# CARBON AND NITROGEN ANALYSES IN MICROBIAL SAMPLES

MOHAMED MAZMIRA MOHD MASRI

646

MPOB INFORMATION SERIES • ISSN 1511-7871 • JUNE 2013 MPOB TS No. 124

Several researchers have reported the importance of total carbon (TC), total nitrogen (TN), total organic carbon (TOC) and carbon per nitrogen ratios (C/N) in microbial cultures. These information are useful in understanding the metabolism of microbes and may be used to select the optimal carbon and nitrogen sources for cultivation. In wastewater and stream water, the analysis is important to determine the level of toxicity and its effect on the environment. TOC, TC, TN and C/N analyses of liquid samples are different compared to the analyses of solid samples (soils and sediments). TC in liquid samples is a sum of all organic carbon atoms covalently bonded in the organic molecules of a given sample. TN refers to the sum of all forms of nitrogen in a liquid solution such as nitrate, nitrite, ammonia-N and organic forms of nitrogen, whilst TOC is the value of TC minus the inorganic carbon (IC).

## OBJECTIVE

To provide a service to analyse the carbon and nitrogen content in microbial and liquid sample.

## METHODOLOGY

### Preparation of Samples for Analysis

Samples with heavy suspended solids are filtered using a fibre or membrane filter. As the filter itself is likely to contain carbon, thorough washing with Milli-Q water is carried out prior to analysis.

### Determination of TC, TN, TOC and C/N Ratio

TC, TN and TOC in a liquid sample is determined using the Total Organic Carbon Analyser (TOC-VCPN, Shimadzu Japan) and Total Nitrogen Analyser (TNM-1, Shimadzu Japan) based on the principles of oxidative combustion-chemiluminescence (*Figure 1*). Combining the TNM-1 with a TOC-VCPN analyser creates a TOC/TN simultaneous analysis system. The samples are serially diluted using zero water prior to analysis. The quantity of carbon or nitrogen in the samples is expressed in g litre$^{-1}$.

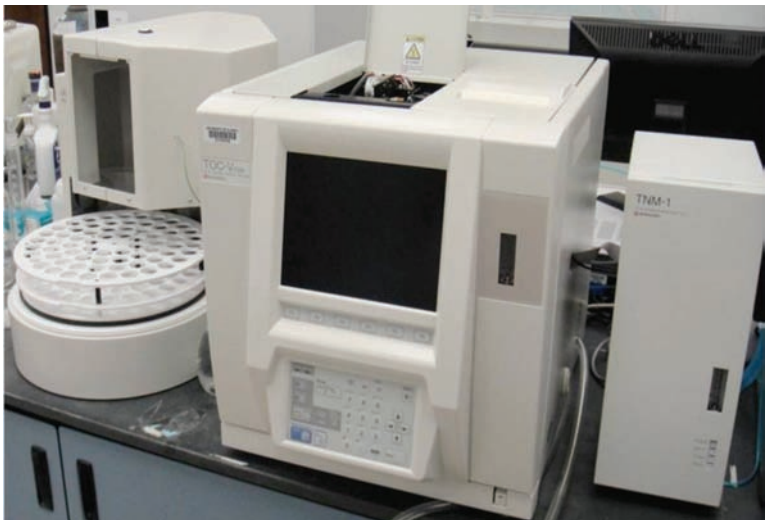

*Figure 1. The instrument used to determine total carbon (TC), total nitrogen (TN), total organic carbon (TOC) and carbon per nitrogen (C/N) (TOC-VCPN and TN -1, Shimadzu Japan).*

ISSN 1511-7871
9 771511 787001

Malaysian Palm Oil Board, Ministry of Plantation Industries and Commodities, Malaysia
P. O. Box 10620, 50720 Kuala Lumpur, Malaysia. Tel: 03-8769 4400 Fax: 03-8925 9446 Website: www.mpob.gov.my

MPOB

## BENEFIT AND COST

This is a reliable method to determine the amount of TC, TN and the carbon:nitrogen ratio in microbial cultures and other liquid samples. The cost for the analysis in 2013 is RM 100 per sample and is subject to change.

For more information, kindly contact:

Director-General
MPOB
P. O. Box 10620
50720 Kuala Lumpur, Malaysia.
*Tel*: 03-8769 4400
*Fax*: 03-8925 9446
www.mpob.gov.my