

Gasmeter™ FTIR application note

Continuous emissions monitoring in waste incineration plants

KEY WORDS

- Continuous emissions monitoring (CEM)
- Waste incineration
- Fourier Transform Infrared (FTIR)

PRODUCTS

- [CX4000](#) For continuous emissions monitoring
- [GASMET CEM II](#) FTIR Continuous Emissions Monitoring system

OVERVIEW

Waste incineration is an effective way of converting waste to energy. On the other hand, waste incineration plants are governed by strict emissions regulations. An FTIR Continuous Emissions Monitoring System such as **Gasmeter™** CEMS can simultaneously measure all regulated components. Measuring multiple gas components with just a single analyzer dramatically reduces operation and maintenance cost. **Gasmeter™** CEMS can be used in various types of incinerators for different types of waste: municipal, hospital, chemical, hazardous waste, municipal sludge, etc.

The modular construction of **Gasmeter™** CEMS simplifies service and reduces down-time. All **Gasmeter™** CEMS are built and calibrated to suit the plant specific measurement need. Moreover, the calibrations are based on a physical constant — the absorption coefficient of a gas compound. Thus calibrations are very stable.

TYPICAL APPLICATION

Compound name	Range	Unit
Water	0 – 30	vol-%
Carbon Dioxide	0 – 25	vol-%
Carbon Monoxide	0 – 75	mg/Nm ³
Nitrogen Monoxide	0 – 200	mg/Nm ³
Nitrogen Dioxide	0 – 200	mg/Nm ³
Nitrous Oxide	0 – 100	mg/Nm ³
Sulfur Dioxide	0 – 75	mg/Nm ³
Ammonia	0 – 15	mg/Nm ³
Methane	0 – 100	mg/Nm ³
Hydrogen Chloride	0 – 15	mg/Nm ³
Hydrogen Fluoride	0 – 15	mg/Nm ³



Gasmeter™ CEM II system:

CX4000 FTIR gas analyzer; Gasmeter sampling unit; Gasmeter Industrial Computer; Analog outputs or ModBus;

Heated sample probe; Heated sample lines; Optional oxygen analyzer



Gasmeter™ Sampling System

Hot extractive sampling ensures reliable results for water soluble & reactive components. All parts that are in contact with the sample gas are heated to 180 °C. The system also has a number of built-in safety features; in the unlikely event of a temperature drop or a power loss, the sampling automatically stops and system is flushed with zero gas.

Data Handling

The spectra measured by **Gasmeter™** analyser is analyzed in an industrial computer that is running the **Calcmeter™** software. There are several possibilities for data output.

Alarms:

- Alarms are transmitted via relay contacts

Analysis results, options:

- Analog output 4 - 20 mA
- ModBus
- RS-communication
- DDE linking to external software

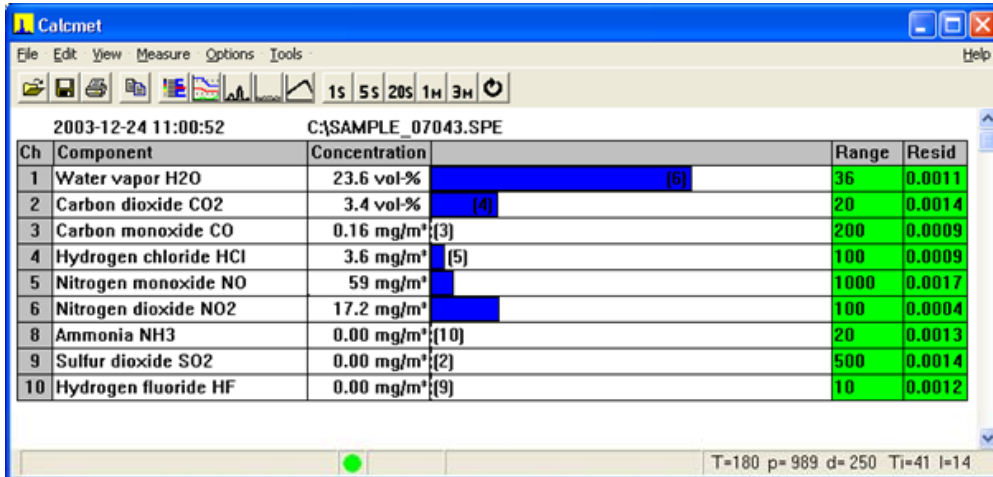
Remote control:

- Modem connection and PC Anywhere software



APPLICATION DATA

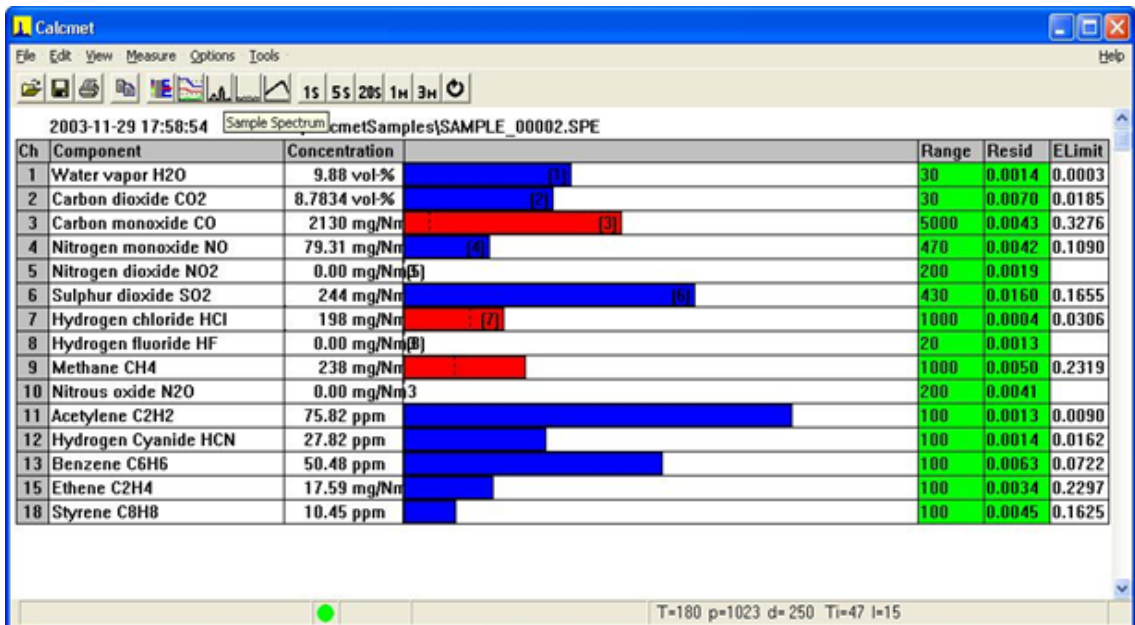
Actual analysis information from a hospital waste incineration facility that is running optimally.



Ch	Component	Concentration	Range	Resid
1	Water vapor H2O	23.6 vol-%	36	0.0011
2	Carbon dioxide CO2	3.4 vol-%	20	0.0014
3	Carbon monoxide CO	0.16 mg/m ³	200	0.0009
4	Hydrogen chloride HCl	3.6 mg/m ³	100	0.0009
5	Nitrogen monoxide NO	59 mg/m ³	1000	0.0017
6	Nitrogen dioxide NO2	17.2 mg/m ³	100	0.0004
8	Ammonia NH3	0.00 mg/m ³	20	0.0013
9	Sulfur dioxide SO2	0.00 mg/m ³	500	0.0014
10	Hydrogen fluoride HF	0.00 mg/m ³	10	0.0012

T=180 p= 989 d= 250 Ti=41 I=14

Emissions data from unclean combustion from an incinerator that is using natural gas as base fuel. Hydrocarbon and CO concentrations are high. In addition, dangerous amount of HCN is present.



Ch	Component	Concentration	Range	Resid	ELimit
1	Water vapor H2O	9.88 vol-%	30	0.0014	0.0003
2	Carbon dioxide CO2	8.7834 vol-%	30	0.0070	0.0185
3	Carbon monoxide CO	2130 mg/Nm ³	5000	0.0043	0.3276
4	Nitrogen monoxide NO	79.31 mg/Nm ³	470	0.0042	0.1090
5	Nitrogen dioxide NO2	0.00 mg/Nm ³	200	0.0019	
6	Sulphur dioxide SO2	244 mg/Nm ³	430	0.0160	0.1655
7	Hydrogen chloride HCl	198 mg/Nm ³	1000	0.0004	0.0306
8	Hydrogen fluoride HF	0.00 mg/Nm ³	20	0.0013	
9	Methane CH4	238 mg/Nm ³	1000	0.0050	0.2319
10	Nitrous oxide N2O	0.00 mg/Nm ³	200	0.0041	
11	Acetylene C2H2	75.82 ppm	100	0.0013	0.0090
12	Hydrogen Cyanide HCN	27.82 ppm	100	0.0014	0.0162
13	Benzene C6H6	50.48 ppm	100	0.0063	0.0722
15	Ethene C2H4	17.59 mg/Nm ³	100	0.0034	0.2297
18	Styrene C8H8	10.45 ppm	100	0.0045	0.1625

T=180 p=1023 d= 250 Ti=47 I=15

This application note is meant to be an informative example of typical application where Gasmeter analyzers could be used. This is not a technical specification sheet. Information in this document is subject to change without prior notice. Optimal product configuration is application dependent, and exact application details such as detection limits, components included in the application, etc depend on process and/or measurement site details and may vary. Please, contact your local Gasmeter sales representative to get information specific to your needs.