

# Gases for Life

The industrial gases magazine



Oxygen speeds up wastewater treatment:

## Treatment plants step on the gas

Cold grinding:

Colder,  
smaller, finer

Dry ice and nitrogen:

Historical documents  
saved

CO<sub>2</sub> recovery:

Environmental  
protection and CO<sub>2</sub>



## Dear Readers,

You have before you the first issue of "Gases for Life", our new magazine for industrial gases. The name says it all: "Gases for Life" wants to show you in a clear and practical way why industrial gases are an invisible but important part of our daily lives. Whether it be processes, production or products – many of the things we take for granted today would be difficult, if not impossible, without gases and their innovative application.

This is true for the treatment of wastewater, for example – a technical necessity in our highly civilised world. Today, many wastewater treatment plants are faced with the problem of having to cope with a growing demand for wastewater treatment or sudden spikes in the water load. The traditional response to these challenges has been to use more chemicals or build bigger treatment plants.

The smart alternative – both economically and environmentally – is oxygen. The targeted addition of this gas to the clarification tanks will boost the treatment plant's capacity in line with requirements and in a natural way. Such a process is used at the Fejérvíz Zrt waterworks in Hungary – so successfully that its wastewater treatment plant in Mezőszilas, south-west of Budapest, is regarded throughout the country as a model of efficient and environmentally friendly wastewater treatment.

Oxygen's uses don't stop there, however: for example, it optimises the production of ceramics and improves root development in plants. And did you know that oxygen owes its name to an error of early science?

You can read all this and more in this, the first issue of "Gases for Life". I am sure that our new industrial gases magazine will prove to be a varied and interesting source of information for you.

I wish you an enjoyable experience reading "Gases for Life"!

Best wishes

A handwritten signature in blue ink, appearing to read 'Stefan Messer'.

Stefan Messer



## Cover Story

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## Treatment plants step on the gas

Hungary's EU accession in 2004 gave the country's wastewater industry a considerable development boost and led to it being brought into line with EU standards across large parts of the country. Today, the wastewater treatment plants have to cope with very large load fluctuations. They are aided in this by the targeted addition of oxygen, which facilitates significant efficiency and capacity gains. András Paszera, Environmental Technology Manager at Messer in Hungary, implemented just such a solution for the Fejérvíz Zrt waterworks.

**Cover photo:**  
András Paszera opening the oxygen supply to the waste water treatment plant aeration tank.



## Practical Focus

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## Colder, smaller, finer

The finer the powder, the better the end product – this rule applies in many production processes. The grinding process is cooled in order to ensure that the materials do not stick together or deteriorate in quality.



## Using Gases

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## Historical documents saved

Hurricane Xynthia flooded the historical archive in the old town of La Rochelle. The irreplaceable records were saved by freeze-drying.



## Green Page

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## Environmental protection and CO<sub>2</sub>

In Belgium, Messer recovers up to 150,000 tonnes of CO<sub>2</sub> a year from industrial waste gas.

### Good for you and the environment

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## Germany: Gas for Zeiss quality

### Nitrogen cleans eyepieces

The name Zeiss has been synonymous with optical devices of the highest quality for more than 150 years. Since last year, Carl Zeiss SportsOptics GmbH in Wetzlar has been using nitrogen from Messer to clean its high-quality eyepieces for binoculars. Thanks to its high purity and complete dryness, gaseous nitrogen cleans the eyepieces more effectively than compressed air. Binoculars



On-site installation of the nitrogen tank at Zeiss

are also filled with nitrogen to prevent misting as a result of moisture. The company uses over one million cubic metres of nitrogen for this every year. A twelve-metre-high nitrogen tank, which can be seen from afar, has therefore been installed on site at the optical specialist's Hesse plant.

*Harald Hain, Messer Industriegase*

## Spain: Firing with oxygen

### Frit makes ceramics shine

Frit is needed in order to give ceramic tiles their shine. It is a ceramic intermediate product consisting of molten glass

powder. Oxygen is added to increase the heating capacity of the furnaces during frit production. This saves fuel and reduces carbon dioxide emissions. By signing a contract with Smalticeram for the supply of 300 tonnes of liquid oxygen per month, Messer has won another frit producer as a regular customer. The Spanish glass and ceramics industry is mainly concentrated in the Castellón area of the Valencia region. It is only some 200 kilometres from Messer's Spanish production centre. Messer is familiar with the specific requirements of this industry, having dealt with companies like Ferro, Colorrobia and Quimicer.

*Marion Riedel, Messer Ibérica de Gases*

## Ukraine: Pipeline for pipelines

### 20 per cent more capacity

The Siemens-Martin furnace operated by Ukrainian pipeline manufacturer NTZ-Interpipe has had its capacity increased by 20 per cent. The conditions for this were created by the sales specialists at Messer in Estonia and the experts at the burner technology centre in Gumpoldskirchen, Austria, working together with the customer. NTZ-Interpipe needs 1,100 tonnes of argon and 10,000 tonnes of oxygen for the optimised process from Messer's air separation plant in Kharkov.

*Michael Holy, Messer Tatragas*

## Peru: New gas concept

### Welding gases for 2,000 buses

New gas mixing installations are helping Peruvian bus manufacturer Modasa save time and money in its welding operations. Messer in Peru developed an innovative welding gas supply concept for this purpose. The new gas mixing installations are supplied with liquid carbon dioxide and liquid argon, the former accounting for 20 per cent and the latter for 80 per cent. The system pipes the gases through more than 750 metres of pipeline to some 170 MIG welding machines. This significantly relieves the strain on logistics and cylinder manage-



Experiencing the quality of the Modasa buses at first von Storm and Stefan Messer

ment. Modasa is using the new technology in the construction of 2,000 buses which will go into operation in Lima's new metropolitan transport system as well as at other bus operators across the country. Modasa has been a leader in the construction of transport vehicles in Peru since 1994.

*Hugo Gálvez, Messer Gases del Peru*

## Austria: O<sub>2</sub> promotes root growth

### Efficiency in greenhouses

In high-tech greenhouses, the targeted addition of oxygen to the irrigation water leads to improved root development and thus to enhanced plant growth. The plants are healthier overall and yield more saleable fruit over the course of their life cycle. A welcome side effect is that the oxygen prevents the irrigation



Oxygen promotes faster plant growth.



hand (l. to r.): Juan Bedoya, Hugo Gálvez, Wilhelm

system's pipes, filters and diaphragms from silting up. This minimises the work involved in cleaning these supply systems and therefore reduces costs.

*Herbert Herzog, Messer Austria*

#### Bosnia-Herzegovina: New gas analysis

### New equipment for analysis laboratory

The Messer gas analysis laboratory in Rajlovac has been completely re-equipped. The state-of-the-art Servomex infrared gas analysers, which provide measurements of maximum reliability, precision and robustness at extremely low detection levels, form the centre-piece of the new equipment. "This equipment will help us to provide our customers with even more targeted support and offer additional gas quality control services," explains Denis Butigan, who is responsible for safety, health and environmental protection. The laboratory in Bosnia-Herzegovina is shortly due to be accredited in accordance with the general international and European standards.

*Lejla Rizvanović, Messer BH Gas*

#### Germany: Fast and chilled transportation of sensitive goods

### Dry ice speeds things up

Dry ice is very cold, easy to use and versatile, making it ideal for transporting sensitive goods.



Dry Ice Pelletizer A120P

As well as rapid transportation, some food and pharmaceutical products also require reliable refrigeration during transportation. In such cases, GO! EXPRESS & LOGISTICS, a courier and express service with worldwide operations, relies on dry ice. It ensures that the sensitive goods are delivered without loss of quality. GO! keeps consignments of this nature, such as frozen fish, chilled with dry ice

at around minus 79 degrees Celsius. Trockeneis Deutschland GmbH is the dry ice logistics nerve centre. The company operates an ASCO Dry Ice Pelletizer A120P at the GO! premises in Bremen. As a system provider offering complete CO<sub>2</sub> solutions, ASCO also supplies the necessary liquid carbon dioxide as well as the dry ice boxes.

*Nicole Urweider, ASCO Carbon Dioxide*



GO! uses dry ice to chill perishable goods such as food and pharmaceutical products when making deliveries in Germany.



# Colder, smaller, finer

Today, finely ground raw materials form the basis of innumerable manufacturing processes. The general rule is that the finer the powder, the better the quality of the end product. For example, in order to make surfaces resistant to impact or chemicals, grain sizes of between 100 and 400 micrometres are needed for paint additives. But not all materials can tolerate the heat that is invariably generated during grinding in modern high-performance mills. Cold grinding offers a way out of the dilemma.



Cold grinding technology can be used for a very wide range of materials.

**T**hermoplastics, elastomers and some waxes are too tough, elastic or soft to be ground to powder under normal conditions. Some material may even melt or stick together during grinding, therefore making the process quite impossible. Other products – for example spices – suffer a dramatic loss of quality above a certain temperature. This can be prevented by means of cooling during the grinding process. In recycling, where comminution is also an important production step, cryogenic technology facilitates the separation of raw materials. During cold grinding, the material to be ground is cooled and embrittled with liquid nitrogen or carbon dioxide. The liquid gas is added to the material as it is transferred from the storage tank to the

grinder in what is called the precooler. The cold grinding material subsequently enters the mill together with the gas, where both substances cool the crushing process. It is also possible to cool the mill itself instead of the product. This involves spraying liquid nitrogen or carbon dioxide directly into the grinder, where the gas reduces the temperature to the required level.

#### Separation by type

Both techniques make it possible to achieve particularly fine grain sizes during the grinding process. The cold temperatures ensure that the quality of the raw material remains unaffected. Mill throughput is also increased significantly: the cold, brittle grinding material is

easier to process. The fact that melting and sticking are eliminated means that the mills can operate at optimum speed. Recycling largely involves the separation of composite materials such as fibre-reinforced thermoplastics, galvanised plastic parts or packaging with product residues. Conventional grinding methods reach their limits here. Only cryogenic grinding technology permits the raw materials to be sorted into pure component types. The process utilises the differences between the materials in terms of linear expansion and embrittlement capabilities.

A welcome side effect of cold grinding is that the grinding plant is “inerted”. The gases displace oxygen from the process to create a chemically inert atmosphere which reliably protects against fire and explosion. Furthermore, inerting prevents chemical reactions between the mill atmosphere and the material being ground, which is a particularly important aspect when it comes to foodstuffs.

*Editorial Team*



#### Further information:

**Oliver Dietrich**

Manager Application

Technology Industry

Messer Group GmbH

Phone: +49 (0) 2151 7811-226

oliver.dietrich@messergroup.com



Checking the quality of powders and granulates in the cold grinding centre

## New customers in cold grinding technology:

Whether it be used tyres or hotmelt adhesives – cold grinding is of interest to many branches of industry, as shown by new acquisitions in China and Germany.

**China:** Tianyang Hotmelt Adhesives Co. Ltd (THA) is a leading producer of adhesives which are used in the manufacture of shoes, furniture and cars, among other things. THA is currently building a plant in Kunshan with an annual capacity of 12,000 tonnes. The individual cryogenic grinders have a maximum capacity of over seven kilos per minute. The nitrogen requirement is up to 16,000 tonnes of liquid nitrogen per year. With the help of Messer, THA wants to even out the temperature fluctuations in the production process and optimise the raw material recycling rate in order to reduce energy consumption.

**Germany:** Spreelast GmbH specialises in the recycling of used tyres and the production of granulates. At its site in Spreewald, it operates a tyre recycling facility with a cryogenic fine grinding stage. The cold grinding equipment for this facility was originally supplied by Messer Griesheim and has proved itself over many years of operation. Now Messer has also been entrusted with the nitrogen supply. Our close contact and excellent cooperation over the many years of providing technical support played an important part in this decision. Spreelast requires around 2.5 million cubic metres of the gas per year.



Cold grinding allows tyre granulate to be...



...ground to very fine grain sizes.

### ECOLABEL champion uses Messer oxygen

The Gomà-Camps family in Spain has been in the papermaking business for ten generations spanning more than 250 years. Today, its group of companies is one of the leading manufacturers of tissue products, which are used primarily in the hotel and catering sector as well as the healthcare sector.

**T**he largest production facility is in La Riba (Tarragona). Today, two thirds of total production is concentrated at the site where the first Gomà-Camps started making paper back in 1758. The group currently produces some 90,000 tonnes of tissue paper a year at its production centres in Spain and Portugal. It also has a distribution centre in the South of France. Gomà-Camps employs a total of 425 staff.

The plant in La Riba has two paper machines: one of these uses raw fibres, while the other one uses recycled fibres, with a corresponding saving in wood, water and electricity. Gomà-Camps sets great store by not using any environmentally harmful chemicals in the recycling processes. The company was the first Spanish tissue paper manufacturer to receive the ECOLABEL, the top environmental protection certification awarded by the EU.

In Vilaverd, near La Riba, and in Egea de los Caballeros in Aragon, Gomà-Camps operates converting plants where paper

rolls weighing three tonnes are processed into an extensive range of quality products such as serviettes, tablecloths and sanitary products. The group has a production area of more than 20,000 square metres for tissue paper processing.

Messer has installed two tanks for carbon dioxide and oxygen at the plant in La Riba. The carbon dioxide is used for regulating the pH during paper production. Preparation of the paper pulp requires a high pH in order to facilitate refining and deinking. The subsequent paper production process requires a low pH in order to limit fibre swelling and therefore optimise the drainage process in the machine's pressing area. In the production facility's wastewater treatment plant, which has a capacity of 30 cubic metres per hour, Messer hose mats have also been installed to ensure biological clarification through oxygenation. They speed up the rate at which the organic load in the wastewater is degraded. The hose mats ensure that the oxygen is dispersed very finely and in precise quantities at the bottom of the basin. Low capital costs and low-maintenance operation are further advantages.

In the past five years, Gomà-Camps has invested 23 million euros in technologies, environmental protection and the acquisition of new facilities. Particular attention is devoted to research and development, as demonstrated by its collaboration with Rovira i Virgili University in Tarragona. One of its main projects is concerned with the production of biogas through anaerobic degradation of sludge.

*Jordi Soler & Marion Riedel, Messer Ibérica de Gases*



Eduard Romer (l.) from Gomà-Camps and Jordi Soler from Messer in Spain inspecting the wastewater treatment plant.







Haluk Tuncer, Managing Director of Messer in Turkey (l.), and Plant Manager Adem Aykac want to offer their customers significant added value.

Air separation unit and filling plant commissioned

## Systematic growth on the Bosphorus

Messer has strengthened its presence in Turkey considerably. The company's claim to provide customers with comprehensive system solutions for gases and application technologies has been backed up by the commissioning of an air separation unit and its own filling plant for cylinder gases.

**T**he plant in Kartepe is designed for an overall liquefaction capacity of 5,000 standard cubic metres of oxygen, nitrogen and argon per hour. It is meant to guarantee the supply of industrial gases to the largest growth market in South-East Europe.

"Our comprehensive system solutions allow us to offer significant added value compared with our local competitors," says Haluk Tuncer, Managing Director of Messer in Turkey. "And the market's positive reaction have already borne us out in this regard."

In the country between the Black Sea and the Mediterranean, the principal customers for Messer gases are industrial furnace operators, shipyards, car manufacturers and hospitals. Recently, a new reference customer was also won in the ceramics industry, with an annual liquid oxygen requirement of 3,000 tonnes. The gas improves the heating capacity of the furnaces and helps to save fuel. "In order to continue our expansion, we are relying on the sector-specific multiplier effect," says Tuncer. "Word of the quality of our service is rapidly spreading among experts."

*Editorial Team*

# People Focus

## 6 questions for

Dr. Joachim Münzel



Dr. Joachim Münzel (47) is a physicist and patent attorney who has worked at Messer since 1999. He has been in charge of the Messer Group's patent department since 2003, first at Messer Griesheim and then at the newly formed Messer Group GmbH. He is married with two children and lives in Kelkheim near Frankfurt.

1. My biggest professional challenge at Messer so far has been...  
...converting all the patents and trademarks from the former Messer Griesheim to Messer Group GmbH.
2. What typifies Messer for me is...  
...the good team spirit that exists at the company and the high standards that the employees demand of themselves.
3. My strengths are...  
...an ability to grasp things quickly as well as a technical understanding, which allows me to rapidly turn the many creative ideas that we receive into patent applications.
4. I have a weakness for...  
...classical music, good food, mountain scenery ...
5. What fascinates you about gases and gas applications?  
The sheer diversity of applications – from metallurgy to food processing – in which gases can be used.
6. The most important invention of the last century is...  
...difficult to say given the large number of inventions that have radically changed our world (for good or bad) over this period: perhaps penicillin.

# Wastewater treatment plants step on the gas

From the outside, wastewater treatment plants look like places where nothing happens in a hurry; not that much seems to be going on in the large basins. But this impression is misleading. The physical, chemical and biological wastewater treatment processes literally take place below the surface. And here the speed of the processes definitely matters: the quicker the purification process, the greater the plant's efficiency. Biological clarification can be greatly speeded up through the targeted addition of oxygen. In Hungary, the experience with this process has been good, and has helped to keep investment costs down.

The Hungarian wastewater industry has received a considerable development boost over the past decade. As part of Hungary's EU accession in 2004, the infrastructure was modernised across large parts of the country, bringing it into line with EU standards. At the same time, however, the demands on the system have changed considerably. Hungarians are much more economical with their drinking water today – consumption has dropped by a quarter since the early 1990s, from around 125 litres to approximately 95 litres per head. While there has also been a corresponding drop in the quantity of wastewater, its relative pollutant load has increased significantly. Furthermore, the wastewater treatment plants are often faced with considerable load fluctuations. Varying

amounts of wastewater, often containing a high concentration of pollutants, have to be treated as and when the need arises while at the same time complying with strict limits. Increasing the capacity by means of conventional technology is time-consuming and expensive. A cost-effective alternative is to speed up the purification process. The partial oxygenation process (PO) developed by Messer boosts the efficiency of existing plants while keeping capital expenditure low. The process involves injecting pure oxygen instead of normal air into the activated sludge basins. This has the effect of boosting aerobic bacterial activity, resulting in a much faster biodegradation process. This also applies to the very important process of nitrification, the bacterial oxidation of ammonia to nitrate.

→ Continued on page 12



The liquid oxygen is stored in tanks at the customer site.

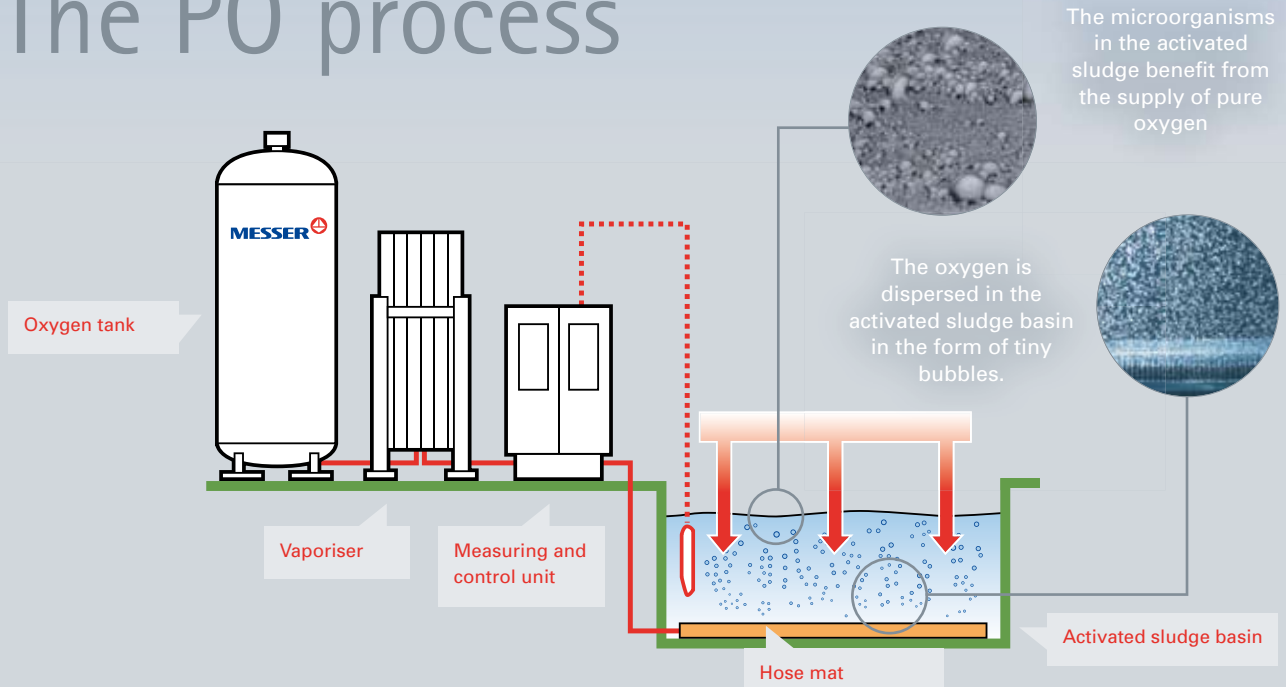


"The addition of oxygen is an environmentally friendly way of achieving a marked increase in the efficiency of wastewater treatment plants."

András Paszera, Technology Manager Environment at Messer in Hungary

Partial Oxygenation

## The PO process



The PO process can be used in a wide range of industries, including the chemical, leather, textile and food industries as well as the pulp and paper industry and municipal wastewater treatment plants.

### The strengths of partial oxygenation:

- Increased cleaning capacity
- Reliable nitrification
- Flexible response to shock loads
- Marked reduction in odour emissions
- Silent oxygen injection
- Increased operational reliability
- No need to expand treatment plant, low investment costs
- Emergency use possible in event of aerator failure
- Suitable as interim solution

*Continued from page 10 →*

The aeration hoses, injectors and oxidators used in the PO process can be precisely calibrated in accordance with the treatment plant's parameters. "The choice of system or system combination is largely determined by the application and the local conditions," says András Paszera, an environmental technology specialist at Messer. Important parameters include the basin geometry and the availability and cost of electricity.

Thick-walled hoses with a large number of tiny pores or a pump-Venturi injector are used to inject the oxygen into the activated sludge basin, where it is dispersed in the form of very fine bubbles.

## Interview with

## Zalán Varvasovszki, Water Technology Expert at Fejérvíz:

"We were so impressed with the PO system that we commissioned a second one in Vértesacsza in May 2010."



A large number of Hungarian wastewater treatment plant operators visited the Fejérvíz Zrt plant in 2010.

**The customer:**

The county of Fejér, south-west of Budapest between Lake Balaton and the Danube, has been supplied with drinking water and had its wastewater treated by the Fejérvíz Zrt waterworks since 1913.

Messer's PO system has enabled the municipal enterprise to increase the capacity of existing plants considerably without any new build.

This allows a particularly large amount of oxygen to be added with a correspondingly high degree of efficiency, as well as precise dosing in line with requirements.

"Partial oxygenation is especially suitable for industrial plants with heavily fluctuating loads and for wastewater treatment plants with campaign operation," András Paszera explains. "This means that it is no longer necessary to have large, capital-intensive basin volumes available – physical capacity is replaced by biological efficiency."

*Anita Kötél, Messer Hungarogáz*



**Gases for Life:** What kind of difficulties were you faced with at the wastewater treatment plant in Mezőszilas before trial operation of the PO system?

**Zalán Varvasovszki:** There is a nursing home in Mezőszilas which has grown considerably in the last few years. Roughly one third of the local wastewater comes from this home – much more than originally envisaged, and what's more it is heavily polluted with ammonia. The conventional aeration system at the local wastewater treatment plant couldn't cope. Even the installation of additional aeration capacity was not always able to ensure an appropriate supply of air and an adequate level of purification in the activated sludge system. The activated sludge basin was putrefying before our eyes.

**Gases for Life:** So what did you do?

**Zalán Varvasovszki:** In 2007, we tried out a system for adding pure oxygen. The necessary infrastructure and oxygen was supplied by Messer. The three aeration nozzles were replaced and approximately five cubic metres of oxygen per hour added to the activated sludge basin.

**Gases for Life:** What were the results?

**Zalán Varvasovszki:** After two and a half weeks we managed to return to optimum "living" operating conditions. The addition of pure oxygen ensures stable nitrification and favourable biological conditions. The system has also proved itself in periods of unusually large volumes of wastewater, for we have



already experienced numerous shock loads lasting several days. In such cases, the oxygen content in the wastewater drops dramatically. Here the flexibility of partial oxygenation allowed us to respond effectively. We have also seen a marked decrease in the plant's electricity consumption. We were so impressed with the PO system that we installed it as a reference system in September 2008. We also commissioned a second PO system in Vértesacsza in May 2010.

**Gases for Life:** What was the situation at Vértesacsza?

**Zalán Varvasovszki:** Here, too, the wastewater arriving at the treatment plant was heavily polluted. The PO system now provides an optimum oxygen supply for nitrification, even in periods of greatest demand. This has allowed us to reduce the aeration nozzle operating time by 15 to 20 per cent. The nitrogen content in the treated water is continuously below 20 milligrams per litre and thus well below the upper limit. In theory, the treatment plant could now even take 10 to 20 per cent more wastewater.

*Anita Kötél, Messer Hungarogáz*

**Further information:****András Paszera**

Technology Manager  
Environment

Messer Hungarogáz

Phone: +36 (0)70 - 335 11 48

andras.paszera@messer.hu



Restoration of the saturated records is aided by freeze-drying

Freeze-drying with dry ice and liquid nitrogen

## Historical documents saved

The heavy flooding that hit the French port of La Rochelle in February 2010 also submerged the département general council's archive. Irreplaceable records were at risk of disintegrating as a result of the moisture. It was necessary to act quickly in order to prevent mould and bacteria from doing their worst. The restoration experts used cryogenic industrial gases from Messer to freeze the historic documents immediately and subsequently restore them by means of freeze-drying.

**A**t the end of February, Hurricane Xynthia swept through the west of France at speeds of up to 200 kilometres per hour, leaving behind a trail of destruction. Large parts of the country were flooded. In La Rochelle, the capital of the Charente-Maritime département, the floods also swamped the historic

centre as well as the archive of the Conseil Général. Here the water saturated the contents of 24,000 archive packages that were being stored on 3,000 metres of shelves. Most of the département authority's damaged records were unique and irreplaceable documents that were at risk of disintegrating. The general

council therefore hired AAD Phénix, a firm that specialises in repairing this kind of damage, to save the documents from destruction.

AAD Phénix, a subsidiary of the SAMSIC Group, started by removing the damaged records from the damp archives

and taking them to the company's paper treatment centre in Bourges. Before transportation, the documents were packed into special insulated containers and immediately frozen with dry ice.

"The process of freezing has to take

from the solid to the gaseous state. A vacuum and very low temperatures are needed for this. In the vacuum drying chamber, the ice is transformed directly from the frozen to the gaseous state (sublimation). The liquid state is neatly

sidestepped, thus preventing further damage to the paper," explains Olivier Revert.



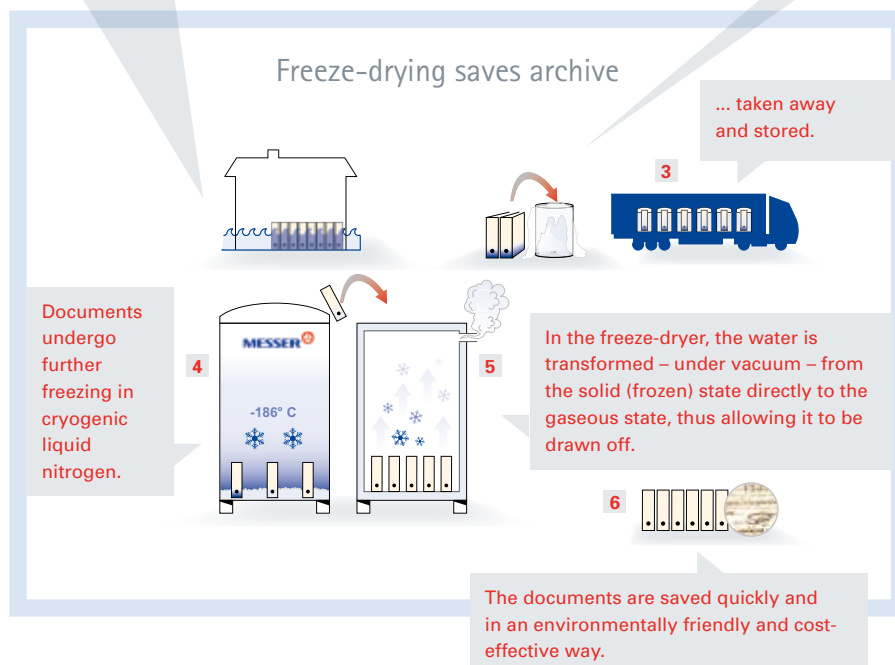
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Documents are immediately frozen with dry ice in insulated containers...



1

Historical documents damaged by flooding



place as quickly as possible in order to prevent mould and bacteria infestation," explains Olivier Revert, in charge of risk and damage calculation at AAD Phénix. Dry ice is solid carbon dioxide (CO<sub>2</sub>), which sublimates (turns into a gas) at minus 78.48 degrees Celsius. Messer sources most of its carbon dioxide from industrial waste gas emissions.

### Freeze-dried documents

In Bourges, the documents were chilled to the much lower temperature of minus 186 degrees Celsius using liquid nitrogen before being placed in the compartments of a freeze-dryer. "Freeze-drying exploits the direct transition of water

from the solid to the gaseous state. A vacuum and very low temperatures are needed for this. In the vacuum drying chamber, the ice is transformed directly from the frozen to the gaseous state (sublimation). The liquid state is neatly

### Quick and creative

In order to ensure that there was enough nitrogen and carbon dioxide for the entire process, the gases were delivered to the general council site in La Rochelle in large tanks. "We needed a gas supplier who could provide a 5,000-litre tank at virtually a moment's notice," says Olivier Revert. "Messer responded quickly and flexibly, and at the same time we were very impressed with their excellent offer." To prepare it in the shortest possible time, the commercial and technical staff came together in a dynamic and intensive exchange of information. "In my experience, this kind of thing is not

possible in companies above a certain size," says Olivier Revert. The speed and smoothness of the cooperation between Messer and AAD Phénix was key to the preservation of the archives.

The technology with which the objective was achieved actually has its origins in the food industry. These irreplaceable cultural assets were dried and cleaned with the help of cryogenic gases, using the same method that is employed in the production of instant coffee for example. In comparison with the conventional mechanical method that is normally used in such cases of water damage, freeze-drying technology has huge advantages, one of them being that the documents are restored in a fifth of the time.

As well as representing a considerable gain in productivity, it also allows a particularly rapid response in emergencies – which most of these kinds of operations are. What is more, the process – and it is a process that is used creatively – is kind to the environment, as the materials that are used do not leave behind any waste and are, in part, obtained from industrial waste gas emissions. Last but not least, it is cost-effective and easy on the budget.

*Editorial Team*



### Further information:

**Gwennaél Le Goff**

Sales Manager

Messer France S.A.S.

Phone: +33 (0) 5 57 77 87 49

glegoff@messer.fr

# Industry Spotlight

Automotive

Chemical Industry

▶ **Food**



Pharmaceuticals

Medicine

Germany: Successful certification



Dr. Jutta Kantelberg, DQS, and Guido Simon, Production Manager at Messer Industriegase, after the successful certification in Siegen

## Pure food

The German management system certification body, DQS, has certified Messer's food safety management system in Siegen in accordance with the DIN EN ISO 22000 standard.

The quality seal applies to both the filling plant and the air separation unit. The certification is regarded as an increasingly important mark of quality in the food industry, where gases like oxygen and nitrogen are used in processing and packaging, and also as additives. They come into direct contact with food and are themselves regarded as such.

The purity of Messer gases exceeds the minimum quality required by law. The management system also ensures a controlled filling operation and strengthens our existing quality and management systems.

*Dieter Schlesch, Messer Industriegase*

Hungary: Nitrogen hardens chocolate layer

## Ice cream cones stay crispy

Unilever has developed a new process for the production of the popular Cornetto ice cream. In order to ensure that the moisture from the ice cream does not make the cones soft, they are coated with a special impregnation layer consisting of warm chocolate heated to a temperature of 40 degrees Celsius. This layer of chocolate must not reduce the crispiness of the cones, however. It is therefore rapidly cooled to 10 degrees Celsius with the aid of cryogenic nitrogen at minus 196 degrees Celsius. Messer is supplying the international brand name manufacturer with 1.5 million tonnes of liquid nitrogen a year for its production operation in Hungary.

*Anita Kötél, Messer Hungarogáz*

Italy: Dry ice regulates pastry temperature

## Light croissants

The classic Italian breakfast consists of a cup of cappuccino and a cornetto pastry or sweet croissant. It is normally eaten standing at a bar. Travellers like



The cornetto pastry – no Italian breakfast is complete without it

to have breakfast in an "Autogrill", one of the world's largest providers of food, beverages and retail services "on the road". The Italian firm Fresystem SpA is Autogrill's main supplier of frozen gastronomic and breakfast products. In order to ensure that its cornettos and croissants rise nicely during baking, it is essential to maintain a certain temperature when kneading the pastry, a process that generates heat. Fresystem does this by using liquid carbon dioxide from Messer. The temperature of the dry



Image: Unilever

The Cornetto cone is now even crispier

ice that is produced when the liquid gas expands is minus 78.9 degrees Celsius. This ensures optimum temperature control and guarantees a breakfast of pure enjoyment.

*Lorena Vaschetto, Messer Italia*

Switzerland: Cold nitrogen safeguards quality

## Dry ice for wine growers

Last year, Messer supplied wine growers in the Swiss canton of Valais with dry ice during the grape harvest. A carbon dioxide tank and an ASCO pelletiser were installed in Charrat in order to meet the short-term demand. The dry ice lowers the temperature of the must, thus slowing down the process of fermenta-



Dry ice pellets cool the grapes.

tion and preventing unwanted bacterial growth. It also helps to ensure better preservation of the grapes' constituents and flavours during cold fermentation.

*Reiner Knittel, Messer Schweiz*





CO<sub>2</sub> recovery is kind to the environment

## Environmental protection and CO<sub>2</sub>

Messer produces up to 150,000 tonnes of carbon dioxide a year from industrial waste gas at Belgium's largest CO<sub>2</sub> recovery plant. This means that instead of being emitted into the atmosphere, the gas can be put to economic use again.

Messer has commissioned a state-of-the-art CO<sub>2</sub> liquefaction plant with an annual production capacity of 150,000 tonnes of carbon dioxide on the site of British company Ineos Oxide in Zwijndrecht near Antwerp, Belgium. The production plant recovers around 20 tonnes of CO<sub>2</sub> per hour from industrial waste gas, and renders it reusable. The CO<sub>2</sub> is captured from Ineos' chemical installations, where it is generated as a by-product.

Water and impurities are removed from the gas in several steps, before it is liquefied by means of cooling and compressing and stored in tanks. The

liquefied gas is then put into tankers, which transport it to the customer. This means that the CO<sub>2</sub>, which is usually directly released into the surrounding environment, is put to economic use as a "green gas".

The special properties of carbon dioxide, such as its inertness and its high solubility in water, make it a versatile product with a range of uses. For example, it is added as carbonic acid to make carbonated soft drinks. In the treatment of drinking water and in wastewater neutralisation, CO<sub>2</sub> dissolved in water can replace the use of hydrochloric acid. In cryogenic liquid and solid form (dry ice),



Transparent technology:  
CO<sub>2</sub> liquefaction plant

carbon dioxide is used as a coolant down to temperatures as low as minus 79 °C.

Messer operates its largest CO<sub>2</sub> plant jointly with IJsfabriek Strombeek. For this purpose, the two companies have set up a joint venture, called "bECO<sub>2</sub>", in which Messer holds a 70 per cent stake. bECO<sub>2</sub> has invested a total of 17 million euros. Messer uses two thirds of the plant's capacity to supply carbonic acid, dry ice and gaseous and liquid carbon dioxide to its customers in the food and beverage sector as well as the manufacturing and water industries, among others. The remaining third is taken by IJsfabriek Strombeek.

*Diana Buss, Messer Group*



Installation of the storage tanks for the liquefied carbon dioxide

# Oxygen – Tendency towards reaction

More than half – 50.5 per cent to be precise – of the parts of our planet that are accessible to humans consists of oxygen. That includes the atmosphere, hydrosphere (bodies of water) and the earth's crust to a depth of 16 kilometres. By virtue of its mass alone, therefore, oxygen is the most fundamentally important element of our world.

It is thanks to the work of cyanobacteria that it got into the earth's atmosphere in the first place. They were probably the first organisms to release molecular oxygen as a gaseous waste product of their metabolism. Before that, our young planet's atmosphere was virtually devoid of oxygen.

Oxygen owes its name to an error of early science. The 18th century pioneers of chemistry thought that the colourless and odourless gas was responsible for the formation of acids. So they named it oxygenium (acid forming), derived from the Greek word *oxys*, meaning sharp or acid.

Incidentally, oxygen is the third most common element in the universe after hydrogen and helium, albeit with a much smaller percentage by mass than on earth. In the solar system, it accounts for about 0.8 per cent. But this is expected to change: the majority of white dwarfs – which according to current theory is the final state of almost every star – have cores that consist of carbon dioxide and oxygen. But that's still a while away. So for the time being, oxygen can perform its vital function on earth as the fundamental element that sustains all higher forms of life. Oxygen's reactive properties are utilised by industrial enterprises to ensure efficient and cost-optimised production: oxygen plays a part in most industrial processes involving combustion or chemical reactions – from steelmaking to water treatment.

*Editorial Team*

## Profile: Oxygen [O<sub>2</sub>]

<b>Element symbol</b>	O
<b>Occurrence</b>	20.942 % of air; 50.5 % of the atmosphere, hydrosphere, biosphere and lithosphere combined.
<b>Boiling point</b>	-183°C. At atmospheric pressure, liquid oxygen only takes up 1/854 of its gaseous volume.
<b>Freezing point</b>	-218.9°C
<b>Chemical properties</b>	Extremely reactive, combining with almost all of the other elements. It is involved in most combustion and corrosion processes.
<b>Production</b>	Air separation
<b>Uses</b>	Accelerates chemical reactions in various industries and processes; raises melting temperatures in the metal and ceramics industry; accelerates biological and biochemical processes, for example in water treatment; used as an auxiliary and medicinal resource in medicine – and many more



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### Published by:

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Corporate Communications  
Gahlingspfad 31  
D-47803 Krefeld

### Editorial Team:

**Diana Buss** – Editor-in-chief  
Phone: +49 2151 7811-251  
diana.buss@messergroup.com

**Benjamin Auweiler**, Corporate Office  
benjamin.auweiler@messergroup.com

**Angela Bockstegers**, Corporate Office  
angela.bockstegers@messergroup.com

**Thomas Böckler**, Application Technology  
thomas.boeckler@messergroup.com

**Dr. Christoph Erdmann**,  
Production & Engineering  
christoph.erdmann@messergroup.com

**Tim Evison**, Corporate Office  
tim.evison@messergroup.com

**Michael Holy**, Region Central Europe  
michael.holy@messergroup.com

**Anita Kötél**, Region Southeast Europe  
anita.kotel@messer.hu

**Monika Lammertz**, Application Technology  
monika.lammertz@messergroup.com

**Dr. Joachim Münzel**, Patents & Brands  
joachim.muenzel@messergroup.com

**Angélique Renier**, Region Western Europe  
arenier@messer.fr

**Joachim Rohovec**, Application Technology  
joachim.rohovec@messergroup.com

**Marlen Schäfer**, Corporate Office  
marlen.schaefer@messergroup.com

**Nicole Urweider**, ASCO Carbon Dioxide AG  
urweider@ascoco2.com

### Concept and Realisation:

**Agentur Brinkmann GmbH**  
Mevissenstraße 64a  
D-47803 Krefeld

### Text and Editing:

**klartext: von pekker!**  
Römerstraße 15  
D-79423 Heitersheim

### Translation:

**Context GmbH**  
Elisenstraße 4-10  
D-50667 Köln

Go to [www.messergroup.com](http://www.messergroup.com) for comprehensive information about "Gases for Life".

"Gases for Life" is published four times a year in German, English and Hungarian.

## The Gases for Life editorial team

## We are ...



From left to right: Anita Kötél, Dr. Bernd Hildebrandt (guest editor), Nicole Urweider, Tim Evison, Marlen Schäfer, Thomas Böckler, Dr. Christoph Erdmann, Monika Lammertz, Michael Holy, Diana Buss, Dr. Joachim Münzel and Benjamin Auweiler. (not pictured: Angela Bockstegers, Angélique Renier und Joachim Rohovec)

## Competition

## Delicious!

In each issue, we will be giving away gourmet hampers to the winners of our prize draw. These hampers will be full of specialities from the country featured in our cover story. This time there are delicacies from Hungary to be won, including acacia honey, salami, paprika paste, Unicum liqueur and much more besides.

**What gas is used to optimise wastewater treatment?**

6

**What process is the optimal solution for crushing heat-sensitive materials?**

3

**What is the name of the joint venture for CO<sub>2</sub> recovery which Messer formed with IJsfabriek Strombeek?**

1

For your chance to enjoy these special delicacies, all you need to do is answer our questions relating to this issue of "Gases for Life". The letters in the coloured boxes will give you the answer. Please send it by email with the subject line "Gases for Life competition" to: [diana.buss@messergroup.com](mailto:diana.buss@messergroup.com). The deadline is 21 April 2011.



Jó étvágyat!

This competition is not open to employees of the Messer Group or their families. If there are multiple correct answers, the winners will be chosen at random. The result of the draw will be final and not subject to appeal.

**La Rochelle, where Messer saved a flood-damaged archive, is the capital of which region?**

4

Answer:

Have fun and (with a bit of luck) enjoy the delicacies!  
Your Gases for Life team.

# Liquid nitrogen chills CFCs.



CFC coolant poses a particular problem when it comes to recycling refrigerators. Thanks to intelligent technology involving the use of cryogenic liquefied nitrogen, the environmentally harmful CFCs can be condensed and captured. This means that they are not released into the atmosphere, while the condensate can ideally be used in new production processes.

For more on **household appliances, food-stuffs, furniture, beverages, lamps, paper, computers, cars** and a host of other products where gases play an important role, go to:

www.**Gases for Life**.de

