

DIRECT AA MERCURY DETERMINATION IN NATURAL GAS

The gas and oil combustion is a very significant source of mercury input in the environment. The typical mercury concentration in natural gas is between 1 to 200 ng/l. Mercury, being present in hydrocarbon gas, initiate corrosion of aluminium structures and catalyst poisoning, and these effects have serious implications for the oil industry. Mercury extraction and purification of gases, as well as reworking the products of gas deposits, which involve mercury separating as a fairly toxic element, is very important for the environment protection. It is important even in cases when mercury is not an industrial component: the huge amounts of world annual reworking gas should be taken into account.



Mercury Zeeman atomic absorption spectrometer with high frequency modulation of light polarization **RA-915+** (manufactured by LUMEX Ltd., Russia) can be used for direct on-line measurements of the mercury concentration in natural gases. The use of the Zeeman background correction and a multi-path analytical cell provides high selectivity and sensitivity of measurements. As a result, the instrument allows direct determination of mercury in hydrocarbon gases due to the elimination of preliminary precipitation and collection of mercury in absorption traps. Therefore, analyses can be carried out with the ultra low detection limit (0.01 ng/l) in real time.

To perform a measurement, the spectrometer is placed near a gas well or other sampling point (gas conduit, string, separator etc). Gas flows continuously through the analytical cell. The gas flow rate is controlled with a valve and is maintained constant to an accuracy of 5%. Occasionally, a simple device is mounted upstream of the instrument to separate the gas from a liquid phase (water, condensate or oil). The blank signal is regularly checked by passing the gas through a special filter with the Hg-adsorption efficiency of 98-99 %. The mercury concentration is measured once per second and is processed by a computer with a simultaneous data display.

The validity of the method is proved by the agreement between the synchronous measured by RA-915+ and Standards method ISO 6978 (cold vapor).

No.	Deposits	RA-915+, ng/l	MERCURY 3000 (ISO 6978), ng/l	Δ , %
01	Grodsinsk	110	93	+15
02	Mlodasko	34	39	-8
03	Nemeznic	24	23	+6
04	Paprotzh	19	21	-5
05	Shevche	9.8	12	-18
06	Bonikovo	1.7	2.5	-30
07	Ujaz	< 0.5	No detect	0
07	Buck	<0.5	No detect	0
08	Stashnev	< 0.5	No detect	0

Mercury in natural gas with RA-915+ analyzer (single path cell)

1, 3, 3 – Zero control

2 – Natural gas (measured value 3.1 ng/l, RSD 0.1 ng/l)

4 – Natural gas (measured value 3.1 ng/l, RSD 0.1 ng/l)

