

METHOD STATEMENT

Determinand:

Determination of Total Organic Carbon and Dissolved Inorganic Carbon

Matrix:

Sample Types: Raw, Potable, Surface and Ground waters.

Principle of Method:

This method uses the SHIMADZU TOC-L CPH TOC analyser.

Total Organic Carbon (TOC) is the amount of carbon bound in an organic compound and it is used as a non-specific indicator of water quality. The TOC in water sources can either be derived from natural sources (eg:- Humic acid, Fulvic acid) or synthetic sources (eg:- Detergents, Pesticides).

This method can be used to determine the TOC or DOC of a sample. For a DOC measurement the sample should be filtered through a 0.45um filter disc prior to acidification with the orthophosphoric acid preservative. In this method TOC and DOC are determined by measuring the amount of Non-Purgeable Organic Carbon (NPOC). NPOC is commonly referred to as TOC.

First the sample is acidified to pH 2 – 3 and then sparge gas is bubbled through the sample to eliminate the IC component. The remaining TC is measured to determine total organic carbon; the result is referred to as TOC. Purgeable organic substances in the sample are lost during the sparging process. The instrument uses a 680°C combustion catalytic oxidation method. The carbon dioxide generated is swept by an inert carrier gas to an Infra-red detector where the concentration of the carbon dioxide present is determined. The amount of carbon present in the sample is directly proportional to the absorbance of CO₂ measured.

Interferences:

None

Performance of the Method:

Range of Application:

LOD – 10 mg/l C

The analytical range may be extended by sample dilution.

Limit of Detection

TOC_P: <0.136 mg/l C. The reporting limit is <0.14 mg/l C

TOC_P2: <0.35 mg/l C. The reporting limit is <0.35 mg/l C.

Recoveries of Compounds, Bias and Uncertainty of measurement:

TOC_P

Sample type	Mean sample result (mg/l)	Mean sample spike result (mg/l)	Spike Recovery (%)	Bias (%)	Uncertainty (%)
Soft	1.494	4.553	101.95	-	-
Medium	1.388	4.884	99.88	-	-
Hard	1.583	4.566	99.45	-	-
Raw	2.554	4.503	97.48	-	-
Filtered Raw	2.346	4.704	94.29		
Borehole	0.822	4.841	100.47	-	-
2.0 mg/l Std	2.115	-	-	5.73	±18.59
8.0 mg/l Std	8.139	-	-	1.73	±5.53



METHOD STATEMENT



TOC_P2

Sample type	Mean sample result (mg/l)	Mean sample spike result (mg/l)	Spike Recovery (%)	Bias (%)	Uncertainty (%)
Raw	1.657	2.822	101.24	-	-
Filtered Raw	1.424	2.933	100.59	-	-
2.0 mg/l Std	2.199	-	-	2.96	±7.57
8.0 mg/l Std	8.237	-	-	-2.20	±10.86

References:

The Instrumental Determination of Total Organic Carbon, Total Oxygen Demand and Related Determinands 1979.

Methods for the Examination of Waters and Associated Materials. (HMSO), ISBN 011-751458 6

SHIMADZU Total Organic Carbon analyser, TOC-L CPH/CPN, User's Manual.

Water Quality-Sampling-Part 3: Guidance on the Preservation and Handling of Water Samples. BS EN ISO 5667-3-2003, Page 14.

