MICROTRAC MRB

Calibration Check

Instrument: BELPYCNO L

How to perform a calibration check

For accurate results with the BELPYCNO L few operations are recommended:

1. Recalibrate the instrument volume whenever the volume reducer and the relevant sample vessel are changed (i.e. when increasing or decreasing the sample chamber volume)
2. Recalibrate the instrument in case the temperature setting is changed
3. Check the sample vessel number and use the relevant correction procedure in case the vessel is different from the one used in the calibration
4. Check regularly (i.e. once every couple of weeks) the currently installed volume reducer.

The operation at point 4 might be performed with certified reference materials for skeletal density, if available, but also any material with a known density might be used as a reference, for instance glass or quartz spheres. For a rapid check, it is possible to "analyze" the same calibration sphere that was used to calibrate the volume in use, this last method is easy, quick and precise.

Just follow this simple procedure example using the small volume chamber (about 20 cc) and the relevant calibration sphere:

a. Take the calibrated sphere and identify the relevant certified volume, i.e. small volume sphere = 14.36648 cc
b. Place the sphere in the sample chamber, close the lid and wait for optimal temperature stabilization at least 5 minutes. Note: for larger calibration spheres (medium, large or extra large) allow 5 minutes more
c. Select START NEW ANALYSIS
d. Select ANALYSIS PARAMETERS
e. Check that the analytical parameters are the following:
   Reference: I
   Reduction: Small
   Filler volume: 0.00000 cc
   Repeated analyses no.: 4
   Flow cleaning time: 5 sec
   Number of cleaning cycles: 10
   Sample cleaning time: 0 sec
   Atm. stabilization time: 15 sec
   Restriction delta pressure: 2.00000 bar
   Equilibrium delta pressure: 0.00020 bar
   Equilibrium delta time: 15 sec
   Standard deviation %: 0.010 %
   No. of good measurements: 5
   No. of max. measurements: 25
   High Precision: Yes
   Temperature set: 20.00 °C

Note: in case of Extra Small chamber it is recommended using a standard deviation of 0.05%

f. Exit from the analytical parameters menu and select START ANALYSIS
g. Type in the SAMPLE NAME: "Calibration sphere small"
h. Type in the box of the TOTAL WEIGHT the calibrated volume of the small sphere: Total weight: 14.36648 -> Leave all the other parameters null.
i. Run the experiment using the software for saving the acquired data automatically. Usually the first run should be discarded because there might be still some air trapped in the system.
j. Check the results of "Density" of the last three runs.
k. As the density is the sample weight divided by the sample volume, theoretically if the measured volume is exactly the same as the sphere certification, you will get: Average sample density = 1 this is the ratio between the certified and measured volumes

When the instrument is well calibrated (0.05% accuracy), the ratio between the certified volume and the measured volume should be between 0.9995 and 1.0005

Note: in case of the Extra Small chamber, the accuracy is usually about 0.1%

If operating properly an optimal result will be the following:

RESULTS

- Average Sample Volume: 14.36792 cc
- Volume Standard Deviation: 0.00031 cc
- % Standard Deviation on Volume: 0.00217 %

- Average Sample Density: 1.0001 g/cc
- Density Standard Deviation: 0.00002 g/cc
- % Standard Deviation on Density: 0.00217 %

Average Sample Density after: 1.0001 g/cc

Where the standard deviation is relevant to the last three cycles of the run while the calibration accuracy is given by:

$(1.0001 - 1) / 1 * 100 = 0.01\%$

For further information please contact us at:

www.microtrac.com