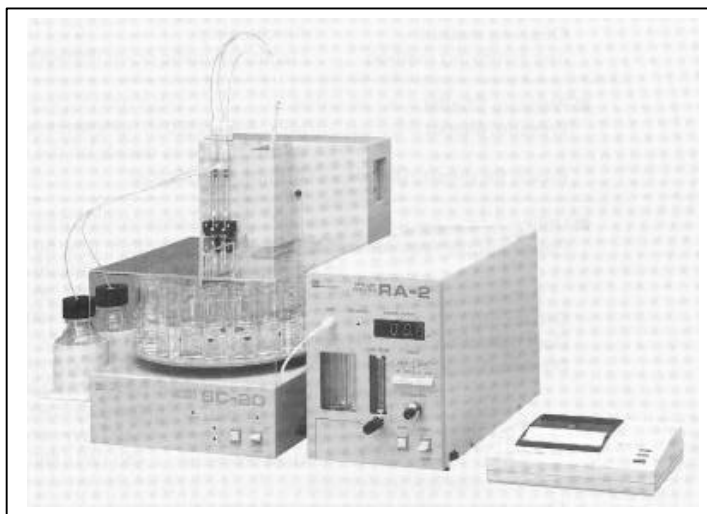
#### -1. High Sensitivity

Lower limit of detection: 0.005 ppb (SIN: 3, sample quantity: 20 ml)

#### -2. High Reliability

- Accurate, reliable measurement can be performed at all times even if the sample temperature varies or when an interfering substance exists in the sample.

In mercury analysis by the reducing vaporization method, the reaction speed and the peak height are liable to be affected by a sample temperature variation and also by an



interfering substance that may exist in the sample. Whereas, even in such a case, the RA-2 series is capable of conducting trouble-free measurement since it employs "the open blast type equipped with an integrator".

- The RA-2 series is complete with safety devices that are important for unattended operation. (See -3. Function in 4. Specifications.)
- A sturdy construction is effected by a simple configuration worked out after many trials, along with carefully selected materials and high workmanship.

#### -3. High Level of Economy, Coupled with Safety Features

- A compact, power-saving design. The system occupies only small space in laboratory and spends little energy.
- The sample quantity required is 20 ml or less, which is below 1/5 compared with 100 ml used in general by the reducing vaporization method, leading to a substantial decrease in terms of the quantities of both reagent and waste fluid.
- The only requirement is electricity. No special gas or no gas cylinder is necessary.
- The mercury gas after measurement is removed by activated charcoal in large capacity

(capable of collecting 5 to 6 grams of mercury, calculationwise, under coexistence of oxygen) installed in the RA-2. Usually, no replacement of the remaining activated charcoal is necessary through system life.

#### -4. Simple Operation

Microcomputer controls and monitors the system on your behalf. The operator has only to install sample vessels onto a turret and to specify the measurement mode.

### 3. Application

City water, river water, lake and marsh water, rainwater, waste fluids from factory, as well as a variety of samples (foodstuffs, organisms, urine, fertilizer, medicine, etc.) to which the reducing vaporization method is applicable.

### 4. Specifications

#### -1. Measuring Part RA-2A

Analysis principle and method:	Reducing vaporization method, open blast type equipped with integrator
Detection method	Nondispersive double-beam cold vapor atomic absorption method
Light source, detector	Low-pressure mercury discharge lamp, phototube
Wavelength and cell length in use	253.7 nm, 200 mm
Two-point calibration:	calibration with subtracted blank
Measurement range:	0-20 ng, 0-1000 ng (auto range)
Resolution :	0-99.9 ng (0.1 ng), 100-999 ng (1 ng)
Measurement mode, time	Peak mode (30 sec), integral mode (1-15 min)
Display :	LED: countdown timer, mercury quantity (ng), error message (Er-1: lamp burn-out, Er-2: cell contamination, Er-3: soft, Er-4: SC-20)
Output :	0-1 V, RS-232C*

\* When a printer specified by NIC is connected (the contents of printout):

Measurement range, sample No, mercury quantity, concentration (ppb), analog amount (absorption curve)

When computer, display and printer are connected along with NIC software V3 (windows 3.1 or more) (the contents of display and printout);

Various necessary data and tabulation/color display, recording, etc. of them

Wash liquid for gas scrubber	0.1 normal solution of sodium hydroxide
Dehumidifying	Electronic cooling
Pump	Diaphragm pump 1lit/min
Dimensions, weight	205 Wx400 Dx275 H (mm), 13 kg
Power supply	100/220 V, 50/60 Hz, 0.07 kVA (peak)

#### -2. Automatic Sample Changer SC-20

Number of samples	20
Sample quantity	~20 ml/each
Time required	40 sec+measurement time (30 sec-15 min) per sample
Automatic dispenser	2 series, ~1 ml/series/operation
Dimensions, weight	300 Wx415 Dx410 H (mm), 10 kg
Power supply	100/220 V, 50/60 Hz, 0.1 kVA (peak)

#### -3. Function

Measurement mode 1:

Sequential measurement of 1 to 20 samples

Measurement mode 2:

Measurement-cleansing-measurement-cleansing

Stop:

Optional designation with pin, No. 20, automatic stop

Manual operation:

All operations can be made manually and independently.

Automatic restart when power is restored after failure:

The ready status of the measuring part RA2 is confirmed, and then restart is made from the state existing prior to measurement of a sample whose measurement was suspended due to power failure.

Emergency auto stop:

When something other than gas is feared to come into the cell because of sample foaming, etc., a stage preceding to the scrubber detects the abnormality and stops the pump automatically.

Requirements for interlock with sample turret rotation:

The turret should be standstill at the prescribed position, the bubbler should be standstill at the prescribed position (upper limit), the RA-2 should be in the ready status, and the stop pin should not be set.