Calibration Stability

An important parameter for a process control instrument is the "durability" of system calibration. A stable instrument—one that maintains calibration for a long time—is more available for process stream analysis. Not to be neglected is the expense of calibration gases and skilled technicians' time.

To assess long term stability of the Series 3000 cycloidal analyzer, an air monitoring method[1] was set up in Gas Wizard™. The objective was to measure key ion intensities in outside air over an extended period of time when the atmospheric pressure and humidity were fairly constant—without recalibration. We were fortunate in finding a 68 hour period in which this was the case. Following initial calibration, ion current measurements at 14, 20, 28, 29, 32, 34, 36, 38, and 40 amu were used to determine the concentration of N_2 (from 28 amu), O_2 (from 32 amu), the $^{17}O_2$ molecular isotope (at 34 amu), and Ar and its principal isotopes (at 40, 38 and 36 amu). The results for this 68 hour study are summarized in the following table.

68 hr total	*N2*	*O2*	*O2-34*	*Ar-36*	*Ar-38*	*Ar-40*	*14/28*	*20/40*	*29/28*
Initial Calibration	78.03	20.95	0.0815	0.0030	0.0006	0.934			
Mean Measured	78.01565117	20.96011078	0.081492977	0.002994342	0.000613874	0.938236855	0.098286763	0.136878499	0.007769103
Standard Error	0.000132879	0.000125277	1.62665E-06	2.94128E-07	1.4214E-07	1.21447E-05	1.14973E-06	4.56923E-06	4.50068E-08
Standard Deviation	0.009910831	0.009343874	0.000121325	2.19377E-05	1.06016E-05	0.000905816	8.57531E-05	0.000340798	3.35686E-06
%RSD	0.0127%	0.0446%	0.1489%	0.7326%	1.7270%	0.0965%	0.0872%	0.2490%	0.0432%
Sample Variance	9.82246E-05	8.7308E-05	1.47197E-08	4.81261E-10	1.12393E-10	8.20502E-07	7.3536E-09	1.16143E-07	1.12685E-11
Range	0.088049035	0.082563368	0.004744212	0.000208878	0.000127385	0.007706635	0.000664207	0.002217472	2.8403E-05
Minimum	77.97734455	20.91500365	0.081144096	0.002919073	0.000579031	0.933714163	0.098065088	0.136111223	0.007754582
Maximum	78.06539359	20.99756702	0.085888307	0.003127951	0.000706416	0.941420798	0.098729295	0.138328695	0.007782985

The precision of these data reflect excellent instrument stability. This assures high quality data from Series 3000 instruments while minimizing calibration down time.

Monitor Instruments' Series 3000 cycloidal mass spectrometers provide process analysis in a wide variety of industries. Our application specific inlet systems, versatile Gas-Wizard™ software, and stable analyzers assure cost effective, high quality process control information. We invite you to visit our website (www.monitorinstruments.com), to request information via e-mail at info@monitorinstruments.com, or post at 290 East Union Rd., Cheswick, PA 15024, USA, or to contact us by telephone at +1.724.265.1212 or fax at +1.274.265.1199. We will give your application the careful, confidential consideration it deserves.

[1] See Monitor Instruments' Quantitative Method Development Application Note.