TOC 4

TOC DETERMINATION IN SLUDGE

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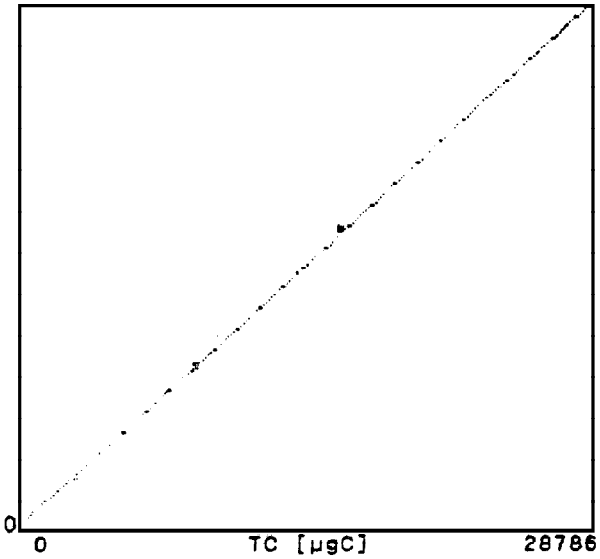
To characterize and limit the amount of organic substances in waste the TOC-parameter (total organic carbon) was incorporated as determination parameter in the new TA Siedlungsabfall (TA: Technical instruction, June 1st 1993). This sum parameter which is a firm component in the water analysis already for years also becomes more and more important in the solid sample analysis. In this case, the waste depending on the content of TOC is assigned to different dump classes.
In order to be classified under dump class 1 (mineral material dump) the waste may at the most include a TOC content of 1 mass percent of dry residue. For rating in dump class 2 (settlement waste dump), a maximum of 3 mass percent of dry residue is permitted.

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CAL CURVE F#10
 TC 4-POINT
 LEAST SQUARES r=1.000

 [CONDITIONS]
   RANGE                : x30
   CELL LENGTH          : STD
   DATE                 : 08(AUG)-09-1994
 [DATA]
   STD CONC    AMNT      µgC   AREA   #
    40.0%    71.96mg  28786  23535   3
    40.0%    40.16mg  16066  13697   3
    40.0%    21.76mg   8706   7484   3
    40.0%    6.767mg   2706   2279   3   P
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Fig. 1: Four point calibration with Glucose

Instrumentation

The determination was done by use of the Shimadzu TOC-5000 with the solid sample module SSM-5000A. On account of the present concentration areas in the solid substance the short measuring cell (0,4 mm of length) was used in the TOC-5000.

Ceramic boats, which are supplied with the device, were used as sample vials.

Measuring conditions

TC oven temperature:	900 °C
IC oven temperature:	200 °C
Carrier gas pressure:	3 bar
Carrier gas flow rate:	0,5 l/min

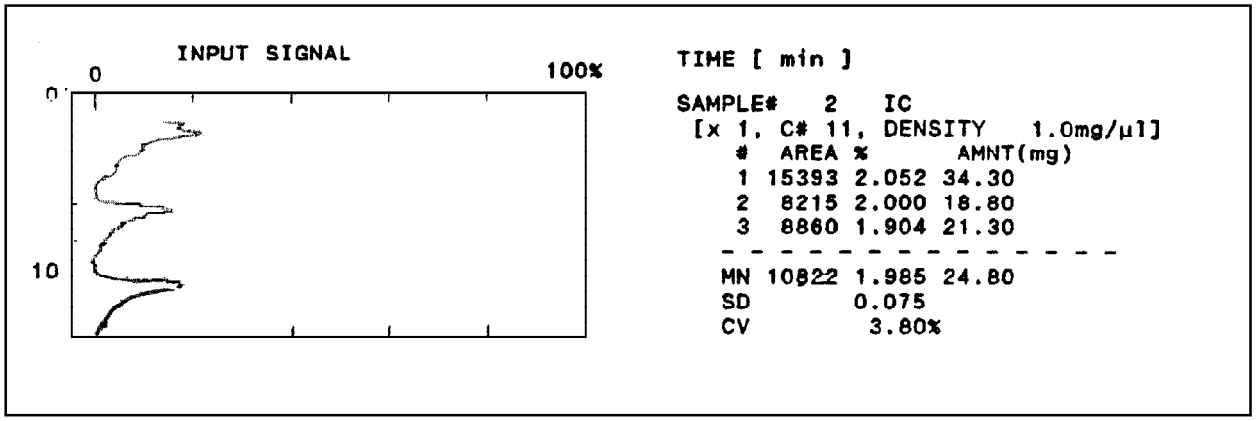

Fig. 6: Analysis of the inorganic carbon in sample 2 after homogenizing

Because of the described observations, sludge 1 after the filter press was cut up in a mortar until a homogeneously fine sample grain was available. A further IC analysis was done afterwards (shown in figure 6) . The effect of homogenizing is to be recognized distinctively. The result of the analysis for the inorganic content of this sample shows that the mean value of approx. 1% carbon almost doubled to 1,99 ± 0,08% of inorganic carbon. The peak forms show a fast increase of CO_2 concentration and it is distinctively to be recognized that the conversion is complete within the detection time.

Sample	TC	IC	TOC
Original sludge 1	1,31 ± 0,02	0,116 ± 0,008	1,19 ± 0,03
Sludge 1 after filter press	12,1 ± 0,2	1,99 ± 0,07	10,1 ± 0,3
Sludge 1 after thermal drying	6,26 ± 0,08	1,47 ± 0,06	4,8 ± 0,1
Original sludge 2	1,52 ± 0,04	0,40 ± 0,02	1,12 ± 0,06

Table 1: sample contents in %

The results of the investigations are summarized in Table 1. As to be expected, the original sludge's show the smallest TOC content because of their considerably high content of water. If the water is removed with the filter press the TOC content in sludge 1 increases to 10,1 %. High volatile organic compounds will be removed during the thermal drying as well as the water. So that the TOC content decreases even more, compared to the pretreatment with the filter press.

Reference of Literature

/1/ MURL-Ministerium für Umwelt, Raumordnung und Landwirtschaft des Landes NRW Technische Anleitung (TA) Siedlungsabfall - Argumente und Informationen, Fakten, Daten, Zahlen, ökologische Abfallwirtschaft 12, 1993

/2/ Diplomarbeit von Dang, Thi Mai Lien über Optimierung der Bestimmung des organisch gebundenen Kohlenstoffes (TOC) in Feststoffen mit Hilfe verschiedener Meßmethoden und Analysengeräte, Fachhochschule Aachen, Abteilung Jülich

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