



"We've been able to develop a highly effective waste water treatment system which has all the benefits of oxygenation, but none of the inconvenience of gas storage and delivery."

Peter Barratt, Commercial
Technology Manager,
Environmental & Clean
Technology

The OXY-DEP™ VSA System

for effective treatment of waste water

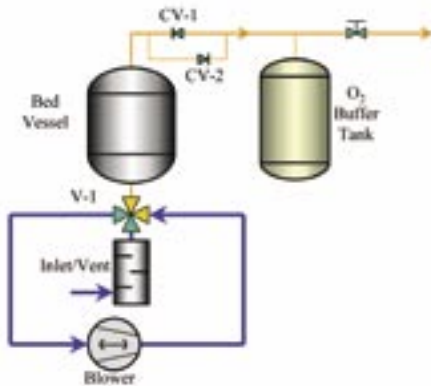
Introduction

At Air Products we understand the pressure companies are under to meet environmental legislation relating to waste water treatment. It is widely recognised that the oxygenation process is one of the most effective for treating aqueous waste, but for some companies, the costs of supplying oxygen on-site can be prohibitive. That's why we've developed the OXY-DEP™ VSA system.

How does it work?

The OXY-DEP™ VSA system comprises a Vacuum Swing Adsorption oxygen generator (the VSA) integrated with a low energy mixer/oxygenator.

The mixer is mast-mounted allowing easy installation and access. The VSA is based upon robust lobe-type blower technology. Together they form a novel, efficient, yet easily maintained package capable of delivering dissolved oxygen to any wastewater basin or oxidation vessel.



The diagram shows the main components of the VSA. There is a single blower that alternately blows into and pulls a vacuum on the single bed of molecular sieve, depending on the position of the motorised four-way valve. The valve and the blower are virtually the only moving parts in the VSA. As air passes through the bed, nitrogen is adsorbed leaving high purity oxygen, which feeds forward into the buffer tank. Once the bed is saturated the blower pulls a vacuum on the bed, which causes the nitrogen to be desorbed and vented. A final backwash of oxygen flushes out the last of the nitrogen and leaves the bed clean to begin another cycle.

What does it mean to my process?

Low emissions - compared to air-based aeration with typical oxygen transfer efficiencies below 20%, OXY-DEP™ VSA reduces the volume of gas leaving the surface of the treatment basin by approximately 99%. This gives dramatic reduction in the levels of VOCs and odours originating from the basin.

High shock load resistance - the high rates of biological treatment and rapid dissolution possible with oxygen generally give rise to higher levels of biomass solids (sludges) in a biological treatment basin. This gives the system resistance to shock loads that would typically cause process failure in an air dependent system.

High efficiency – specific oxygen transfer rates of approximately 1kg/kWh can be achieved in the basin environment. This is comparable with air-based technologies, for which high clean water test figures are usually quoted, but which operate at much reduced efficiency in dirty water and at normal effluent treatment temperatures.

High treatment rates – up to 10kgCOD/m³/day can be achieved with oxygen-enhanced systems; the rest of the treatment system is usually the limiting factor. This allows simple and cost-effective “turbo charging” of existing overloaded plants. New plants can be designed with a much smaller footprint, especially if advantage is taken of complementary technology such as membrane solids separation.

Easy installation – all that is required is a flat area near to the treatment basin. This could be concrete, gravel or any firm area of ground. The VSA is easily offloaded with a forklift truck and only requires an electrical connection to commence operation.

The mixer can be installed without draining the mixer basin; in fact the whole system can be installed within two hours without any interruption to the normal effluent treatment process.

Oxygen permits/building regulations may not be required – As oxygen is only made when it is required, a VSA is less demanding than a liquid oxygen storage in terms of site permitting and building regulations.



A typical stainless steel mixer oxygenator



The OXY-DEP™ VSA 500 System

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