Ion Mobility Spectrometry
Photo Ionization Detector
Gas Chromatography

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Application Note

Workplace Safety Applications

- DMS -

We solve Applications since 1992

Introduction

DMS (Dimethylsulfate) is a liquid compound with a high vapor pressure. It is a widely used basic Chemical in the production of Agrochemicals, Cosmetics and Pharmaceutics. It is very toxic at ppb- concentrations already, but also carcinogenic and mutagenic. Furthermore by hydrolysis sulfuric acid is formed, so it is very corrosive also. Since there's no warning effect in terms of irritation and/ or odor, dangerous amounts can be incorporated without realizing. The effects of intoxication, which are mainly chemical burn of the lungs, occur 6 to 12 hours after exposition. Thus, it is very dangerous.

Challenge

A potential exposition to human bodies can occur by inhalation, but also by very fast diffusion through the skin. Due to the properties of DMS, this will even not be recognized immediately. Humans potentially exposed to chemicals like this, normally are workers in chemical plants, where DMS as basic Chemical is produced and stored, but also workers in the production Agrochemicals, Cosmetics and Pharmaceutics. Furthermore for living areas close to such production sites this poses a significant threat. So it is mandatory to monitor not only work places but also the whole production plant environment for the presence of traces of DMS. Adequate monitoring equipment is therefore a LTO- requirement.

Solution

IUT's IMS-Analyzer is capable of detecting and quantifying substances like these in the required ppb concentration level. The coupling of a gas chromatographic pre- separation prior to the high sensitive IMS technology provides an analyzing performance, where compounds like DMS can be measured and quantified with outstanding sensitivity, repeatability within cycle times of minutes. By applying GC- pre separation, the unique method properties of IMS are available even in the background matrix of chemical production plants.

IMS- Analyzers are based on a field-proven Ion Mobility Spectrometry (IMS) technique that is highly selective and sensitive to chlorinated hydrocarbons. IMS is an atmospheric pressure, time of flight detection technique. The sensitivity, selectivity, and speed of response make the technique superior in many aspects compared to other monitoring methods. The industry- proof spectrometer design allows using these advantages in 24/7 stand- alone operation. Unlike electrochemical devices, the IMS units are impervious to extreme temperature or humidity conditions. IUT Technologies' IMS units are designed for long term, continuous measurements with little or no maintenance and few consumables. The electronics are completely solid-state without moving parts or optics to require alignment.

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Specifications

DMS

Description	Continious workplace safety monitoring for DMS, CE certified
Principle of Operation	IMS with gaschromatographic pre-seperation (GC-IMS), no carrier gas required
Standard Range	DMS: 0-100 ppb
Resolution	± 2 % of full scale
Lower detection limits	DMS: < 1 ppb

Operating Specification

Operating ambient temperature	Mobile Housing:	-10 °C - 50 °C	(+14 °F - 122 °F)
	19" Housing:	0 °C - 50 °C	(+32 °F - 122 °F)
	NEMA 4X Housing:	-40 °C - 50 °C	(-40 °F - 122 °F)
Output	Integrated graph. display, 4 - 20 mA loop, 2 alarm relay, 1 fault relay, 1 RS 232		
Maintenance Rate	1x yearly service; scrubber change after arrangement (10 - 30 min operation)		

Analyzer Physical Specification

Dimensions	Portable Housing:	280 (W) x 100 (H) x 280 mm (D)	(11 x 3.9 x 11 inch)
	19" Housing:	483 (W) x 135 (H) x 420 mm (D)	(19 x 5.3 x 16.5 inch)
	NEMA 4X Housing:	500 (W) x 500 (H) x 210 mm (D)	(19.7 x 19.7 x 8.3 inch)
Weight	Portable Housing:	7 kg	(15.5 lbs)
	19" Housing:	10 kg	(22.0 lbs)
	NEMA 4X Housing:	18 kg	(40.0 lbs)

Utility Requirements

Power supply	230 (115) VAC; 3 (5) A; 50 (60) Hz	
Avg. power consump.	Portable: 16 W (Battery); 19": 33.6 W	NEMA 4X: n.a.
Peak power consump.	Portable: 56 W (Loading); 19": 51.6 W	NEMA 4X: n.a.
Intake Flow	250 - 300 ml/min at atmospheric pressure (self-priming)	
Sample Exhaust	± 3.5 kPa (0.5 psi) (max.) at atmospheric pressure	

Features

- Patented IMS-Technology
- Measurements possible at low ppb to ppm range
- Long-term-stability and reliability
- Solid-state electronics and few moving parts
- Low Maintenance Time - High Up Time
- No vacuum pumps and carriergas required

Substance	CAS Nr.	Range	LOD	Accuracy
DMS	77-78-1	0-100 ppb	< 1 ppb	± 2% full scale

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Techmation B.V.
Van Tienhoven v.d. Boogaardstraat
14a PO BOX 195
4250 DD Werkendam
Netherlands