



# Gas production Medical gas purity

As medical gas purity legislation evolves, On Site Gas Systems, Inc. discusses the rise of PSA oxygen generation.

Traditionally, oxygen in the medical field has been produced centrally and then distributed in liquid form or as a gas via cylinders which were filled and then transported to the customer – a logistical and financial burden. However, an alternative means of oxygen generation exists in the medical market, and particularly in the US – Pressure Swing Adsorption (PSA).

Commercialised in the 1970s, PSA systems utilise commonly available components that can greatly reduce the initial capital required compared to the cryogenic production of oxygen, for example, and offer the kind of mobility that address the varying requirements of the hospital and healthcare sector. The rise of this method in healthcare has been facilitated by ‘monographs’ that deem

the use of oxygen in the range of 90-96% purity acceptable.

The specification for oxygen that is allowed to be delivered to hospitals is defined by monographs in Pharmacopeias – USP in the US. Because oxygen had traditionally been delivered from cryogenic sources, the original USP monograph for medical grade oxygen specified that the gas had to have a purity greater than 99%. However, extensive clinical tests led to the conclusion that 93 +/- 3 percent oxygen presented no physiological effect on patients and USP 93 oxygen is now acceptable for use.

A similar monograph now exists in Europe too (see feature, page XX). With these two major health bodies accepting the use of oxygen in the range of 90% to 96% in hospitals, the door is open to alternative means of oxygen delivery, such as PSA.

Since 1987, O<sub>2</sub>N<sub>2</sub> Site Gas Systems, Inc. of Newington, Connecticut has been developing and manufacturing PSA systems to generate oxygen and nitrogen and membrane technology to generate nitrogen gas. The company’s vision is to bring the life-saving value of producing oxygen on-site for distribution to patients or using it to fill cylinders near the point of use.

The company is FDA, ISO 9001 and 13485 certified and operates three divisions: Portable Oxygen; Commercial and Industrial; and Oil, Gas and Mining. The Portable Oxygen division provides an FDA cleared and CE approved, self contained, man portable, USP 93% oxygen system designed to deliver medical oxygen in remote locations and harsh environments. Several thousand Portable Oxygen Generation systems (POGS) have been deployed in Iraq, Afghanistan, used by FEMA, Homeland Security, several nations, and the United Nations (UN) for disaster relief such as Katrina and Haiti.

Mobile field hospitals can use the system as a direct feed to a medical application, use the medical air to operate equipment and also have the ability to fill cylinders. Emergency Preparedness

Teams can now quickly deploy and start producing oxygen for continuous use in any disaster without delays due to a compromised infrastructure or the need for other heavy equipment to unload the oxygen system or deliver liquid oxygen.

### Increasing interest in PSA

On Site Gas Systems has been delivering systems for almost 20 years that produce up to 99% oxygen using PSA technology, to countries such as China, Portugal, Brazil and others that require healthcare providers and hospitals to use only 99% oxygen. The company’s products are also heading into space as it develops a system for NASA to provide 99% oxygen for the International Space Station.

But as countries assess the expense and accessibility of medical oxygen for remote clinics, hospitals and ambulatory, On Site Gas Systems has seen increasing interest in purities that are below 99%, as well as cylinder filling stations. The company

has developed systems of virtually any output flow from the clinic to the hospital for purities from USP 93% to 95% and 99%. These can all be configured to fill cylinders as their primary purpose or in concert with patient delivery.

In fact, the company has delivered several dozen cylinder filling stations for medical clinics throughout Iraq as part of the reconstruction effort and remote regions of the Andes Mountains in Peru and Chile.

Simple yet robust designs enable systems to operate for decades in the most remote locations in the world and under the harshest environments. This attitude is fundamental to On Site Gas Systems’ product reputation – safe, reliable gas generation systems that save lives, protect the environment, and offer solutions to our customers. As the sphere of medical gas production purity and legislation continues to evolve, not only does this present new opportunities

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for technologies such as PSA, but it also requires the gas and equipment industry to embrace an equally robust and assured approach to delivery solutions.

As it is imperative that the hospitals always get the oxygen they need, the onsite oxygen system of today and tomorrow must address the varying needs of healthcare sectors around the world. 