

Accepted Manuscript

Selection Criteria for Oxidation Method in Total Organic Carbon Measurement

GeunSeok Yoon, Sang-Min Park, Heuiwon Yang, Daniel C.W. Tsang, Daniel S. Alessi, Kitae Baek



PII: S0045-6535(18)30276-5

DOI: 10.1016/j.chemosphere.2018.02.074

Reference: CHEM 20832

To appear in: *Chemosphere*

Received Date: 15 December 2017

Revised Date: 06 February 2018

Accepted Date: 11 February 2018

Please cite this article as: GeunSeok Yoon, Sang-Min Park, Heuiwon Yang, Daniel C.W. Tsang, Daniel S. Alessi, Kitae Baek, Selection Criteria for Oxidation Method in Total Organic Carbon Measurement, *Chemosphere* (2018), doi: 10.1016/j.chemosphere.2018.02.074

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

1 Selection Criteria for Oxidation Method in Total Organic Carbon 2 Measurement

3 GeunSeok Yoon¹ · Sang-Min Park¹ · Heuiwon Yang¹ · Daniel C.W. Tsang² · Daniel S.
4 Alessi³ · Kitae Baek^{1*}

5 ¹Department of Environmental Engineering and Soil Environment Research Center,
6 Chonbuk National University, 567 Baekje-daero, Deokjin, Jeonju, Jeollabukdo 561-756,
7 Republic of Korea

8 ² Civil and Environmental Engineering, Hong Kong Polytechnic University, Hung Hom,
9 Kowloon, Hong Kong, China

10 ³ Department of Earth and Atmospheric Sciences, University of Alberta, 1-26 Earth
11 Sciences Building, University of Alberta, Edmonton, AB T6G 2E3, Canada

12 *Corresponding author (K.Baek)

13 Tel.: +82-63-270-2437; Fax: +82-63-270-2449; E-mail: kbaek@jbnu.ac.kr
14

15 Abstract

16 During the measurement of total organic carbon (TOC), dissolved organic carbon is converted into CO₂
17 by using high temperature combustion (HTC) or wet chemical oxidation (WCO). However, the criteria
18 for selecting the oxidation methods are not clear. In this study, the chemical structures of organic
19 material were considered as a key factor to select the oxidation method used. Most non-degradable
20 organic compounds showed a similar oxidation efficiency in both methods, including natural organic
21 compounds, dyes, and pharmaceuticals, and thus both methods are appropriate to measure TOC in
22 waters containing these compounds. However, only a fraction of the carbon in the halogenated
23 compounds (perfluorooctanoic acid and trifluoroacetic acid) were oxidized using WCO, resulting in
24 measured TOC values that are considerably lower than those determined by HTC. This result is likely
25 due to the electronegativity of halogen elements which inhibits the approach of electron-rich sulfate
26 radicals in the WCO, and the higher bond strength of carbon-halogen pairs as compared to carbon-
27 hydrogen bonds, which results in a lower degree of oxidation of the compounds. Our results indicate
28 that WCO could be used to oxidize most organic compounds, but may not be appropriate to quantify
29 TOC in organic carbon pools that contain certain halogenated compounds.

Download English Version:

<https://daneshyari.com/en/article/8851722>

Download Persian Version:

<https://daneshyari.com/article/8851722>

[Daneshyari.com](https://daneshyari.com)