

# Application note

## TOC analysis in soil using the vario MAX cube

In environmental research, the determination of the carbon content, especially in solid material, is an important parameter. In most cases not only the total carbon content (TC) of the sample is of interest but also the organic carbon content (TOC). In order to determine the TOC content in solid samples a method has been developed for the vario MAX cube, which is in agreement with the international standard ISO 10694.

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The TC content of different soil samples has been determined with the vario MAX cube in CN mode. Afterwards, the vario MAX cube was modified into TOC mode as described in the user manual.

For TOC determination, the samples have to be acidified in order to purge out the inorganic carbon. Therefore, the soil samples were weighed into silver foil cups, acidified using HCl, dried, placed into ceramic crucibles and analysed with the vario MAX cube.

For TC determination the samples were directly weighed into steel crucibles.

### instrument:

vario MAX cube  
TOC mode

### sample:

1000 mg for TC  
300 mg for TOC  
soil  
solid

sample	C [%]	TOC [%]
soil-1	2.91 ± 0.08	1.33 ± 0.01
soil-2	2.61 ± 0.06	2.34 ± 0.02
soil-3	0.525 ± 0.013	0.500 ± 0.015
soil-4	9.37 ± 0.05	8.89 ± 0.01
soil-5	1.59 ± 0.04	1.36 ± 0.04
soil-6	0.685 ± 0.023	0.640 ± 0.008

The results show that the TC and TOC content of soil can be determined with a very high precision, even for soil samples with a very low carbon content.

Using the vario MAX cube, TOC analysis can be performed after minor modifications to the instrument, which can easily be done by the user.

The vario MAX cube is very well suitable for environmental applications and is in full agreement with the international standard ISO 10694 on "Soil quality – Determination of organic and total carbon after dry combustion (elementary analysis)".

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