Application Note

Accupoint LP2™ for Medical Gas

In 1999, MEECO learned that its electrolytic technology is the only method specified by the European Pharmacopoeia for moisture analysis in medical gases. Subsequently, we have received multi-unit orders from gas manufacturers in Germany and Italy for the new Accupoint LP2. Please review the following information to determine if the Accupoint LP2 is right for you or your customer's application.

Background

Health care providers in hospitals and research laboratories depend on the delivery of high-quality medical gases. For example, medical grade oxygen is used to sustain life in the emergency room, in surgical procedures, and to treat patients with respiratory ailments. In the United States and Europe, medical gases are regulated as drugs. Over ten years ago, no requirement existed for moisture analysis in medical gases. Today, the most stringent requirement for trace moisture can be found in the most recent revision of the European Pharmacopoeia[1] as shown in Table 1. The moisture analysis must be done by the electrolytic method. Not more than 60 parts-per-million (ppm) moisture must be present in the production of medical grade air, oxygen and nitrogen, and in cylinders of nitrous oxide and carbon dioxide. Over the years, suppliers of medical gases noticed that moisture seepage could occur during delivery to the storage tank. Moisture measurement is specified at this juncture so this must be monitored carefully to avoid high levels of moisture contamination.

Basic Application

The electrolytic principle of operation is specified in the European Pharmacopoeia as the only method to measure moisture for the medical gases as shown in Table 1. Electrolytic detection of moisture is very reliable. Incoming moisture molecules are adsorbed on a phosphorus pentoxide coating, which is a strong desiccant. The moisture molecule is dissociated into hydrogen and oxygen molecules. The moisture dissociation creates a current directly proportional to the amount of water present through Faraday's Law.

The moisture content in medical gases ranges from 60 ppm to less than 1 ppm, where it resides 90% of the time. A challenging range for any equipment, the achievement of this span is possible due to the linearity of the Accupoint LP2 range of 0-1000 ppm. Each moisture analysis performed on the LP2 can be recorded to 0.1 ppm resolution (see spec sheet). The lower detectable limit of the LP2 standard cell is 1 ppm.

[1] *European Pharmacopoeia Supplement 1999.*

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Table 1. Trace gas impurity specification and method for medical gases in the European Pharamacopoeia[1]

Medical Gas	***Impurity Specification***		***Method***
Medical Air (production)	CO_2	<500 PPM	Infrared (IR)
	CO	< 5 PPM	IR
	SO_2	< 1 PPM	UV fluorescence
	$NO+NO_2$	< 2 PPM	Chemiluminescence
	H_2O	**< 60 PPM**	**Electrolytic**
	Oil	< 0.1 mg/m^3	IR
	Assay	% Oxygen	Paramagnetic
Oxygen — O_2 (production)	CO_2	<300 PPM	IR
	CO	< 5 PPM	IR
	H_2O	**< 60 PPM**	**Electrolytic**
	Assay	% Oxygen	Paramagnetic
Carbon Dioxide — CO_2	CO	< 5 PPM	Gas Chromatography (GC)
(cylinders)	$NO+NO_2$	< 2 PPM	Chemiluminescence
	H_2O	**< 60 PPM**	**Electrolytic**
	Total Sulfur	< 1 PPM	UV fluorescence
	Assay	% CO_2	IR
Nitrogen — N_2 (production)	CO_2	<300 PPM	IR
	CO	< 5 PPM	IR
	O_2	< 50 PPM	Electrochemical
	H_2O	**< 60 PPM**	**Electrolytic**
	Assay	% N_2	GC
NItrous Oxide — N_2O	CO_2	<300 PPM	GC
(cylinders)	CO	< 5 PPM	GC
	H_2O	**< 60 PPM**	**Electrolytic**
	$NO+NO_2$	< 2 PPM	Chemiluminescence

WARNING: To maintain the best possible benefit of using the LP2 to measure to 1 ppm, we strongly recommend that the user wet the cell with a 5-10 ppm moisture check gas on a periodic basis. The wetting procedure should be done every four to six weeks to avoid cell dry-out due to prolonged exposure to a very dry gas stream.

Attached please find a brochure on the Accupoint LP2. Please feel free to call (1-800-641-6478) or e-mail us at our new website, www.meeco.com, to learn more about this new and emerging application.