

SIMPLE AND ACCURATE MEASUREMENTS OF BIOGAS COMPOSITION

Fields of use

The device is useful in all processes involving analysis of biogas, carried out in biogas plants, waste treatment facilities, and any industrial or research facilities that carry out biogas concentration measurements.

Current state of technology

The solution has been demonstrated and tested in the laboratory.

Type of cooperation

License agreements and/or technical cooperation agreements with industry or research partners performing routine gas concentration measurements, manufacturing agreements with industry partners with the capacity for manufacturing the apparatus (e. g. plastics manufacturers).

Intellectual property

Patent application has been filed.

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Summary

Current approaches to biogas composition analysis often include measurements of individual components in separate samples. An apparatus is presented which allows for measuring volumes of individual (bio)gas components as well as total (bio)gas from the same sample, simplifying the analysis and increasing its accuracy.

Description of the invention

In environmental biotechnology, the biological methane potential test is routinely used to determine quantities of methane produced per gram of volatile solids in batch systems. In most assays the tests are conducted on small volume (up to 0.5 L) laboratory scales, which do not necessarily reflect the full-scale reactor environments. Biomass and solid substrate particles are usually homogenized, reducing particle size, consequently affecting methane production. Furthermore, separate samples are usually needed in order to measure separate biogas components, which introduces inconsistencies in measurement results. Finally, these solutions do not have sufficiently high through-put in order to analyze large numbers of samples.

The invention solves these problems by allowing for large-scale (up to 10 L) samples to be analyzed, with no need for homogenization of the sample and no need for multiple samplings. The invention upgrades existing procedures by introducing a gas capturing element to the analysis setup. It consists of a chamber installed over an existing gas volume measuring device wherein the sampled gas is recovered and redirected to a gas stripping unit. In this unit, a specific biogas component (e. g. methane) is purified and its volume measured in a subsequent gas volume measuring device. Therefore, data about the volumetric fraction of a specific component within a given biogas sample is obtained from a single sample.

Main Advantages

- technically simple and inexpensive
- suitable for on-site use in industrial laboratories
- suitable for analysis of complex samples
- high through-put / possible simultaneous analysis of a large number of samples
- suitable for analysis of multiple gas components from the same sample, decreasing variability in experimental results
- expands the number of gases (CO₂, CH₄, NH₃ and H₂S) that can be routinely analyzed, depending on the number of sensors integrated in industrial gas meters on site

- device may be connected to a suitable downstream application (eg., to a successive or subsequent biogas volume-measuring system, to a gas stripping unit, to a gas collector bag, a gas storage tank, or a ventilation outlet)
- suitable for a range of scales, from 0.5-L containers to 10-L containers, eliminating the need for homogenization of the sample
- suitable for batch and semi-continuous operation, laboratory or pilot scale