APPLICATION NOTE:

TRL INSTRUMENTS

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Total Organic Carbon (TOC) Measurement of Industrial Waste Samples by TRLI-TOC

1. Introduction

The aim of this publication is to show reliability of our TRLI-TOC analyzer in measuring TOC concentration of the industrial waste samples. Determination of TOC is based on the principle of TOC=TC-IC. Total Carbon (TC) and Inorganic Carbon are measured during the analysis. Details on the repeatability of the assay and the empirical findings are presented below.

Sample Description: Industrial Waste Sample - Liquid

2. Experimental Conditions

Before starting the experiment, the samples are diluted with water by 1/10 ratio. The measurements are done under following settings of the analyzer:

Parametre	Value
Decomposition Zone Temp.	900 °C
Catalytic Zone Temp.	750 °C
Air Pressure	1.5 bar
Carrier Gas Flow Rate	300 mL/dk

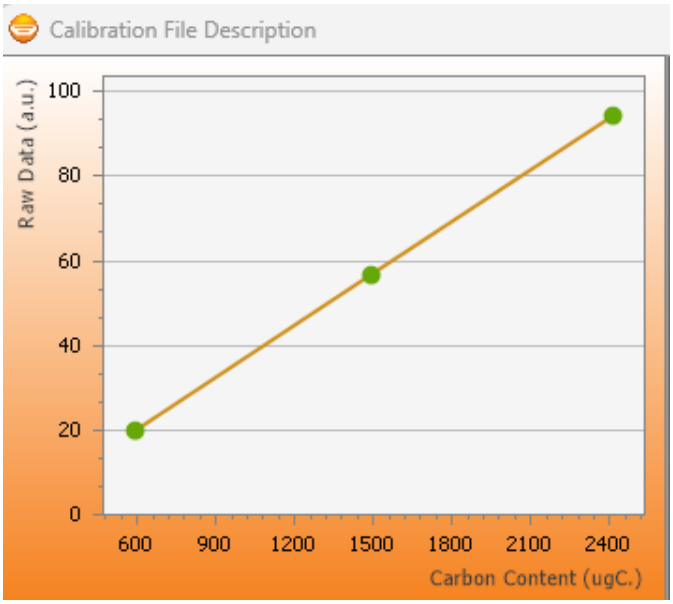
3. Calibration

Calibration is done by waging solution having below specification and calibration curves are here below.

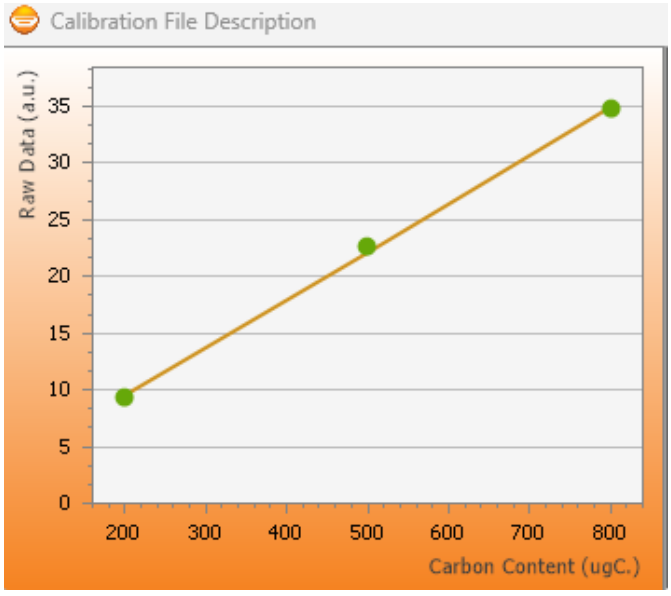
Standart Name	Standart Concentration
$CaCO_3$ (for TC)	12%
$KHCO_3$ (for IC)	12%

Calibration Equation (TC)	R^2
$y = 0.04080 \cdot x - 4.194$	1.0000

Calibration Equation (IC)	R^2
$y = 0.04234 \cdot x + 1.065$	0.9994



TC Calibration



IC Calibration

4. Results

The TC and IC content for the unknown samples are calculated by the TRLI-TOC software, along with the RSD values, are as follows:

Table 1: Industrial Waste Sample 1 TC Result (Diluted with the ratio of 1/10 by water)				
Repeat Number	Sample Size (mL)	TC Result (%)	TC Average (%)	RSD (%)
1	0.1	3.31	3.36	2.12
2	0.1	3.33		
3	0.1	3.44		

Table 2: Industrial Waste Sample 1 IC Result (Diluted with the ratio of 1/10 by water)				
Repeat Number	Sample Size (mL)	IC Result (%)	IC Average (%)	RSD (%)
1	0.2	3.06	3.04	0.81
2	0.2	3.02		
3	0.2	3.06		

Table 3: Industrial Waste Sample 2 TC Result (Diluted with the ratio of 1/10 by water)				
Repeat Number	Sample Size (mL)	TC Result (%)	TC Average (%)	RSD (%)
1	0.1	2.87	2.94	2.22
2	0.1	2.96		
3	0.1	2.99		

Table 4: Industrial Waste Sample 2 IC Result (Diluted with the ratio of 1/10 by water)				
Repeat Number	Sample Size (mL)	IC Result (%)	IC Average (%)	RSD (%)
1	0.2	2.87	2.83	1.21
2	0.2	2.80		
3	0.2	2.82		

Table 5: Industrial Waste Sample 3 TC Result (Diluted with the ratio of 1/10 by water)				
Repeat Number	Sample Size (mL)	TC Result (%)	TC Average (%)	RSD (%)
1	0.1	2.99	3.04	2.26
2	0.1	3.02		
3	0.1	3.12		

Table 6: Industrial Waste Sample 3 IC Result (Diluted with the ratio of 1/10 by water)				
Repeat Number	Sample Size (mL)	IC Result (%)	IC Average (%)	RSD (%)
1	0.2	2.88	2.88	0.26
2	0.2	2.87		
3	0.2	2.87		

Table 7: Industrial Waste Sample 4 TC Result (Diluted with the ratio of 1/10 by water)				
Repeat Number	Sample Size (mL)	TC Result (%)	TC Average (%)	RSD (%)
1	0.1	3.42	3.31	2.81
2	0.1	3.17		
3	0.1	3.33		

Table 8: Industrial Waste Sample 4 IC Result (Diluted with the ratio of 1/10 by water)				
Repeat Number	Sample Size (mL)	IC Result (%)	IC Average (%)	RSD (%)
1	0.2	2.70	2.77	4.13
2	0.2	2.70		
3	0.2	2.90		

TOC concentrations are calculated as the difference between TC and IC:

Table 9: Unknown Samples TOC Result	
Sample No.	TOC Calculated (%)
1	0.32
2	0.11
3	0.16
4	0.54

5. Conclusion

In this study, the total carbon (TC) and total inorganic carbon (IC) contents of unknown liquid samples were calculated. Following the analysis conducted with 4 different unknown samples, as illustrated in the results section of the report, high repeatability of results was obtained for all samples using the TRLI-TOC analyzer. The samples were diluted prior to analysis due to their high carbon content. The dilution ratios are included in the results table.