Pure Gases Monitoring Applications

CH4 / NMTHC / CO / CO_2 impurities measurement in pure gases

Context & Challenges

Some companies (e.g. pure gases manufacturers) are producing or using Ultra High Purity gases (UHP) and are requested to perform quality control of their cylinders. For such application, highly sensitive analyzers are required.

The idea is to propose a sensitive and flexible instrument that can be used for different kind of application. Then, a solution can be to monitor CO, CO_2, CH_4 and other non methane hydrocarbons with the same instrument to be able to provide a Total Hydrocarbons concentration. The difficulty is to provide such instruments with ability to work in different matrix (O_2, N_2, He).

Chromatotec® Solutions

chromaCO option NMTHC for impurities CH4 / NMTHC / CO / CO_2 measurement at few ppb concentration levels

The chromaCO option NMTHC (Non Methanic Total Hydrocarbons) is an analyzer specifically designed for the measurement of impurities such as: CH4 / NMTHC / CO / CO2 in pure gases.

There are two possible configurations:

For CH4 / NMTHC configuration, the analyzer is working with a trap (placed after the injection valve), a column and a Flame Ionisation Detector (FID).
For CO / CO2 configuration, a converter (methanizer) is integrated between a column and the FID to convert the different compounds in CH4. Then, these compounds are analyzed by the Flame Ionisation Detector (FID). The main advantage is to be able to analyze compounds which have low or very low response factors (e.g. HCHO) with a FID, or are generally not possible to measure (e.g CO / CO2)

The coupling of these two configurations offers a wide range of analysis possibilities and allows the customer to select the measurement according to his needs.

Technical information and results

A/ Operating conditions for CO / CO_2 configuration:

Carrier gas: H2: 9 mL/min
Sample pressure: 1 bar
Injection: 0.250 mL loop
Oven Column: Porapak Q, Temperature= 80°C
Methanizer
Detector: Flame Ionisation Detector (FID)
Sample: mix of standard (CO: 49ppm / CH4: 51ppm / CO2: 50ppm)
Amplification: 2
BS: 14 300

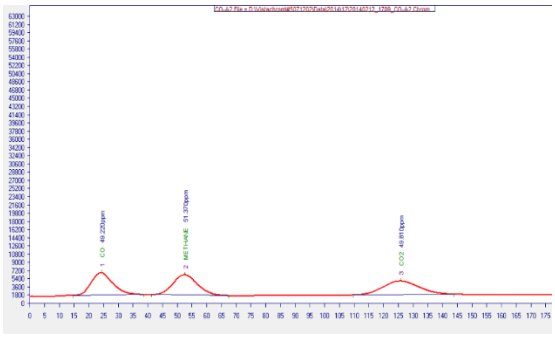

Fig 1: Operating conditions for CO / CO_2 configuration

B/ Operating conditions for CH4 / NMTHC configuration:

Carrier gas: H2: 9 mL/min
Sample pressure: 1 bar
Injection: 0.250 mL loop
Trap: 3 phases
Detector: Flame Ionisation Detector (FID)
Sample: pure gas
Amplification: 3
BS: 17 000

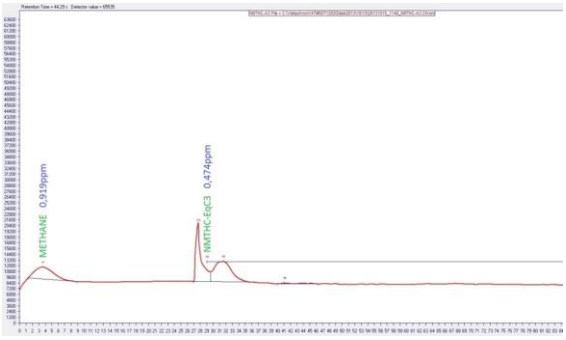

Fig 2: Operating conditions for CH4 / NMTHC configuration

Conclusion:

Chromatotec® has developed a specific analyzer for impurities measurement at trace level (LDL: 20 ppb) in pure gases.

This analyzer is perfectly suitable for pure gas quality control and fulfills the specific requirements of this market. Using the appropriate configuration, the instrument will be able to reach high level of sensitivity for specific and targeted molecules. The chromatographic column allows using the instrument in different matrix (e.g. O_2, N_2, He…).

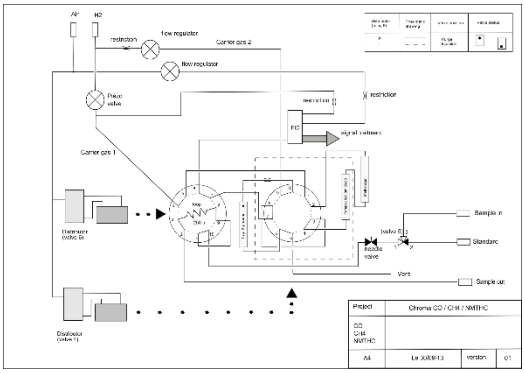

Fig 3: Pneumatic Scheme