COD to TOC Correlation Method

A general description of a method, which can be used to obtain a good correlation between COD and TOC, is described in this document. There are a number of points, which require careful attention:

- The same samples must be analysed by the BioTector and the laboratory COD method.
- The samples should be analysed at the same time. If the samples are let to stand for any length of time, microbiological activity will alter the TOC and COD content of the sample.
- If any sample preparation method, such as homogenisation, filtration, dilution etc. is applied, the same methods should be applied for both BioTector and Laboratory COD samples.

To obtain a COD to TOC correlation for a specific stream:

1. Take a minimum of five samples from the sample stream at various times when it is known that the stream has different TOC or COD concentration. The recommended minimum quantity to take for each sample is three litres (3 L).
2. Mix the 3 L sample well, and split this sample into three one litre (1 L) containers and label them accordingly (e.g. Sample A1, B1, C1 etc.) for TOC and COD analysis.
3. Keep one of the samples (e.g. A1) with the BioTector and send the other two samples (B1 and C1) to the laboratory. Analyse the samples using the BioTector and a laboratory COD/BOD method as soon as possible without any time delay. If a time delay is inevitable, the samples must be preserved applying a correct sample preservation method. The recommended preservation method is freezing (at approximately -18°C) for long time delays (e.g. a few days) or cooling it down to 4°C for short time delays (e.g. a few hours). Before analyzing the sample, the sample must be warmed up to room temperature.
4. Connect Sample A1 container directly to the BioTector Manual/Calibration port. If there is no Manual/Calibration port installed, connect the sample to Stream 1 port. If the Stream 1 port is used, set the Sample Pump REVERSE time to zero seconds. Sample analysed at Manual/Calibration port does not require any Sample Pump REVERSE time adjustment.
5. The samples should be analysed at the correct TOC range of the BioTector. See Operation, System Range Data menu for the calibrated ranges of BioTector. If Manual/Calibration port is used, the most appropriate TOC range should be programmed. If the TOC levels of the samples are not known, the operation range can be programmed as A (Automatic) in Manual Program menu.
6. Analyse Sample B1 and C1 using the laboratory COD method. The COD concentration and the salt levels in the sample should be carefully evaluated and taken into account for the selection of the correct COD method and COD measurement range for an accurate COD analysis. The laboratory COD analysis and BioTector TOC analysis should be carried out at approximately the same time on the same day.
7. It is recommended to carry out a number of TOC and COD tests on each sample. In COD method, take three samples from each sample (e.g. sample B1 and C1) and analyse these samples at least 3 times and confirm that the laboratory readings are repeatable and reproducible between samples B1 and C1. The results should be within the expected limits of the method used. In BioTector, run at least 6 TOC analysis cycles. If the operation range was known, ignore the first reaction result and average the last 5, if the operation range was programmed as AUTO, ignore the first 3 reactions and average the last 3 results.
8. Calculate the COD to TOC correlation factor by dividing the average COD result with the average TOC result (e.g. 2000ppm COD ÷ 500ppm TOC = 4). Typical expected COD to TOC correlation factors are generally in the order of 2.5 to 4. To obtain the actual overall COD to TOC correlation factor, average all correlation factors obtained for each sample. This factor can then be installed in the COD Program menu of the BioTector for each specific sample stream.
9. Repeat above procedures for any other sample streams.
10. If any of the BioTector system program settings are modified temporarily during above procedures, restore these settings back to their normal settings, when the analysis is complete.

The same procedure can be used to obtain a BOD to TOC correlation factor. In that case the COD lab method has to be exchanged with a BOD lab method.

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