

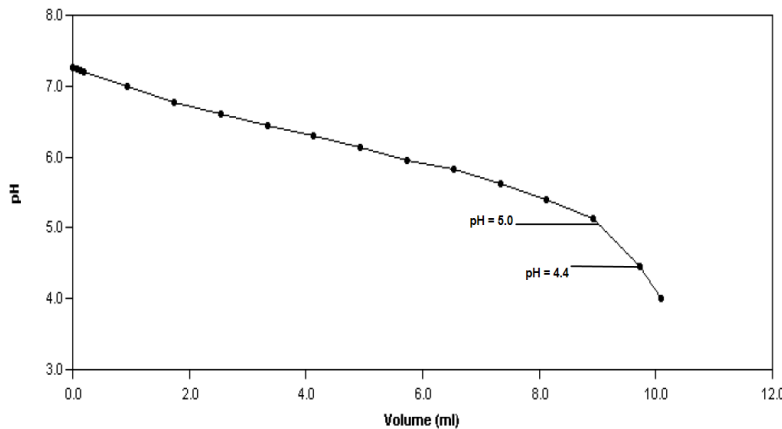
Method Abstract #127

FOS/TAC Ratio

Scope and Application This method determines the amount of total inorganic carbon (TAC), and volatile organic acids (FOS) using the Nordmann method. Then, it measures the FOS/TAC ratio of the sample often used in Biogas plants to monitor the stability of the digester.

Method Summary This FOS/TAC ratio involves the titration of a sample with standard 0.1 N sulphuric acid (H₂SO₄) titrant to endpoints of pH 5.0 and 4.4. TAC calculations are based on the volume of titrant added at pH 5.0; FOS calculations are based on the difference in the volume of titrant added between pH 5.0 and pH 4.4.

Sample Titration Curve



Determination is made as follows:

$$TAC = \frac{EP1 \times C_{titrant} \times 50045}{V_{sample}}$$

Following the titration to calculate TAC, the Nordmann method is used to determine the FOS content by continuing to titrate the same sample from pH 5.0 to pH 4.4 using 0.1 N sulphuric acid. Using the following equation where B is the acid consumed in mL (i.e. volume of titrant at pH 5.0 – volume of titrant at pH 4.4).

$$FOS = ((B \times 1.66) - 0.15) \times 500 \left[\frac{mg}{L} HAC \right]$$

In general, 0.3-0.4 is considered the optimal FOS/TAC value; however, every digester has a unique ratio. Above this range, there is excessive biomass input and below this range, there is too little biomass input.

The following shows a sample calculation of the FOS/TAC ratio attributed to the sample analyzed in *Sample Titration Curve*. At pH 5.0, the volume of titrant added is 8.97 mL, and at pH 4.4 it is 9.81. Therefore, the value of B is 0.84.

$$\frac{FOS}{TAC} = \frac{((B \times 1.66) - 0.15) \times 500}{\frac{EP1 \times C_{titrant} \times 50045}{V_{sample}}}$$

$$\frac{FOS}{TAC} = \frac{((0.84 \times 1.66) - 0.15) \times 500}{\frac{8.97 \times 0.1 N \times 50045}{20 mL}}$$

$$\frac{FOS}{TAC} = 0.28$$

A sample volume of 20ml is recommended, however, different volumes may be used. The FOS/TAC ratio of this substrate is slightly below what is generally considered the optimal level.

Automated FOS/TAC ratio determination is possible in benchtop, autosampler and online (real time) configurations by employing the MT Series Automated Titration Analyzers. As well, there is the added capability to also add COD determination via PeCOD to any configuration. More information about the MT Series can be found [here](#).

References

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