

Gasmeter™ FTIR application note

Carbon Capture and Storage (CCS) applications

KEY WORDS

- Emissions monitoring
- Process efficiency monitoring
- Amine and Ammonia measurements
- Hot/Wet multipoint sampling systems

PRODUCTS

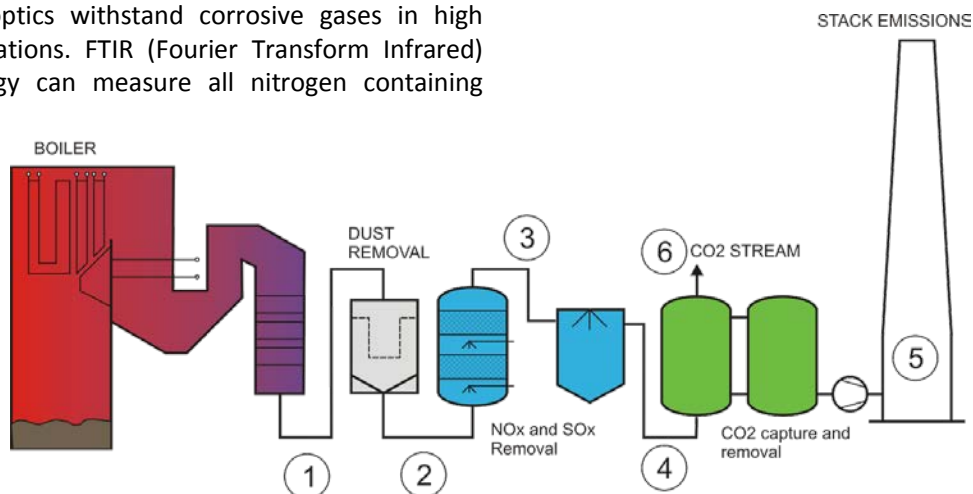
- [GASMET CEM II](#) FTIR Continuous Emissions Monitoring system
- [DX4000](#) Portable FTIR Gas Analyzer
- [PSS](#) Portable Sampling System

OVERVIEW

Carbon Capture and Storage (CCS) is an emerging method of reducing Greenhouse Gas emissions of power plants. Chemical absorption using amine or carbonate solvents, also known as scrubbing, is a well established method of carbon capture. Virtually every commercial CO₂ capture plant in operation uses this process. After removing impurities from the flue gas, such as NO_x, SO_x and hydrocarbons, the gas is passed through an absorption column in which the amine reacts with the CO₂ and selectively absorbs it from the gas stream. The CO₂ rich amine is then heated, where the CO₂ is released from the amine as nearly pure gas.¹

organic and inorganic gases (except N₂) with a high degree of accuracy. The FTIR spectrometer records and stores complete IR spectra of the sample gas in addition to on-line analysis. This means that the automatic on-line emissions monitoring system can also be used as a research tool to look into the process in more detail, possibly revealing trace components such as CO₂ solvent decomposition products.

Gasmeter CEMS (Continuous Emissions Monitoring System) is a hot/wet extractive system capable of monitoring up to eight (8) sampling locations. The hot/wet approach retains ammonia and amines as well as other water soluble flue gas components (SO₂, HCl, HF, formaldehyde) and the rugged gold coated optics withstand corrosive gases in high concentrations. FTIR (Fourier Transform Infrared) technology can measure all nitrogen containing



RIGHT: Gasmeter CEMS system with a CX-4000 FTIR gas analyser and hot extractive sampling system. All parts in contact with sample gas have a minimum temperature of 180 °C. Analysis of trace components (ppm level) is possible in presence of 30 %vol H₂O or up to 100%vol CO₂.

As illustrated below, the Gasmeter FTIR solution for monitoring CCS process streams provides excellent versatility by simultaneously measuring a wide range of gases including many amines created as degradation by-products in the process. This list tabulates many of the gases historically measured by Gasmeter FTIR gas analyzers; the final application gas library is generated site specific.



TYPICAL COMPONENTS FOR POST-COMBUSTION CARBON CAPTURE APPLICATIONS

Compound name	CAS number	Range
Water	7732-18-5	0-25 %
Carbon dioxide High	124-38-9	0-100 %
Carbon dioxide Low	124-38-9	0-15 %
Ammonia High	7664-41-7	4000 ppm
Ammonia Low	7664-41-7	20 ppm
Ethylene glycol (1,2-Ethanediol)	107-21-1	50 ppm
Methylamine	74-89-5	200 ppm
Dimethylamine	124-40-3	100 ppm
Trimethylamine	75-50-3	100 ppm
Ethylamine	75-04-7	100 ppm
Diethylamine	109-89-7	100 ppm
Dimethylethylamine(DMEA)	598-56-1	50 ppm
N,N-Diethylmethylamine	616-39-7	50 ppm
Ethanolamine (MEA)	141-43-5	200 ppm
2-Amino-2-methylpropanol (AMP)	124-68-5	50 ppm

Compound name	CAS number	Range
2-Methylaminoethanol	109-83-1	50 ppm
Methyl diethanolamine (MDEA)	105-59-9	20 ppm
Diglycolamine (DGA)	929-06-6	50 ppm
2-(Ethylamino)ethanol (EMEA)	110-73-6	20 ppm
Methyl-1,3-diaminopropane (MAPA)	6291-84-5	20 ppm
Diethanolamine (DEA)	111-42-2	20 ppm
2-Dimethylaminoethanol	108-01-0	20 ppm
Piperazine	110-85-0	50 ppm
N- Nitrosodiethylamin (NDEA)	55-18-5	50 ppm
N-Nitrosomorpholine (NMOR)	59-89-2	50 ppm
N-Nitrosopiperidien (NPIP)	100-75-4	50 ppm
N-Nitrodiethanolamine (NDELA)	1116-54-7	50 ppm

Other ranges and compounds available; please contact Gasmeter Technologies for further details

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.

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