Solutions for Testing of

LPG (Liquefied Petroleum Gas)

made by ECH

ECH Elektrochemie Halle supports customers involved with the production, storage and distribution of Liquified Petroleum Gases (LPG).

ECH has developed several instruments designed specifically for the determination of specific parameters of LPG products according to methods listed in ASTM, UOP and other industry accepted standards.

Water Content

Coulometric Karl Fischer titration according to ASTM D 7995 by **Aquamax KF PRO LPG**

Hydrogen Sulphide & Mercaptan Content

According to standard UOP 212 by **Titramax VT SULPHUR**

Hydrogen Sulphide Content

Gas extraction technique by **Sulfimax GX** with **Sampling Box**

Gas Composition

According to standard ASTM D 2163 and D 2598 by **MobilGC** with **Sampling Box**

Water Content of LPG

Coulometric Karl Fischer titration according to standard ASTM D 7995

aquamax KF PRO LPG

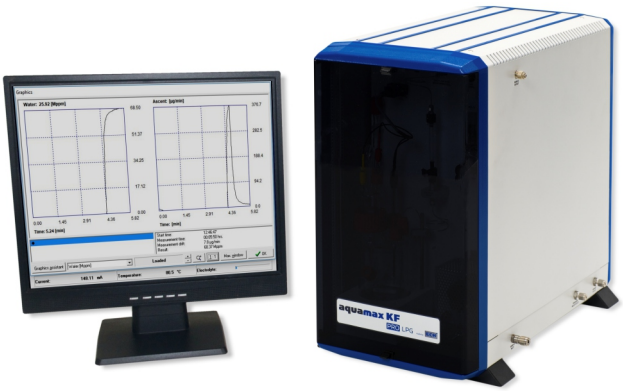
Description

Water is one of the leading causes of corrosion and creates numerous safety hazards during the storage, distribution and use of liquified petroleum gases (LPG) and pressurised low molecular weight hydrocarbons and their different mixtures.

Recent advances have been made in adapting coulometric Karl Fischer titration to analyse the water content in problematic samples such as LPG and LNG. Globally, coulometric Karl Fischer titration is recognised as the leading method of water content determination due to its greater sensitivity and ability to analyse both free and dissolved water.

In 2019, **ASTM D 7995**, the standard Test Method for Total Water in Liquid Butane by Liquefied Gas Sampler and Coulometric Karl Fischer Titration was approved.

The **Aquamax KF Pro LPG** from ECH conforms exactly to the method. In this method, the water content of LPG and gas samples can be analysed from 1 - 10,000 ppm.



The Aquamax KF PRO LPG fulfils the requirements of the standard ASTM D 7995 - 19: Standard Test Method for Total Water in Liquid Butane by Liquefied Gas Sampler and Coulometric Karl Fischer Titration.

Advantages of the Aquamax KF PRO LPG

- Totally automated process, no operator input required for the test
- 250 measurements can be performed in 48 hours
- No balance is required
- Sulphur removal cartridge eliminating the side reactions caused by sulphides/H_2S
- No interference calculation required
- Suitable to test all gas types without any calibration or adjustments
- No separate rinsing gas is required
- Rinsing process is fully automated
- High sample throughput and long reagent life
- Compact device

Hydrogen Sulphide & Mercaptan Content

Conform to standard UOP 212

titramax VT
SULPHUR

Description

Measuring for H_2S concentration is critical. Hydrogen Sulphide (H_2S) is a gas which can cause hugely detrimental effects to a refineries production and safety.

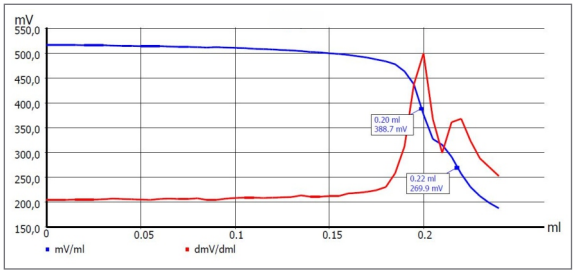
The MAC (Maximum Allowable Concentration) of H_2S is as low as 10 ppm, but H_2S will already breach the odour nuisance threshold at 3 - 5 ppm. Anything over 10 ppm will begin to have serious health consequences such as eye defections, loss of sense and smell, and at over 1000 ppm fatality would be certain in only minutes or seconds.

Aside from the health risk, H_2S gas is extremely corrosive and the presence of H_2S can damage technical equipment within the refinery and will corrode concrete at a rate of up to 10 mm per year.

ECH offer the **Titramax VT Sulphur** according to UOP 212. This method is for determining hydrogen sulphide (H_2S), mercaptan sulphur (RSH) and carbonyl sulphide (COS) in gaseous hydrocarbons and in typical liquefied petroleum gas (LPG) consisting of C3 and/or C4 hydrocarbons.

Also covered is the determination of mercaptan sulphur in LPG which may contain a wide range of hydrocarbon types ranging from ethane to such gasoline boiling range hydrocarbons as pentane and hexane. Each sulphur type can be determined from less than 1 to several thousand ppm.

Titramax VT SULPHUR



Titration graph of a sample

Advantages of the Titramax VT SULPHUR

- Complete measuring system for the determination of hydrogen sulphide and mercaptan sulphur
- Fully-automatic volumetric titration
- Precise adjustment of the titration parameters by control algorithms
- Preset measurement method allows an immediate start
- The result output can be adjusted to your needs by using a formula generator

Hydrogen Sulphide Content of LPG

Determination by gas extraction technique

sulfimax GX go

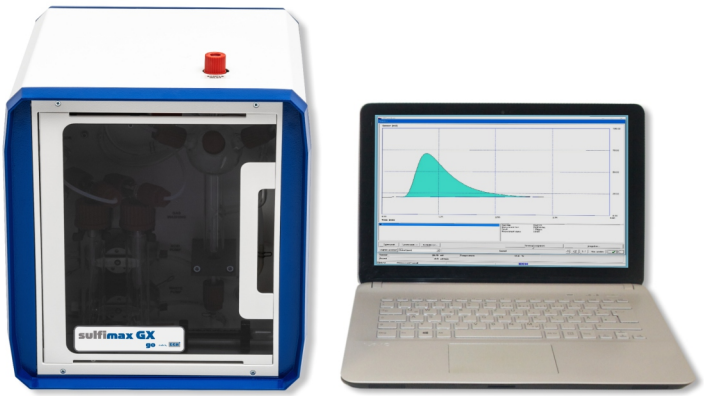
Description

ECH also offer a unique alternative to the popular, yet chemically intensive UOP 212 method. The **Sulfimax GX** H_2S analyzer from ECH allows for Hydrogen Sulphide analysis down to 0.1 ppm.

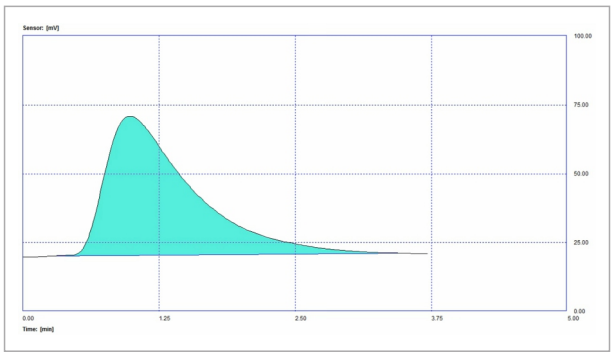
Customers can sample pressurised LPG from cylinders with the LPG **Sampling Box** accessory also designed by ECH.

The Sulfimax GX technique works by using an electro-chemical detector and unique gas extraction technique, the **Sulfimax GX** can measure H_2S in gas samples from 0.1 ppm through to 10,000 ppm.

A typical measurement using the **Sulfimax GX** takes 5 minutes depending on sample composition, whilst any potential mercaptan interference is removed by white oil in a separate extraction chamber.



Sulfimax GX Go - H_2S analyzer as compact version



Typical measurement - automatic peak analysis / interpretation

Advantages of the Sulfimax GX Go

- Analysis of the original sample
- No sample preparation
- Short measuring time - typical 5 min (depending on sample properties)
- Simple calibration
- Minimized cross sensitivity through the indirect method
- Suitable for on-site use

Sampling Box for dosing of liquefied gas into H_2S analyzer

Gas Composition

Conform to standard ASTM D 2163 and D 2598

mobilGC

Description

The **MobilGC** from ECH conforms to ASTM D 2163 and D 2598, this test method covers the quantitative determination of individual hydrocarbons in liquefied petroleum gases and mixtures of propane and propene, excluding high-purity propene in the range of C1 to C5. Component concentrations are determined in the range of 0.01 to 100 percent by volume.

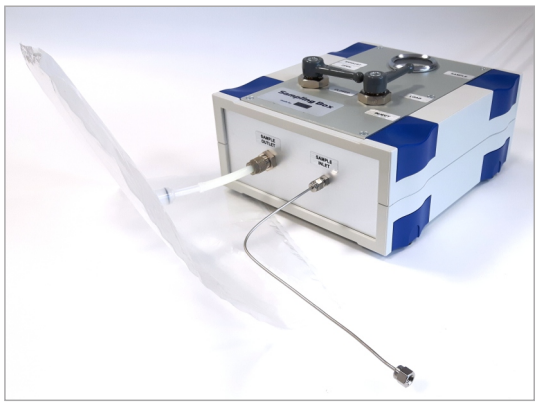
The **MobilGC** portable gas chromatograph (GC) from ECH has a column oven and a microprocessor controlled modular system with temperature program. The instrument can be equipped with two injector systems, two detectors and two oven cassettes. The device has an integrated temperature regulation and a separate pneumatic module with pressure regulators for the carrier gas and additional detector gases. Control and evaluation of the digitized detectors are run by the integrated evaluation program, including storing of unprocessed data and report printing.

The instrument can be used as GC for routine analysis, or automatic portable GC in connection with the integrated gas sample valve and automatic sample injection system.

The sample collection from pressurized LPG cylinder is also possible with a **Sampling Box**.

The handling of the pressurized liquids becomes easy with this module. A homogeneous gaseous sample is guaranted using the sampling box in combination with gas sampling bags.

MobilGC with connected gas sampling bag



Sampling Box for transformation of liquefied gas into gaseous samples in gas sampling bags

Advantages of the MobilGC

- Simple sample preparation with Sampling Box
- Sample loop with 5 ml volume (also other sizes applicable)
- MobilGC with internal carrier gas supply for on-site analysis
- With up to 80 operating hours
- Easy refilling of gas supply
- Measurement sensitivity 0.1 to 100 %
- Result as concentration, as total MON number or as MON value for each component

MobilGC with thermal conductivity detector (TCD):

- Robust device with simple handling
- Only one gas type required
- Helium as carrier gas (according to standard ASTM D 2163)

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