

## **A simple and accurate approach for determining the VFA concentration in anaerobic digestion liquors, relying on two titration points and an external inorganic carbon analysis**

### **Guide for the installation of the programs required for the execution of the method**

Included in the folder is the Microsoft-Excel program, consisting of two calculations: (1) determination of  $VFA_T$  and (2) estimation of  $C_T$  when the  $CO_2$  Pp is known.

Using Microsoft Office 2007 and up is recommended.

For both Microsoft-Excel program calculations the user is required to enable macros ([link Microsoft support website](#)).

Enabling macros is crucial for the use of the program, failing to do so may lead to errors and misleading results.

Some actions may require administrative privileges on the computer, please contact your network administrator for more information.

#### **Installation introductions**

The Microsoft-Excel program part used only for the  $VFA_T$  calculation does not require special installation instructions apart from enabling macros ([link Microsoft support website](#)).

#### **Total inorganic carbon ( $C_T$ ) estimation based on $CO_2$ Pp program**

The Microsoft-Excel program part for  $C_T$  estimation based on  $CO_2$  Pp require the following installation steps:

- i. Enable macros ([link Microsoft support website](#)).
- ii. Make sure that no folders in the folder tree leading to the working folder are in a non-English font (e.g. Arabic, Hebrew, Hindi etc.).
- iii. The program requires the use of the PHREEQC software COM module (IPhreeqcCOM). To install the COM server please go the PHREEQC software [website](#), download and install the Windows COM server based on your version of Windows (32 or 64-bit, see Figure below). Please note that for the 64-bit version of Windows you are required to download and install BOTH Windows COM server files (32 and 64-bit). For convenience, both Windows COM server files are included in the shared folder, but we encourage the user to download the most updated versions from the PHREEQC [website](#), as they are bug-free and contain improvements.

## Download Current Version of PHREEQC

### Graphical User Interfaces

- Windows 32-bit: [phreeqc-3.6.2-15100.msi \[13M\]](#) - Executable, database files, examples, PDF documentation
- Windows 32-bit: [Notepad++ interface](#) - Appelo's Notepad++ interface to PHREEQC version 3
- Windows 32-bit: [PHREEQC for windows](#) - PHREEQC for windows home page

### Batch Versions of PHREEQC

- Windows 64-bit: [phreeqc-3.6.2-15100-x64.msi \[15.6M\]](#) - Executable, database files, examples, PDF documentation
- MacOS (OS 10.7 - 10.12) 64bit: [phreeqc-3.5.0-14000.dmg \[12M\]](#) - Executable, database files, examples, and PDF documentation
- Windows (any processor): [phreeqc-3.6.2-15100.zip \[12M\]](#) - Source, CMake, database files, examples, PDF documentation
- Linux (any processor): [phreeqc-3.6.2-15100.tar.gz \[12M\]](#) - Source, configure, database files, examples, PDF documentation

### PhreeqcRM Reaction Module for Transport Models

- Windows (any processor): [phreeqcrm-3.6.2-15100.zip \[7M\]](#) - Source, CMake, database files, examples, HTML documentation
- Any Platform (any processor): [phreeqcrm-3.6.2-15100.tar.gz \[7M\]](#) - Source, configure, database files, examples, HTML documentation

### IPhreeqc Modules

- Windows (any processor): [iphreeqc-3.6.2-15100.zip \[12.6M\]](#) - Source with CMake, database files, examples, and documentation
- Linux (any processor): [iphreeqc-3.6.2-15100.tar.gz \[12.5M\]](#) - Source with configure, database files, examples, and documentation
- Windows COM 32-bit: [IPhreeqcCOM-3.6.2-15100-win32.msi \[3.4M\]](#) - COM server, CHM documentation
- Windows COM 64-bit: [IPhreeqcCOM-3.6.2-15100-x64.msi \[3.6M\]](#) - COM server, CHM documentation (Both 32-bit and 64-bit COM versions should be installed on 64-bit versions of Windows)

- The COM server requires the use of the Microsoft .NET Framework 3.5. This Windows feature needs to be turned on (within the control panel – [link to Microsoft support webpage](#)) or downloaded and installed ([Microsoft download link](#)).
- Make sure the included PHREEQC database file (file name “phreeqc.dat”) is placed in the same folder as the Microsoft-Excel program file.

## Troubleshooting

Error	Error message	Solution
The result cell is showing an error value	#VALUE!	<ul style="list-style-type: none"><li>- Make sure macros are enabled.</li><li>- Make sure only numbers are typed into the input cells.</li></ul>
When pressing the “Run Phreeqc” button an error message appears.	Run time error 424; error 429, Automation error; error initializing DLL; Object required.	<ul style="list-style-type: none"><li>- Make sure macros are enabled.</li><li>- Make sure only English fonts are in the folders directory tree.</li><li>- Make sure the COM server is installed correctly.</li><li>- Make sure the Microsoft .NET Framework 3.5 is installed and turned on.</li></ul>
Phreeqc errors		<ul style="list-style-type: none"><li>- Check input parameter units</li><li>- Check input parameters accuracy</li></ul>