

On-line gas analysis in high purity gas production

Express Multi-Component Gas Analyzer GAOS MS-20-9



Process Mass Spectrometry

The MS process mass-spectrometer provide real-time, fast, accurate, comprehensive gas analysis.

OPERATIONAL CHARACTERISTICS

- Modular configuration, fast replacement of blocks for maintenance service and repair;
- IP54 protective execution;
- Continuous working 24 hours during 6 – 12 months without of servicing of vacuum system;
- Automatic algorithm of working with the functions of diagnostics, adjustment, calibration and operative control of measurements accuracy.



$H_2, D_2, T_2, He, CH_4, H_2O, Ne, N_2, CO, O_2, Ar, CO_2, SO_2, Kr, Xe$

200 ns



Industrial Sample Conditioning Block

$C_2H_6, C_3H_8, C_4H_{10}, C_5H_{12}, C_6H_{14}, C_6H_6, C_7H_8$

Depending on the analytical applications, the process mass spectrometers MS are equipped with various modifications of Sample Conditioning System.

SAMPLE CONDITIONING SYSTEM SPECIFICATIONS

- Continuous of gas probe sampling under conditions:
 - Temperature up to 1200 °C;
 - Dust content up to 30 g/m³;
 - Pressure (10⁻³÷3) bar;
 - Presence of a condensate, aggressive gases;
- Step by step cleaning of gas probe, dust, condensate removal, cooling;
- Switching from various points of sampling and gas probe transportation on the mass spectrometer input;
- Automatic control of the operating parameters (temperature, pressure, volume flow) and self- diagnostics of the Sample Conditioning System.

Analytical Applications

METALLURGY

- Basic Oxygen Steel process (converter);
- Blast Furnace Optimization;
- Steel Vacuum Processing (VOD, RH);
- Air separation (analysis of blowing oxygen purity);
- Emissions Monitoring and Pilot Plant Gas Analysis for non-ferrous metallurgy.

GEOLOGY

- Mud Gas Logging;
- Isotope Analysis;
- Gas Measuring;
- Fluid Inclusions Gas Analysis (geochemistry investigations).

OIL AND GAS INDUSTRY

- LNG production;
- Natural gas processing;
- Hydro-cracking process;
- High-temperature cracking furnace optimization;
- Process of the catalyst regeneration;
- The chemical analysis of technological gases: recycle hydrogen, fuel, inert.

ATOMIC ENERGY

- Chemical and isotope analysis of H₂-He-T₂ fuel gas mixtures (International project "ITER" - experimental thermonuclear reactor);
- Chemical and isotope analysis of gas phase of the fuel elements cover;
- Monitoring of hydrogen and other gases migration during the atomic reactor stress testing.

HIGH-PURITY GAS PRODUCTION

- He, Ne, Ar, Kr, Xe, H₂, N₂, O₂

ALTERNATIVE ENERGY

- Plasma gasification of the solid waste with reception of synthesis-gas for power and chemical industry;
- Optimize of hydrogen reformer and catalyst efficiency for fuel cells development and testing.

INVESTIGATIVE ANALYSIS

- Monitoring of the gas phase for thermal, thermogravimetric analysis;
- The elemental analysis (C, N, O), quantity determination of the dissolved gases in metals;
- Pilot plant gas analysis of the metallurgical processes.

Process Mass Spectrometry in High Purity Gas Production

High Purity Gas Production

The modern technologies in radio-electronics, cryogenic, laser, space techniques, medicine demand more and more high-purity gases, making thus more and more strict requirements under the concentration of the micro impurities. The technology of production of high-purity gases demands modern analytical methods both for operative control of technological process, and for quality assurance of raw materials, intermediate and end products.

The process mass spectrometry is the method which allows to solve problems of analytical control at all stages of the high-purity gases production. The basic advantages of a method:

- High speed of the analysis — operative control of the technological process in the several points by one device;
- The simultaneous multi-component analysis in the wide dynamic range – determination of the basic components and micro impurities of the gas mixture for the one cycle of measurements;
- Low detection limits – determination of micro impurity and ultra-micro impurity without the enrichments stages;
- The isotope analysis — control of the technological process of the gases of spectral cleanliness production.



GAOS MS-20-9 mass spectrometer. Determination of the micro impurities, high purity neon production (99,9999 %), «IceBlick», Odessa

High Purity Gas Production

Process Mass Spectrometry in High Purity Gas Production

Specification of the GAOS MS-20-g mass spectrometer

Range of registered masses, Da	1÷200
Resolution at 10 % level, M/ΔM	200
Measured components:	He, Ne, Ar, Kr, Xe, H ₂ , N ₂ , O ₂ , CO, CO ₂ , C _x H _y
Dynamic range, % vol.	0,00005÷100
Detection limits, ppm	0.1
Rate, scan/s	20 000
Duration of the analysis cycle, s, no more	2
Chanel of the registration system:	
analog mode	16
count mode	16
Automated self-calibration	
Automated correction of the base line	

