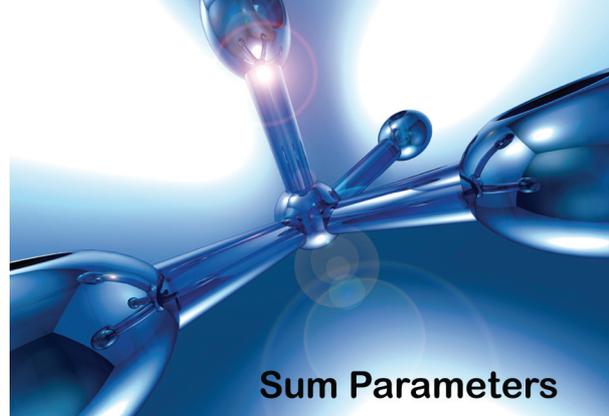


# Application Note

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## Determination of total organic carbon in solids according to the European Standardisation EN 13137



### DIN EN 13137

The European Standardization 'Characterisation of waste – Determination of total organic carbon (TOC) in wastes, sludges and sediments' has been in effect since December 2001. A large number of very different types of carbon compounds can be present in wastes, sludges and sediments. Their individual determination can be quite time consuming and pose considerable analytical challenges. For many analyses however, the determination of total carbon will be sufficient.

Based on the determination method, elemental carbon, carbide, cyanide, cyanate, isocyanate, isothiocyanate and thiocyanate can be detected as organic carbon as well. The described measuring range is at 0.1 % absolute carbon.

Two measuring processes are proposed in the European Standardization: the difference method (determination of TC and IC in the sample) and the direct method. In the direct method the inorganic fraction (carbonate and hydrogen carbonate) is removed via acidification. This, however, can lead under certain circumstances, to erroneous results (through volatile compounds in the sample or via secondary reactions). In case of doubt, the difference method should be used.

### SSM-5000A

The solid sampling module can be adapted for each model in the TOC-V series. After one-off installation, the system allows easy switching via the operating software between aqueous and solid samples without the need for system reconfiguration.



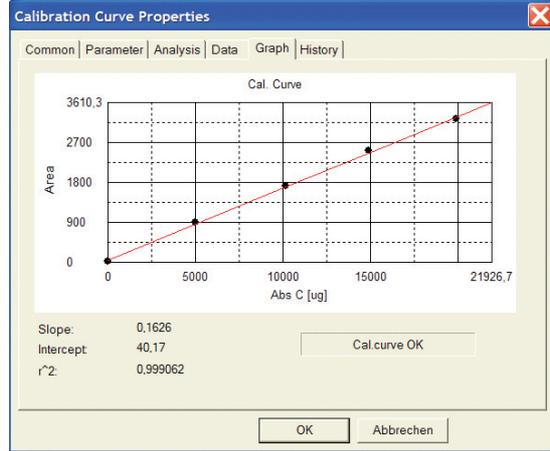
SSM-5000A

The module consists of two parts, the TC-port and the IC-port. This enables real TOC analysis via the difference between the TC and IC results. For TC measurement, the sample is weighed onto a ceramic boat and is pushed into the combustion tube via the TC-port, where a catalyst guarantees the complete conversion to CO<sub>2</sub>. The combustion process takes place normally at 900 °C. The CO<sub>2</sub> formed is subsequently led to the NDIR detector in the main instrument for detection.

For IC measurement the sample is also weighed onto a ceramic boat and then placed into the IC-port. After closing the port, phosphoric acid is pipetted into the boat which is then pushed into the oven at 200 °C. Due to this carbonates and hydrogen carbonates are converted into CO<sub>2</sub>, which is subsequently led to the detector. The TOC content is then calculated via the difference between the TC and IC measurements.

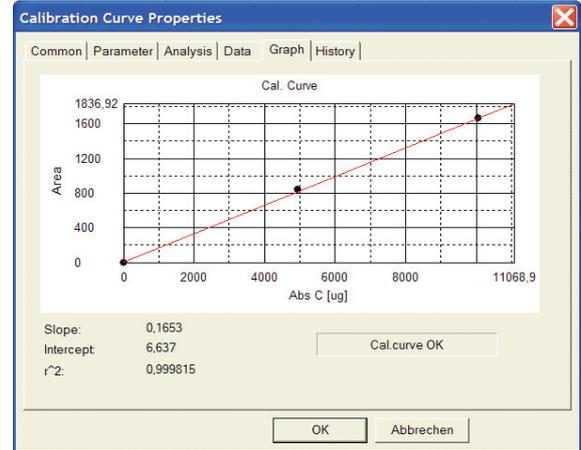
### TC-Calibration with glucose standard

Weight	Absolute Carbon	Area (mean value CNV)	CV in %
0	0	0	
12,5	5000	886,0 ± 9,94	1,12
25,43	10173	1671 ± 15,4	0,92
37,27	14907	2492 ± 18,92	0,76
49,83	19933	3244 ± 69,69	2,15



Calibration Curve Graph

### IC-Calibration with sodium carbonate standard



Calibration Curve Graph

Weight	Absolute Carbon	Area (Mean value CNV)	CV in %
0	0	0	
43,8	4949	847,3 ± 9,64	1,14
89,05	10063	1659 ± 22,32	1,35

Each point is measured three times, following the results of the third point:

Weight	Area	CNV	Mean CNV	Abs. C
37,1	2472	2472	2492± 18,92	14840
37,8	2542	2495	<b>CV CNV</b>	15120
36,9	2496	2510	0,76%	14760

### Sample Measurement

Bauxite is measured as real sample

	TC-Determination	IC-Determination
Result	1.30 ± 0.001%	0,94 ± 0.009%
CV	0,11%	0,95%

The TOC-result of the bauxite sample is 0,36%

The given specifications serve purely as technical information for the user. No guarantee is given on technical specification of the described product and/or procedures.