



Mining & Mineral Processing



OXYMAT at a glance

Bringing PSA Generators to Your Mine

Oxymat is a Denmark based company specialized in designing and manufacturing on-site Oxygen and Nitrogen solutions, using Pressure Swing Adsorption (PSA) Technology. We have been designing, engineering and manufacturing Oxygen generator systems since 1978 and nitrogen systems since 2001. We possess first hand knowledge of the market, development, demands and possibilities the PSA technology holds. It is our mission to be your preferred innovative, dynamic and environmentally responsible supplier of on-site oxygen and nitrogen solutions worldwide.

Our team of more than 80 skilled and dedicated employees is based in 4 different locations:

- Denmark: Administration, Sales and Service
- Slovakia: Administration, R&D, Production, Project management, Sales and Service
- China: Administration, Sales and Service
- Colombia: Sales and Service

With more than 20 engineers (project managers, 3D CAD designers, automation engineers and experienced sales engineers) making sure we offer the right solution for any demand.

Through an ever ongoing process we are always focused on developing Oxymat to be cost-effective and ahead of the competition in terms of quality, performance and price. This strategy has made it possible to grow to the size and position Oxymat has in the market today. Our 2015 turnover was 20,1 mil. € and our product range is the most energy efficient in the market and even at a competitive price.

Our team of specialists will always be able to serve any demand. From our extensive standard industrial or marine programme to highly specialized turnkey projects, Oxymat will provide the quality solution. We offer a wide range of standardized control systems, and remote access and offer to tailor make automation solutions according to your requirement.

It is our priority to always deliver high quality products and services. Oxymat holds all relevant approvals for serving the numerous applications we supply.

- ISO 9001
- ISO 13485
- ISO 14001
- ISO 18001 (OHSAS)
- PED 97/23/EC Module B+D
- MDD 93/42/EEC (Medical Device Directive)

Marine Class societies - we can deliver according to the rules of:

- American Bureau of shipping
- Bureau Veritas
- Det Norske Veritas
- Germanischer Lloyd
- Lloyd's Register
- Nippon Kaiji Kyokai
- RINA

Why Oxymat PSA generators are the wise choice?

At Oxymat, we only see challenges - not problems! No matter your need or application we can provide state-of-the-art design to meet your requirements. In close cooperation with our increasing number of gold mining customers, we have designed and developed a product line specifically for this application.

Product range includes models supplying from 2.5 to 30 TPD.

Special design features include:

- Low energy consumption (1,0 kW/m³)
- Low CO₂ emission
- Heavy duty construction designed for rough conditions
- High quality & durable components
- Container installed systems
- Frame-built design
- Plug and play installation
- High quality touch screen control unit
- Remote control access
- Specialist support from planning, installation and operation of your project

The essence of PSA

The PSA process is an extremely clean operation and the only 'raw material' is air. On-site generators allow for an uninterrupted supply of gas with a high purity output. This means that you can produce gas where and when you need it, and in the exact quantity and quality you need. In other words; you become self-sufficient and you no longer have to rely on delivery from external suppliers.

Worldwide manufacturer

More than 3500 Oxymat generator systems are currently in operation around the world. To provide first class aftermarket service, our service technicians are always ready to make sure your equipment stays in good condition. Our service team can be reached 24 hours 7 days a week.

Our products and services are well known around the world, and via our extensive network of more than 100 distributors and agents worldwide, you are never far from qualified feedback, when it comes to onsite gas solutions.

Some of the industries we have served so far...

Medical	Laser cutting	Petrochemical
Food and Beverage	Electronics	Marine & Offshore
Process Industry	Aquaculture & Ozone	Goldmining

...and waiting to serve yours.

Here are a few references:

Oxygen generator model	Capacity TPD @ 93% Oxygen	Country of installation	Year of Installation
O600x2, 1 unit	3 TDP	Australia	2013
O800x6, 3 units	30,0 TPD	DRC	2013
O600x3, 2 units	10 TPD	Ghana	2013
O800x6	10 TPD	Mali	2013
O800x5, 1 unit	10 TPD	Ivory Coast	2013
O800x6, 1 unit	10 TPD	Ghana	2012
O600x2, 1 unit	3 TPD	Australia	2012
O800x5, 2 units	20 TPD	South Africa	2011
O600x3, 1 unit	5 TPD	Mauritania	2011
O800x5, 2 units	20 TPD	Ivory Coast	2010
O3000DB, 2 units	11 TPD	Mali	2009
O3000DB, 1 unit	5,5 TPD	Ghana	2009

Mining & Mineral Processing

The use of nitrogen and oxygen in mining and mineral processing.

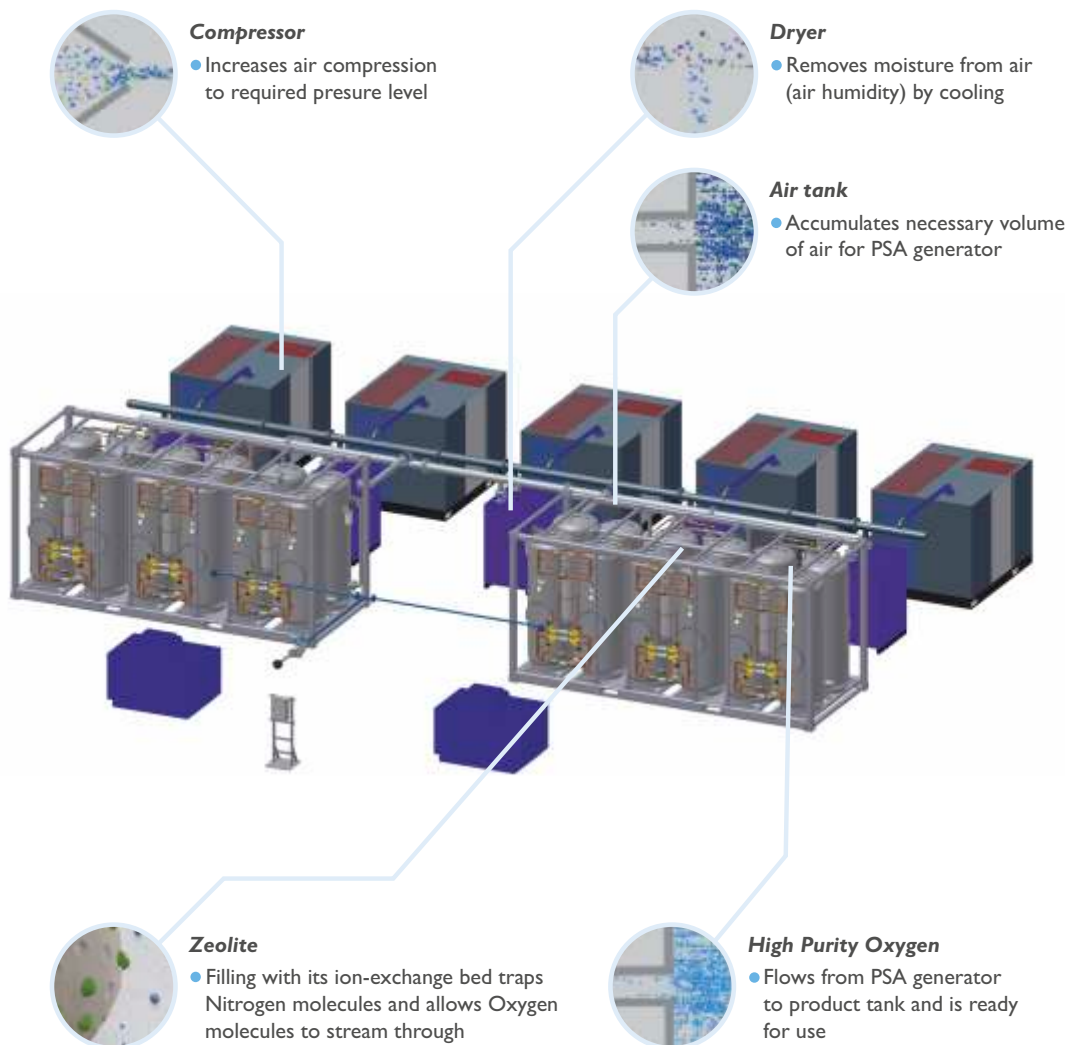
Oxygen and nitrogen is used in a variety of mining and mineral processing applications. Usually we are challenged with requirements of relatively large quantities of gases for installation in remote areas and harsh environments. This is when onsite production is one of the best choices for gas supply.

The nitrogen is primarily used in the mining industry to inert abandoned areas of mines reducing oxygen levels and thereby reducing risks of explosion. This is a very effective method of extinguishing coal mine fires. The inert atmosphere is important by metal processing to prohibit unwanted oxidation.

The oxygen in mineral processing plays an important role in extractions of minerals from ores such as gold and silver processing. Also copper or nickel smelter consume large quantities of oxygen by smelting.

The advantage of the PSA technology is the on-site gas production in very remote areas where the access of supply oxygen is extremely costly and is difficult to transport.

- Gold mining and processing
- Silver mining and processing
- Coal mining
- Copper mining and processing
- Diamond mining
- Nickel processing
- Lead processing
- Iron processing
- Aluminum processing



Technical Features



Advanced control system



- With a complete PSA wiring inside of the skid is designed for fast end easy installation on-site. The system is prepared for a remote control and monitoring of process parameters via ethernet or other interface connection requested by the customer.



Advanced flow control system



- Allows customer to choose the portion of oxygen for each of the leaching silos to fine tune the process of the gold extraction from the ore.



Heavy duty construction



- Is designed for rough conditions of the mining environment. Minimum maintenance of the PSA generator gives easy and long lasting operation for the personnel on site.



Process monitoring



- Of feed air quality and produced Oxygen serves as a protection of the PSA against breakdown as well as assurance that the customer receives Oxygen specified quality and quantity necessary for smooth and safe operation.



3D Engineering



Oxygen is used in process



- Of recovery of gold to increase the level of dissolved Oxygen in leaching process. Complete Oxygen producing plant is suitable for installation right next to the use of Oxygen on-site, substituting the need of liquid Oxygen transport from remote locations.

Special control features:



- Monitoring Oxygen flow, temperature, pressure and purity and feed air dew point, temperature and pressure provide safe operation of the plant. Together with user friendly touch screen and remote control PSA system gives a unique operator friendly solution on the market.

Easy civil works

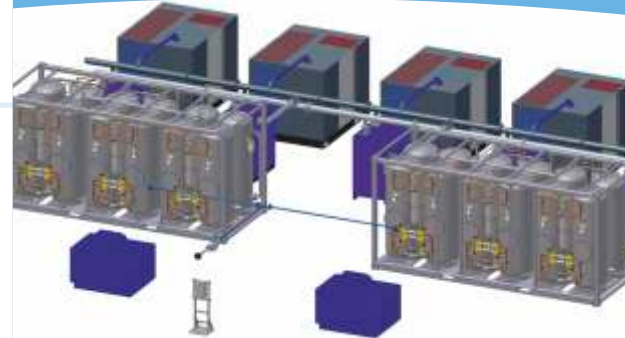


- Are needed to install a complete Oxygen plant. Power connection to the system, interconnection piping and shelter need to be provided. Complete 20 TPD system requires only 5 working days of installation.

Easy transport



- PSA build in standard container frames in different configurations custom made for the mining industrial needs.



Gold Mining

Benefits of using oxygen application in leaching process

- **Increased Gold Recovery**

Higher dissolved oxygen level in leaching process enhances the gold cyanidation thus increase gold extraction rate significantly up to 98%

- **Decreased retention time by leaching**

Conventional leaching time of 96/72 hrs can be reduced up to 50 %

- **Increased Ore throughput**

- **Increased Silver Recovery**

Silver is being dissolved in the leaching process in the same process reaction as gold

- **Decreased Cyanide Costs**

The Cyanidation kinetic depends on the gold, cyanide, water and oxygen in the leaching tanks. The sufficient level of oxygen reduces the amount of cyanide required.

- **Decreased Waste Treatment Costs**

The reduction in the amount of cyanide needed in the leaching process also decreases the amount of cyanide that must be removed from the waste stream. The oxygen generated can be used as a feed gas to an ozone generator and injected directly into the waste stream as an environmentally friendly oxidizing agent.



„Introduction of oxygen in cyanidation process significantly increased gold recovery thus ROI for Oxymat PSA plant was just a few months“

Mr. Glenn Stratford, Kinross

Installation Mauritania, model OSG5 @ 93% purity

Oxygen generator model	Capacity TPD @ 93% Oxygen	Power consumption @ 3,5 bar (g) Oxygen Pressure	Power consumption @ 8 bar (g) Oxygen Pressure
OXG 3	3 TPD	101 kW (808 kWh/t)	112 kW (896 kWh/t)
OXG 5	5 TPD	155 kW (744 kWh/t)	166 kW (797 kWh/t)
OXG 10	10 TPD	310 kW (744 kWh/t)	325 kW (780 kWh/t)
OXG 15	15 TPD	465 kW (744 kWh/t)	487 kW (780 kWh/t)
OXG 20	20 TPD	620 kW (744 kWh/t)	650 kW (780 kWh/t)
OXG 30	30 TPD	930 kW (744 kWh/t)	975 kW (780 kWh/t)

Coal Mining

Benefits of using nitrogen in coal mining

- **Inexpensive medium for inerting**

Compressed air is needed for air separation to produce nitrogen in required purity and quantity

- **Underground fire extinguishing**

By reducing oxygen to below a level where burning is possible

- **Non-aggressive unlike other firefighting sources – water, powder, foam**

Nitrogen does not cause corrosion or any other harm such as other agents tend to. The consequences of using nitrogen are easily eliminated by just airing the premises

- **Constant fire & explosion safe atmosphere**

Nitrogen injecting abandoned areas or mines eliminates the threat of fire or explosion

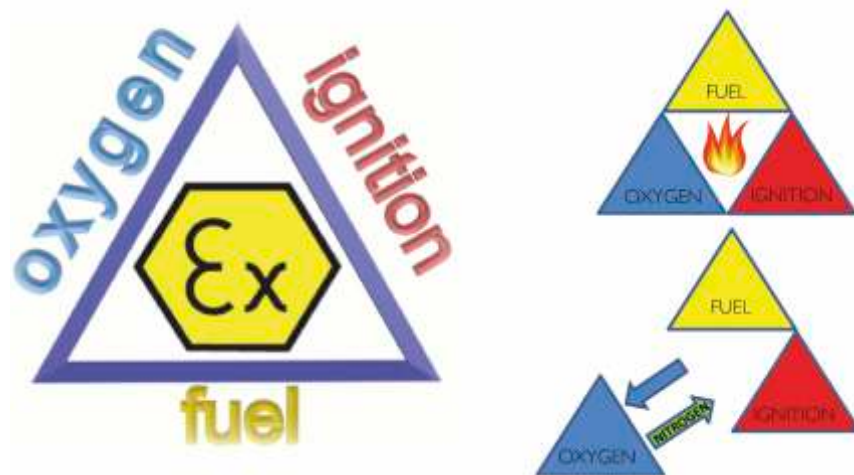
The ,Fire Triangle‘

Oxygen, heat, and fuel are frequently referred to as the „fire triangle.“

The important thing to remember is: Remove any one of these four elements and you will not have a fire or the fire will be extinguished.

Essentially, fire extinguishers put out fire by taking away one or more elements of the fire triangle.

What is easier than displacing oxygen with nitrogen and thereby eliminating the risks of fire.



„The Oxymat nitrogen generating system combined with our container solution have served non-stop in a number of coal mines in the Silesian region. This combination provides a high safety level in operation and at lower costs and minimal down time“

Mr. Lukasz Lasek, Azis mining Service

Nitrogen Capacity Sm ³ /hr	Purity %	Application	Country of installation	Year of Installation
700	97	Coal Mines	Poland	13 units since 2007
173	99	Copper Processing	Zambia	2013
78	96	Aluminium processing	Russia	2012
78	96	Aluminium processing	Russia	2012
63	99,9	Diamond mine	Russia	2011

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Highest level of international approval

Oxymat Oxygen systems are designed and manufactured according to:

- PED(97/23/EC)
- ISO 10083
- ISO 14001

Oxymat has long experience in design, engineering and delivery of hundreds of Oxygen systems all over the world, in accordance with international and national authorities.

Oxymat operates a QA system in accordance with EN ISO 9001:2000 and is certified by Apragaz.

- ISO 13485
- ISO 14001
- ISO 18001 (OHSAS)

