Specifications

PED

Standard Methods:	ASTM D2504, D2505
Configuration:	Thermo TRACE 1300 GC or CompactGC with Plasma Emission Detector
Application:	Custom configured analyser for the analysis of gaseous samples, containing permanent gases, light hydrocarbons, S- or N- containing components, and other component groups
Optional:	Combination with addtional analysis channels
Sample tubing:	Sulfinert® tubing for inert sample path (in case of polar components)
Sample requirements:	See our pre-installation guide for additional requirements
Analysis Time:	Depending on application
Minimum detectability:	1-10 ppb, depending on carrier gas, components and matrix
Accuracy:	Dependant on external calibration and repeatability
Repeatability:	< 1 % RSD

For more information:

G·A·S is an INTERSCIENCE company

G·A·S is the preferred solution partner of

P.O. Box 2148, 4800 CC Breda, The Netherlands
T: +31 (0)76 5411800 F: +31 (0)842 206757 info@gas-site.com www.gas-site.com

GLOBAL™ ANALYSER SOLUTIONS G·A·S

APPLICATION NOTE 215WA0713A

High Purity Analysis using Plasma Emission Detector

ASTM D2504 D2505

G·A·S offers custom configured GC analysers for complex separations, data processing and reporting. We have over 35 years of experience in designing and building turnkey analysers for many application fields. Our analysers are designed to meet many accepted standard methods (like GPA, ASTM, UOP, ISO, etc.) in the Oil and Gas industry. The efficient configurations are based on proven GC technology, resulting in robust instruments with an optimal return on investment.

The High Purity Analyser (HPA) is the standard tool for gas suppliers in determining the quality of bulk gases. Their clients demand high purity with exact specification for various applications like instrumental use and industrial production. Refiners need to know the trace amount of permanent gases in various light hydrocarbon streams. G·A·S offers HPA on Trace 1300 and CompactGC, with PDD (Pulsed Discharge Detector) or PED (Plasma Emission detector). This application note describes the last mentioned.

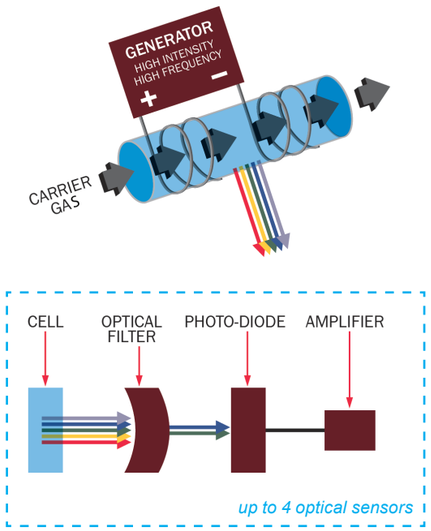


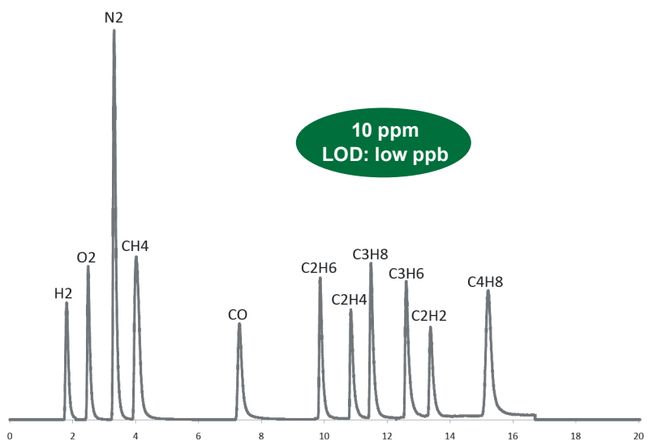
Diagram 1: Plasma Emission Detector, principle

Plasma Emission Detector - Principle

The PED principle is based on electroluminescence: components ionised by an electromagnetic field are emitting spectral lines that are detected by a photo diode. The amount of light is proportional to the components concentration. The emission varies for each substance, and therefore an optical filter is used for selective measurement. Up to 4 different optical systems are used in one detector, allowing simultaneous analysis of a large number of components. See diagram 1. Argon or Helium is used as carrier gas.

Application fields

The PED is used in the same application area as PDD: permanent gases and light hydrocarbons in bulk gases and hydrocarbon streams, see chromatrogram 1. PED offers enhanced sensitivity and selectivity. It is unique for analysing impurities in Argon: separation problems are avoided when Argon is used as carrier gas. PED offers very low detection limits in the ppb range, see table 1.



Chromatogram 1: permanent gases and light hydrocarbons, 10 ppm level

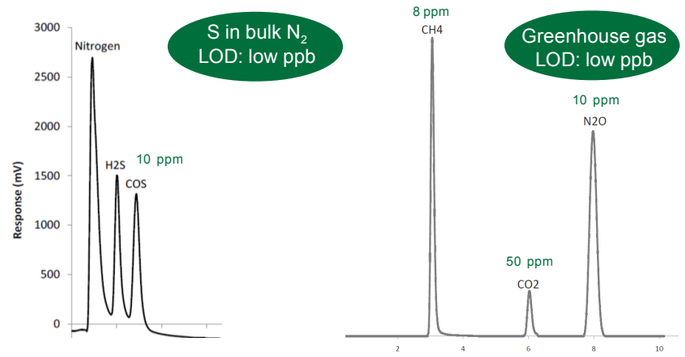
Component	PPM	ppb LOD (S/N=3)
H2	10	3,4
O2	10	2,6
N2	10	1,0
CH4	10	2,5
CO	10	4,1
C2H6	10	2,9
C2H4	10	3,6
C3H8	10	2,6
C3H6	10	2,7
C2H2	10	4,3
C4H8	10	6,4

Table 1: Detection limits using 1/8 " packed column

Plasma Emission Detector

More application fields

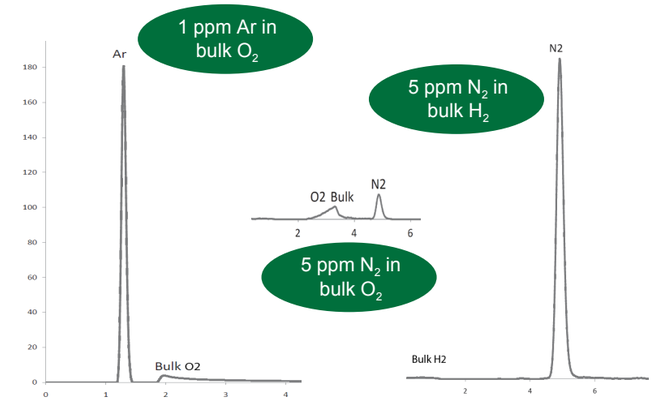
Besides permanent gases and light hydrocarbons many other applications are available. Examples are sulfur components, greenhouse gases (no radioactive ECD needed), SF_6, CF_4, Formaldehyde, NH_3, AsH_3, PH_3 in different matrices like bulk gases (including Kr and Xe), hydrocarbons, SiH_4, GeH_4, NH_3 and HCL.



chromatogram 2,3 : sulfur and greenhouse gases

Selective detection

The optical filters allow selective detection of components of interest, which is a great advantage when ppb impurities elute close to high% matrix peaks. Chromatograms 4, 5 and 6 show large differences in response between bulk and components to be measured. The response difference can be smaller in case of other components, but even then the selective optical filters help peak separation enormously. The use of component traps, which need to be reconditioned or replaced, is avoided in this way.



chromatogram 4,5,6 : selectivity examples

Instruments

The PED is available on Thermo Trace 1300 GC series and G·A·S CompactGC[4.0]. No additional gases besides the carrier gas are needed. Helium or Argon is used as carrier, the latter is often the preferred choice, avoiding Helium consumption. Low system background is mandatory for PED applications. Therefore G·A·S diaphragm valves with internal purge are essential to obtain extreme low leak rate.

CompactGC[4.0]

Diaphragm valve with internal purge

Thermo Trace 1300 GC with valve oven

GLOBAL™ ANALYSER SOLUTIONS G·A·S