

# TECHNOLOGY FOR THE FUTURE

40 years of innovative solutions  
by EnviroChemie

Technology for Water



**ENVIROCHEMIE**

A close-up photograph of a hand watering a small green seedling. A single drop of water is falling from the tip of a finger, creating a vertical line of smaller droplets as it descends towards the plant. The background is a soft, out-of-focus green. The text is overlaid on a semi-transparent dark green rectangular area in the upper left.

**“INNOVATIONS GIVE THE  
FUTURE A FUTURE.”**

Prof. Dr. Hans-Jürgen Quadbeck-Seeger, German chemist

# SOLUTIONS FOR TODAY – THE FUTURE IN FOCUS

**For 40 years,** we have been developing proprietary technologies for all kinds of water treatment jobs. The driving force behind our innovations has always been our customers' requirements.

Auto pioneer Henry Ford once said: "If I had asked people what they wanted, they would have said faster horses." At the age of 15, Ford had already built his first combustion engine and, from that time onward, consistently pursued his dream of an automobile – simply because he believed in this development. Very successfully, as we know today: Ford promoted the breakthrough of the automobile in the mass market through assembly line production. To help his customers reach their destination faster, he did not give them faster horses but a different and better solution.

#### **It all starts with an idea**

As this little story shows, technical innovation always starts with a person who has an idea. In our case, the idea of developing a compact wastewater treatment plant. For in the 1970s in Switzerland, where EnviroChemie was founded, there were largely only municipal sewage treatment plants, whilst several large companies also operated their own solutions. However, there were no products for small wastewater quantities available in the market – until we launched our

Split-O-Mat®. Ever since then, EnviroChemie has been constantly evolving. Today, we are a world-wide provider of technologies that we have developed for physico-chemical, membrane technology and biological treatment of process water, cooling water and wastewater. In this process, our focus is always on the complete water cycle.

#### **Customer needs as driving force**

Our innovations are driven by our customers' needs. We continually search for better solutions for their demands, whether that means meeting increasingly strict legal requirements for wastewater discharge or quality standards for the water required for production. Together with companies, we also search for possible ways to recycle water or raw materials and respond to global challenges such as limited water reserves. Our research and development is always very close to the market. We accept these various challenges and aim to provide in this innovation report an overview of relevant topics and tomorrow's water treatment technologies. In keeping with our motto: "Innovations for water technology – EnviroChemie."





# PRODUCTION WITHOUT WASTEWATER – POSSIBLE BUT NOT ALWAYS SENSIBLE

**Zero liquid discharge** is increasingly becoming an important issue for companies in many regions. For example because there is a shortage of water at their production sites or resources have to be preserved. Wastewater-free production is possible thanks to a combination of different wastewater treatment processes offered by EnviroChemie, however it is economically viable only under specific basic conditions.

Water is required in many places in production. But regardless whether it is used, for example, for plant cleaning, cooling or dissolving substances, it usually has to be treated afterwards. The question is: To what extent? "Technically it is possible, of course, that no wastewater is left over," says Elmar Billenkamp, expert on zero liquid discharge at EnviroChemie. For example, wastewater can be pre-treated with a combination of different EnviroChemie processes to the extent that it completely evaporates and leftover solids can be recycled or disposed of. Or it is treated so that instead of wastewater only sludge or brine is left over as residual material.

"Together with our customers, we always consider the most sensible options for the specific case," says Billenkamp. Depending on the requirements, the EnviroChemie water experts combine proprietary technologies, such as the physico-chemical, biological and membrane processes. "There is no ready-made standard solution for zero liquid discharge," Billenkamp explains: "It requires a very complex combina-

tion of our wastewater treatment processes. Therefore it is economically viable only under specific basic conditions." And these conditions are as diverse as the local circumstances.

## **Restricted discharging**

At some production sites, it is urgent to find alternative wastewater solutions: For example, because it is not possible to use the local sewerage system, the wastewater quantity would be too much for the municipal system or a body of water – or because there simply is none. At other production sites, discharging is restricted by official regulations. "In these cases, it is mandatory to find another wastewater solution," says Billenkamp. In one case, a cosmetics manufacturer had to meet an official requirement that the water used at one of its plants in Brazil has to be almost completely recycled. By combining different processes, EnviroChemie created a system for the company that enables 97 percent of its wastewater to be recycled. The remainder is disposed of as sludge.





## FUTURE TOPIC –

## ZERO LIQUID DISCHARGE

Photo: Matteo Sciarano / Shutterstock

It often pays off to close the water cycle in dry regions.



Zero liquid discharge is an alternative when water is scarce.

### **Water shortage**

Another important motivating force for companies to deal with the topic of zero liquid discharge is water shortage. "Zero liquid discharge is usually not an issue wherever water is cheap and readily available. It often pays off to close the water cycle in regions where water is scarce," says Billenkamp. For example, saline wastewater in a solar factory in Qatar is treated until it can be reused for cooling systems, irrigation or cleaning purposes. The remainder can safely be discharged into the ocean.

### **Freedom from regulations**

In other cases, companies want to free themselves from dependence on official decisions by implementing wastewater-free production. For example, an automobile manufacturer chose a zero liquid discharge solution from EnviroChemie for its oily wastewater in its engine plant in Kazakhstan because it wanted to control its wastewater treatment costs. "Our technology is an investment which is predictable. When fees





Besides drought, environmental aspects are also an issue.

increase – sometimes also arbitrarily –, then it's a different situation," Billenkamp explains.

#### **Environmental protection**

Environmental protection is also an issue. "In these cases, the reasons are internal corporate regulations regarding environmental objectives, or because companies want to obtain specific certificates for their production sites," says Billenkamp. A cosmetics manufacturer wanted to achieve platinum, the highest level of LEED certification, with its factory in Mexico. LEED (Leadership in Energy and Environmental Design) is an internationally recognised building rating system. Bonus points are granted for an innova-

tive wastewater treatment system which can be earned with the aid of EnviroChemie technologies.

#### **Is nil really necessary?**

These examples show how diverse the basic conditions for wastewater-free production can be. And they also show that zero does not necessarily mean nil. Sometimes liquids, sometimes solids are left over. "After all, wastewater does not simply disintegrate. That's why you always have to consider what will happen with the separated substances," says Billenkamp. For example, the solids could be incinerated to produce energy. That makes "zero" even a plus.

# THE FASTER SOLUTION – FOR ANY LOCATION IN THE WORLD

**Modular plants** are an alternative to water treatment. Their advantage: lower costs, higher flexibility and faster implementation.

The new wastewater treatment plant should be ready as soon as possible. But before it can be used, some various steps are still necessary: applying for planning permission, constructing the building, erecting, connecting and test the new plant – all of which can take some time. Thanks to the modular plant concept EnviModul from EnviroChemie, companies can choose a faster solution. For the water technology is encapsulated in modules which replace operational buildings constructed from steel and concrete, so one less costly construction phase is necessary. The fully prefabricated, ready-to-go EnviModules only need to be connected on site.

Our engineers modified these proven EnviroChemie water treatment processes for EnviModul so that they can be fitted into high-quality housing modules and combined in many different ways according to customer requirements. That makes them a fast and individual solution – for any location in the world.

## Comparison of EnviModul plant solutions and conventional plant designs

	EnviModul	Conventional design
<b>Planning time</b>	Short	Long
<b>Permissions</b>	Planning permission very easy	Planning permission complex
<b>Building costs</b>	Low	High
<b>Assembly time</b>	Short	Medium
<b>Commissioning and testing</b>	Pre-tested in factory	All on site
<b>Expansion</b>	Easily possible	Often limited
<b>Plant moving</b>	Possible	Not possible

In EnviModul plants the water technology is encapsulated in a housing module.







EnviroChemie analyses and optimises all processes as part of operation management.

## **FOR EVERY REQUIREMENT – WATER AND WASTEWATER SERVICES**

**Water management** is a science in its own right. For this reason it may be expedient to assign the job of water and wastewater treatment as part of operation management to experts. This model is, however, much more than a simple service. Process optimisation is a part of the job for EnviroChemie.





## FUTURE TOPIC –

## OPERATION MANAGEMENT

“One work life is not enough to become an authority on all plant technologies,” is a saying in the water and wastewater management industry. The possible ways water can be processed and used in production are too diverse and varied nowadays. That is why many contractors trust more and more frequently in the knowledge of experts who can safely and reliably handle all water management jobs.

This includes some interesting side effects: The experts at EnviroChemie not only see to safe wastewater treatment, but are also well versed in legal issues, ensure compliance with all relevant regulations and take care of all officially required testing and documentation. “Contractors can thus limit their liability risk,” says Ulrich Böhm, responsible for operation management and contracting at EnviroChemie.

### Planning security

EnviroChemie offers three different service components which support customers in all areas of water and wastewater treatment. “Our service model includes set-up of the operating organisa-

tion, assistance in interfacing with authorities and fee management and support – also via remote access”, Böhm explains. Operation management is the right solution for customers who prefer to entrust only parts of their processes to others: “In this case we take care of all water and wastewater management,” says Böhm. The main considerations include water quality, plant availability and costs throughout the plant life cycle. The premium class in this area is contracting: EnviroChemie plans, builds and finances the plant in order to operate it afterwards. Customers pay – as with operation management – a basic and volume price, so they have more planning security. No matter which model customers opt for, optimisation of existing processes is always part of the job for EnviroChemie. “However, there is no simple answer to the question of where improvements are possible,” Böhm explains. “A wastewater plant is a complex system which has several parameters that also influence one another. So it always depends on the individual case, which we exactly analyse on site first.”

Responsibility of EnviroChemie ↑



### EnviroChemie offers three different components:

From the service model where we primarily offer expert advice, to classic operation management where we take responsibility for all the treatment plants and systems, through to contracting where we build and manage the plant ourselves. We will be glad to be of assistance.



Photo: Schott AG

**SCHOTT**  
glass made of ideas

## FOCUSING ON THEIR CORE BUSINESS – OPERATION MANAGEMENT IN THE GLASS INDUSTRY

Since 1997 EnviroChemie has operated for Schott AG, the largest European special glass manufacturer, more than 40 plants in the area of well and cooling water treatment, process and wastewater treatment as well as coolant recirculation systems. “Since water treatment is not part of our core business, we decided at that time to outsource operation management to external experts,” explains Dr.-Ing. Thomas Hünlich, head of environmental technology at Schott.

Ten EnviroChemie water specialists have since been responsible for supplying production with all necessary materials flows and safe discharging into the Rhine River at Schott in Mainz, Germany. “This strong local presence is very important to us. For the crew not only ensures operability but also reacts reliably and quickly, for example, when there is a malfunction,” Hünlich says. “Another advantage is that we don’t have to deal with the water issue in every detail yet are still always up to date, for example, when legal conditions change.” Continuous process optimisation during operation is also included in the services. An extremely successful cooperation, as Hünlich finds: “A simple service has long become an important partnership.”

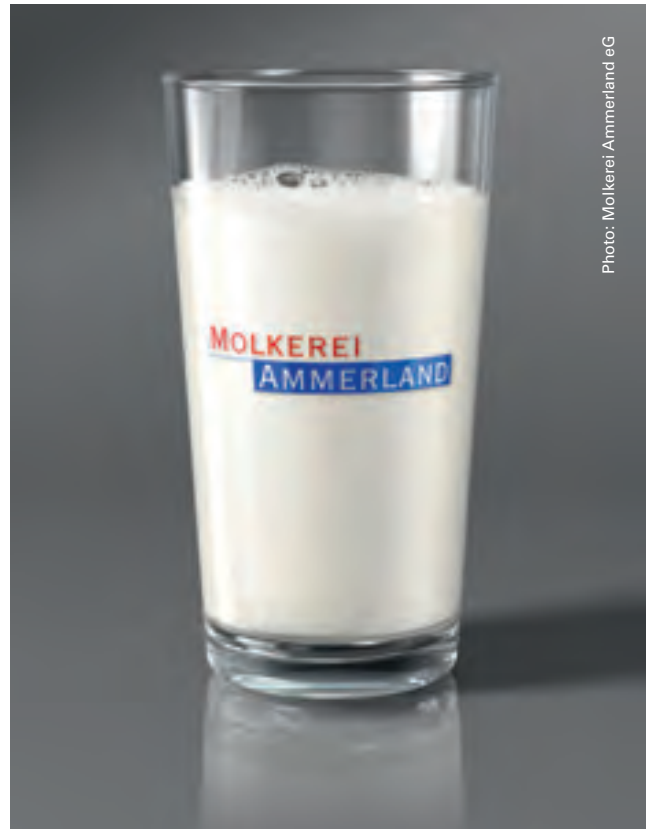


Photo: Molkerei Ammerland eG

## EXPANDING CAPACITIES – CONTRACTING IN THE DAIRY INDUSTRY

In 2009 the large German dairy factory was facing a great challenge: Production at Wiefelstede had to be significantly increased in order to meet the globally rising demand for dairy products. Therefore all the production processes had to be adapted to the new requirements – including process wastewater treatment. “We wanted to focus on our own field during expansion and avoid dealing with process wastewater treatment on top of that,” says Bettina Freese, project engineer at Ammerland. “That’s why we began to search for an external supplier.”

As a result, EnviroChemie has not only been operating the process wastewater treatment plant for Ammerland since 2010, but also expanded and modernised it as part of a operation management contracting assignment. In addition to an increase in capacity of 50 percent, the dairy factory is thus equipped with the latest technology and has more planning security. Furthermore, efficiency improvements enabled a reduction of power and disposal costs. “Our process wastewater treatment is always up to date thanks to EnviroChemie,” Freese says. “At the same time, we can achieve the operational reliability we need. For our production is not possible without process wastewater treatment.”



# IMPROVEMENTS FOR TODAY – IDEAS FOR TOMORROW

**Developing practical solutions:** This motivation has led to a range of innovations in the history of EnviroChemie. Our chemists, biologists, environmental and process engineers constantly work on innovations – not only for our plants and processes but also in our water chemicals.

No two types of wastewater are alike. That makes individually tailored water technology and suitable chemicals all the more important. EnviroChemie is a one-stop shop for complete solutions. In addition to plant engineering, we develop and produce water chemicals in our process engineering laboratory. We currently work with 400 different products – and counting. For EnviroChemie also develops entirely new solutions for individual requirements.

The task is always different every time. For example, one of newest products in our range is a novel defoamer for the painting industry. For in the wastewater from production, special substances in the paints create a foam which poses a major problem for further treatment. “That’s why we teamed up with our customer to develop a defoamer which is suitable for its entire paint range – which includes at least several hundred different ones”, says Dr. Heinz-Ludwig Eckes, responsible for the development of water treatment agents at EnviroChemie.

EnviroChemie develops new products always in accordance with customer requirements, as Jörg Gierschewski, expert on water chemical application at EnviroChemie, explains: “For example, the assessment of hazardous substances is changing increasingly. That’s why companies are continuously searching for alternatives to toxic substances.” Therefore, EnviroChemie developed, for example, an organic compound which can replace the hazardous substance iron trichloride. Its advantage: The substance is safer to transport and process. Just two examples of how EnviroChemie creates practical solutions.



Searching for innovations.

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## Researching for the future

In development EnviroChemie looks beyond practical application into the future. Therefore we participate regularly in German and European research projects and collaborate with numerous universities and research institutes, such as the Fraunhofer Society. Read more about the research projects here:

[www.envirochemie.com](http://www.envirochemie.com)

> Innovation

> Research

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# ENERGY FROM WASTEWATER – DOUBLE PROFIT

**Wastewater is valuable.** It can not only be recycled but also be used to generate power under ideal circumstances. In times of rising energy and water costs, this can pay off for companies many times over.

Wastewater is often hot. In a laundry, for example, the temperature of the wastewater released after the wash cycles can range between 60 and 80 degrees Celsius on average. A lot of heat which is entirely lost during discharging into the sewerage system. Yet it can also be used in a completely different way: as thermal energy. And companies that recycle the wastewater as well can benefit from double savings.

For example, the laundry CWS-boco in Solingen, Germany, washes more than four million towel rolls and roughly one million dust control mats every year. After the washings, the wastewater initially contains detergents and protective substances and is contaminated with heavy metals, but then it is recycled by a treatment concept developed by EnviroChemie. The heart of the process is an aerobic Biomar® membrane bio-reactor with downstream Envopur® reverse osmosis. The result of the process is cleaned water, which can be used for new wash cycles according to the laundry's quality specifications. All in all, up to 80 percent of the wastewater is reused in this manner: That corresponds to a savings of up to 51 million litres of water a year. Or the equivalent of approximately one million

wash cycles of a new conventional washing machine. The special highlight: During recycling a part of the wastewater heat is transferred via a heat exchanger to the cleaned water, so it is pre-heated before it is reused in the laundry. That way the recycled wastewater is already at 30 to 40 degrees before it is reused – fresh water however is supplied at roughly 15 degrees and then has to be heated up to a higher temperature for washing. So the wastewater energy saves heating costs. With this amount of energy it would be possible to operate up to 14,000 refrigerators for one year.

## Ecological argument

An example of intelligent wastewater treatment which saves energy and reduces operating costs at the same time. An important economic as well as ecological argument for more and more companies. Furthermore, a foresighted investment for the future: Energy and water costs will probably continue to rise, and legal regulations will rather be tightened. EnviroChemie has long since identified this trend, and has been developing process technology and concepts since the nineteen nineties to combine industry wastewater treatment with these aspects.



Heat recovery in the industrial laundry  
CWS-boco in Solingen, Germany.



# RAW MATERIALS – LITTLE TREASURES IN WASTEWATER

**Sustainability** also means the responsible use of raw materials. That also includes substances which accumulate in wastewater. For some of these, it can pay off to recover them from the liquid.

Out of sight, out of mind – wastewater has been regarded as a question of correct disposal for a long time. Meanwhile, however, it is also considered to be a resource for raw materials at many companies. “It obviously makes sense to recover costly raw materials like precious metals. But that can also be a very interesting possibility in many other areas,” says Michael Kuhn, who advises customers on this topic at EnviroChemie. Especially the question of cost is an important driving force: “The general rule for almost every company is: Recovery has to be profitable, either because the raw material is expensive or its disposal is costly.” For example, the concentration of the material in the wastewater has to be high enough so that a considerable fraction can be extracted from the water.

## Case-by-case review

Which process is suitable for recycling a special raw material depends on the individual case. For example, an Envopur® micro-filtration process removes glaze residues from the rinse water at a porcelain factory. These residues can then be reused, enabling the company to reduce its operating costs. In the metal processing industry, hydrochloric acid is recovered using the Envocem® ion exchanging process and reused to strip iron parts before further processing. “This ensures consistent quality of the acid bath,

so it doesn’t have to be replaced so often. That means lower operating costs as well as energy costs,” says Kuhn.

However, environmental aspects are also becoming more important in raw material recycling. For example, if a considerable amount of substances was already removed from the wastewater, fewer neutralising agents have to be used afterwards. Or the sludge is less polluted. “Since companies are adopting sustainability guidelines more and more frequently, wastewater treatment is naturally an issue too,” Kuhn says.



The recovery of raw materials with customized plant solutions is economically viable.

# IN THE WRONG PLACE – AGENTS IN WASTEWATER

**Pharmaceutical residues** enter our environment via wastewater and can affect organisms there. Special treatment techniques prevent their release from production.



Photo: oknoart/Shutterstock

Systematic wastewater treatment prevents unintended side effects.

Pharmaceuticals are used for many purposes. But they can have side effects: Studies show that oestrogen in birth control pills not only prevents unwanted pregnancies but also inhibits the reproduction of fish in rivers. According to findings of the Federal Environmental Agency, pharmaceutical residues can be found nearly everywhere, in watercourses as well as in ground water samples and even in drinking water. These substances are not necessarily hazardous, however the extent of the risks cannot be estimated exactly due to lacking studies, warn experts at the Federal Environmental Agency.

Pharmaceutical substances enter wastewater via households or hospitals, because they are excreted by patients or not disposed of appropriately. Another source is the production of pharmaceuticals themselves. Pharmaceuticals accumulate in the wastewater during plant operation at

API manufacturers as well as generic producers. That is why they are increasingly using technologies which eliminate the residues before they enter the general wastewater treatment plant. "The awareness of this issue is increasing without doubt," says José Canga-Rodríguez, pharmaceutical wastewater expert at EnviroChemie. "After all, even tiny concentrations can impact organisms."

For treatment EnviroChemie uses an advanced oxidation process with hydrogen peroxide in conjunction with a high-performance UV reactor. "Our goal is to destroy the agents. If they are only filtered out, that would just shift the problem," Canga-Rodríguez says. "The advantage of the process that we have developed is that it is robust yet flexible at the same time." Thus it can be adapted to quite a few agents in its in-house laboratory, for example also to hormones in birth control pills.



# UNDERESTIMATED RISK – PREVENTING GERMS IN COOLING WATER

**Cooling systems** can be a source of health risks, for example through Legionella bacteria. Ulrich Saalfeld, an expert on cooling water treatment products, explains why the risk is often underestimated and how hygiene management prevents these dangerous bacteria from spreading.

## Mr Saalfeld, a Legionella infection is caused by exposure to the bacteria in the air. Which risks do cooling systems pose here?

Legionella bacteria can be found everywhere in our environment and are not dangerous in normal concentrations. In cooling systems, however, ideal conditions exist, for example due to the temperature, in which bacteria can reproduce quickly. A risk may exist when this contaminated water is aerosolised in an evaporative cooling system. For despite the use of droplet catchers, single droplets can escape from the system. People who inhale these droplets can contract Legionella – even several hundreds of metres away from the system.

## Well, this problem is nothing new. Why has this topic become interesting to companies now?

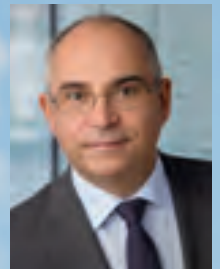
This risk was underestimated for a long time because companies did not deal with their cooling systems in depth. However, a process of rethinking has currently begun – also because there have been several Legionella epidemics in recent years. Many countries have therefore adopted legislation to prevent the spread of Legionella through cooling systems, whilst in other countries such directives are in preparation. That means for more and more operators of cooling water systems that they have to look into this issue more closely.

## So how can its spread be avoided?

It is not enough to clean the system regularly with chemicals. The basis for safe Legionella prevention is a clean overall system. We call it the magic triangle in the cooling water area: inhibit corrosion, prevent deposits and minimise bacterial growth. That is the only way to keep the Legionella concentration at an uncritical level.

## That sounds like a great deal of effort for a risk that does not have to occur ...

Once a hygiene management system is established, the required effort is rather small. In addition, companies profit not only from added safety but they also increase their energy efficiency: If for example an only one millimetre thick bio-film is deposited in a heat exchanger – and it happens fast – that causes a 30 percent loss in efficiency. So hygiene also helps to save energy costs.



The expert on cooling water treatment products at Enviro-Chemie: Ulrich Saalfeld.

## More informationen

EnviroChemie provides advice on this topic as a certified partner of the Association of German Engineers (VDI). More details about the potential danger of Legionella infection in cooling systems can be found in a white paper by Enviro-Chemie:

[www.envriochemie.com](http://www.envriochemie.com)

> Industrial water

> Cooling water

In cooling towers exist ideal conditions for the reproduction of germs.



Scientists have found microplastics even in the Arctic.



# THE DELUGE OF SMALL PARTICLES – A RISK FOR HUMANS AND THE ENVIRONMENT?

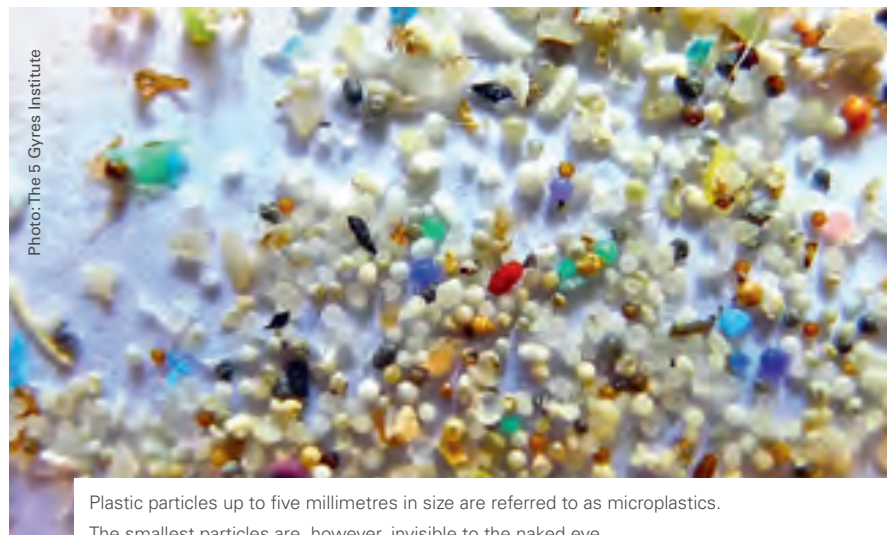
**Microplastics** enter our waters in different ways. As yet the research into whether the tiny particles are a risk for our environment and health is insufficient. However it is clear: It is currently not possible to remove microplastics from the world's oceans. But initial technologies are available which prevent plastics from production ending up in the environment via wastewater.

Our oceans have long since become a giant rubbish dump: Gigantic swirls of plastic bags, old fishing nets and all kinds of other waste are floating around in the world's oceans. Yet these dramatic images are only the tip of the mountain of rubbish. Tiny particles of plastic have meanwhile been found not only in the oceans, but also in rivers, glacier lakes, and, to the horror of consumers, even in mussels, fish and in beer.

The sources of these so-called microplastics are as diverse as their applications. Cosmetics manufacturers use them, for example, as granulate in peels or shower gels. They are also found in many other cosmetic products and cleaning agents through which they enter wastewater. Apart from these primary microplastics, the disintegration of plastics is the most significant source in terms of quantity (secondary microplastics) according to a study conducted by the German Federal Environmental Agency. Larger pieces of plastic are broken down into increasingly smaller particles in the oceans by the wind, the weather and the tides. Other sources of microscopically fragmented plastic waste include tyre abrasion, fibres washed out of functional clothing and the production of plastic parts. According to scientific estimates, roughly six to ten percent of the global plastics production ends up in our world's oceans.

## Nip it in the bud

And once they have reached the ocean, they stay there for a long time. "Plastics usually disintegrate very, very slowly. Some of my co-workers say it takes centuries," says Dr. Gunnar Gerdts from the Alfred Wegener Institute at the Helmholtz Centre for Polar and Marine Research. "Therefore we have to ensure that plastics do not end up in the environment in the first place." The scientist advocates tackling the root causes



Plastic particles up to five millimetres in size are referred to as microplastics. The smallest particles are, however, invisible to the naked eye.

and preventing microplastic particles in water from the start: For example, they can be avoided in cosmetics, and consumers can refrain more often from using plastics, like the plastic bags from supermarkets, in everyday life. Furthermore, the material has to be recycled more efficiently – everywhere in the world. Apart from a reduced use of plastics, effective wastewater treatment also plays role in the prevention of these tiny particles. “Not only municipal sewage treatment plants have to deal with this issue, but also Industrial companies need to consider how to clean their wastewater so that no microplastics are discharged into the sewerage system,” Gerdts says.

#### Microplastics from production

Meanwhile, initial technologies are available for industrial applications which can remove the tiny particles from wastewater, thus preventing plastic emissions directly at the source. A similar solution from EnviroChemie is installed at the eyewear manufacturer Silhouette International

Schmied AG in Linz, Austria. The company produces three million pairs of glasses a year. During production the plastic frames are precisely deburred with grinding tools and continuously rinsed with water, which contains very fine plastic particles from the grinding process. “Thanks to a combined flocculation and sedimentation process, the cleaned water does not contain any suspended solids and can be immediately reused for production,” is how Oliver Brandenburg, expert on water treatment at EnviroChemie, explains the process. However, it is subject to certain preconditions and cannot simply be applied to other situations: “Generally, the topic of microplastics is extremely complex when it comes to wastewater treatment simply because of the wealth of plastics.”

This has also been confirmed by the scientist from the Alfred Wegener Institute. As part of a research project, he inspected twelve sewage plants in North Germany and found considerable amounts of microplastics in sludge as well as in water which was discharged again. “The particles seemed to be too small for the usual cleaning stages,” Gerdts explains.

#### Even the Arctic is affected

As yet it is not possible to estimate the impacts these small particles may have on the environment and humans. “The research into this issue is still insufficient,” Gerdts says. Initial studies indicate, for example, that microplastics bind pollutants and thus may adversely affect organisms which ingest the particles. “However, we do not know if this pollution increases along the food chain,” the microbiologist explains. Yet, one thing is already clear: “It is annoying that microplastics can be found everywhere in nature. They simply do not belong there.” For example in a current research project, he and his co-workers found some plastic particles which had accumulated in Arctic ice: “That is bad enough. But they won’t stay there, and if the poles keep melting, these particles will also end up in the ocean.” Yet there are currently no technologies available to remove microplastics from the world’s oceans. Several institutes and companies are conducting research into solutions, such as plastic-eating bacteria, but it is an extremely difficult task, as Gerdts explains: “There are several plastics with different properties, and the particles float in different layers. I don’t see a solution here any time soon.”



At an Austrian eyewear manufacturer, plastic particles which end up in wastewater are removed from it by EnviroChemie plants.



# DIGITAL CHANNELS – WATER TECHNOLOGY 4.0

**Plants communicate with one another:** People, machines and processes are networked. At the same time automation continues to advance. These developments, which are commonly subsumed under the catch phrase Industry 4.0, also apply to water technology.

## THE BRAIN OF THE PLANTS

Software plays an important role also in water technology. It is used to program the plants correctly. The next generation of this so-called development environment was launched at EnviroChemie in 2015. Better and better software makes the plants increasingly intelligent. For example, EnviroChemie physico-chemical plants detect the degree of soiling in wastewater and add an appropriate amount of chemicals automatically.

## REMOTE CONTROL

The plant reports a problem during wastewater treatment. The days when everything stopped a technician came to the plant and put it back into operation are over. EnviroChemie has offered remote service solutions to its customers for years. This secure remote service connection is provided via a central server in Rossdorf, Germany. In addition, it is possible to network plants with one another and back up data centrally from the archiving systems via the system. Customers too can access their plant, for example, using a tablet.

## ONLINE EMPLOYEE TRAINING

Every industrial employee has to undergo a specific number of training sessions every year. EnviroChemie employs digital channels for this purpose and also offers them to its customers. Whenever and wherever they want, employees can undergo their training sessions on their computers using browser-based training software. This software also sends out training reminders and documents them.

## OPERATION MANAGEMENT TOOL

To optimise system performance, a range of data, such as discharging parameters and consumption rates, is collected continuously. An archiving system, which EnviroChemie customers may use as an additional component, collects these data amounts and correlates them with one another. That makes it easier to identify potentials for improvement – without loads of Excel lists and files full of paper.



Remote service saves time and money.

Technology for Water



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