Measuring Volatile Acids and Alkalinity for Optimal Operation

pH is not enough.

In the multi-stage process of anaerobic digestion different kinds of bacteria convert complex organic compounds first into Volatile Fatty Acids (VFA, or Volatile Acids) and finally into biogas (methane). For optimal results, a digester should have a pH value between 6.5 and 7.5. However, just measuring the pH is not enough. In order to ensure sustainable and safe operation there must be a sufficient buffer capacity–also known as total alkalinity of carbonates (TAC, or simply alkalinity)–in order to compensate for changes in the acid concentration. A digester that is too acidic is toxic for the bacteria, especially for the methane-producing bacteria. Upsets due to the toxic conditions of low pH can be very costly, and re-seeding the digester can be very time consuming. Measuring the ratio of VFA to TAC therefore gives the best indication of the actual condition of the digester.

Time

The digestion process is often monitored simply by means of manual sampling. Manual handling takes up valuable time that could be used for other important tasks. Waiting for laboratory results impedes early detection of any changes in the digester, thus preventing any countermeasures from being taken in a timely manner.

Safety

Fluctuations in the organic load and the solids content pose major challenges for the digestion process. Reliable measurement results that provide information on the status of the digester are necessary for identifying imminent incidents caused by overloading or excessive acidity at an early stage and introducing the appropriate process changes and countermeasures.

Optimisation

Continuous monitoring of VFA and alkalinity:

- Provides 24/7, real-time measurement results to ensure stable digester operation
- Reduces the risk of upset conditions in the digester and can increase biogas production
- Reduces manual labor and time spent waiting for laboratory results

VFA *= Volatile Fatty Acids*

TAC *= Total Alkalinity of Carbonates (alkalinity), carbonate buffer capacity, expressed as mg/L* $CaCO_3$

VFA/TAC *= Ratio of volatile acids and alkalinity*

The optimum ratio is specific to a treatment plant and should be determined through baseline monitoring of normal conditions.

HACH®
Be Right™

EZ7200 Series Analysers for Volatile Fatty Acids and Alkalinity

EZ7200 Analysers are online titrators and available in several models and measuring ranges:

EZ7250	VFA	10 - 500 mg/L as acetate equivalent
	Bicarbonate	1 - 50 meq/L or 100 - 5,000 mg/L as $CaCO_3$
	Total and partial alkalinity	1 - 50 meq/L or 100 - 5,000 mg/L as $CaCO_3$
EZ7251	VFA	20 - 1,000 mg/L as acetate equivalent
	Bicarbonate	1 - 50 meq/L or 100 - 5,000 mg/L as $CaCO_3$
	Total and partial alkalinity	1 - 50 meq/L or 100 - 5,000 mg/L as $CaCO_3$
EZ7252	VFA	100 - 5,000 mg/L as acetate equivalent
	Bicarbonate	5 - 100 meq/L or 500 - 10,000 mg/L as $CaCO_3$
	Total and partial alkalinity	5 - 100 meq/L or 500 - 10,000 mg/L as $CaCO_3$
EZ7253	VFA	500 - 10,000 mg/L as acetate equivalent
	Bicarbonate	5 - 100 meq/L or 500 - 10,000 mg/L as $CaCO_3$
	Total and partial alkalinity	5 - 100 meq/L or 500 - 10,000 mg/L as $CaCO_3$

EZ7200 VFA Analyser

Options

- Monitoring of up to 8 sample streams per analyser, reducing cost per sampling point
- Analog and/or digital outputs for communication

An EZ9130 Self-cleaning Heavy-Duty Filtration System is required for sample preconditioning.

Options for monitoring in the lab

DR3900 Spectrophotometer

Volatile Acids Cuvette Test
Measuring range 50 - 2500 mg/L as acetic acid
Product nr. LCK365

AT1000 Lab Titrator with Biogas Application Package

You want to measure these or other parameters? Our application experts will support you in finding the best solution for your specific situation. Just contact us via phone, e-mail or the website.

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