



*Water Treatment Solutions
for the **Pharmaceutical**
and **Life Sciences Industry.***

EnviroChemie – international competence in water technology

We are experts in industrial water and wastewater technologies. Our core competence lies in providing our customers with reliable and innovative solutions. As an engineering company with specialized daughter companies, we offer a complete range of services based on our long national and international experience. We are always focused on our customers and assist them with the design, planning, engineering, building and commissioning of our plants. In our research facilities and our pilot plants, together with our partners and customers we can develop custom solutions for even the most complex and demanding tasks.

Our high-quality “Made in Germany” solutions are based on chemical-physical, biological and membrane filtration processes, whose state of the art draws on our long list of research achievements and patents. With our customized solutions we can provide services and plants for all kind of water qualities and requirements.

On the fresh water side this includes technologies up to highest quality demands - like highly purified water or water for injection. On the wastewater side this includes solutions according to the respective treatment requirements, covering also removal of trace substances and thermal inactivation. More than 30,000 plants already installed worldwide have given us the necessary expertise for further continuous development of industrial water and wastewater technologies.

Thanks to our in-house Research and Development Department, we can always take advantage of the full potential of technology to consistently meet our customers’ requirements.

Since 1976 leading companies from all around the globe, representing a wide range of industrial sectors have been relying on our expertise.



Pharmaceutical and Life Sciences Industry

Few working environments are as demanding and challenging as that of the pharmaceutical and life sciences industry. The highest quality and performance are demanded at all levels, including for water and wastewater treatment technologies.

Traditional end-of-pipe solutions for dealing with effluents coming out of the production facilities are gradually being replaced by an increasingly decentralised approach of treating individual wastewater streams in the most effective and economically sound way. Moreover, additional goals like reducing overall effluent emissions by reusing treated wastewater in order to work towards zero-discharge strategies, or minimising waste generation and disposal costs, have gradually been incorporated into a more holistic water and wastewater management approach.

A whole array of modern and innovative technologies are currently available in order to be able to tackle the complexity presented by these effluents: active carbon filtration, biological degradation, membrane filtration technology (e.g. single or double step reverse osmosis, ultrafiltration in membrane biological reactors, etc.), oxidation technologies combining different available AOPs (Advanced Oxidation Processes) like ozonation, hydrogen peroxide with radiation from UV light, etc.

Regarding the high standards set by European Pharmacopoeia (Ph. Eur.) or United States Pharmacopoeia (USP) - pharmaceutical process water is one of the most important raw and cleaning materials in the pharmaceutical sector. With customized solutions for preparation, storing and distribution of Purified Water and Water for Injections (membrane based) all requirements are fulfilled to cover a complete water management as a plant solution for pharmaceuticals.

Sustainable plant solutions – environmentally friendly and economic

Solutions

Wastewater treatment with energy recovery

Reliable removal of traces substances

Water recycling

Taylor made solutions according to GMP

Energy recovery from wastewater and waste

Flexible modular plant solutions

Tasks

Minimising operating costs

Energy efficiency

Sustainable technologies

Plant optimisation of cost reduction

Process reliability



Biological wastewater treatment Biomar®OMB – Membrane biological reactors

In order to minimise their footprint wastewater treatment plants have gradually been incorporating state-of-the-art technologies such as membrane biological reactors (MBR) for the main COD (Chemical Oxygen Demand) reduction stage. In these reactors, ultrafiltration membrane modules are implemented as secondary clarifiers, making tertiary filtration stages superfluous.

The main advantages of MBR technology compared to conventional activated sludge technology:

- Overall smaller footprint (30% to 50%)
- Less aeration needed (due to high mixed liquor concentrations, approx. 10–15 g/l)
- Long sludge lifetime (10 to 50 days), hence low sludge production and growth of “specialist” bacteria
- Stable UF permeate quality effluent, which may be suitable for reuse



Pre-assembly of an EnviModul modular plant system with Biomar® OMB membrane biology

Modular Plant solutions EnviModul

Our modular plant systems for decentralised water conditioning, water recycling and wastewater treatment can be installed easily anywhere in the world.

Lower costs, greater flexibility and faster implementation: Compared with traditional, centralised plant solutions, modular plant solutions offer clear benefits. EnviroChemie has developed a stand-alone, modular

system in which water treatment technologies are integrated and can be combined to match customer requirements. The fully prefabricated, ready-to-go EnviModules only need to be connected on-site. An EnviModul component replaces operational buildings constructed from steel and concrete, is semi-mobile, adaptable to different climatic conditions, as well as durable and visually attractive.

**Biomar® anaerobic wastewater
treatment plant generates
biogas and recovers heat**





**Enviochem® chemical
physical wastewater
treatment plant
ready for FAT**

Detoxification and removal of organic and inorganic compounds **Enviochem® – Chemical-physical wastewater treatment**

Chemical-physical water and wastewater treatment ranks among the most efficient basic processes in water purification. EnviroChemie has been using tailor-made Enviochem® systems to produce high-quality solutions for chemical-physical wastewater treatment for more than 40 years.

Enviochem® plants remove inorganic and organic components and toxic substances from wastewater. The largely standardized plant technology ensures that the customer benefits from both consistently high quality and rapid project implementation.

Enviochem® AOP – *Advanced oxidation processes*

Advanced oxidation processes (AOP) refers to a set of chemical treatment procedures, where contaminants are oxidised by hydroxyl radicals coming from ozone and/or hydrogen peroxide. These procedures may also be combined with/catalyzed by UV irradiation and other specific catalysts.

The AOP procedure is particularly useful for cleaning biologically toxic or non-degradable materials such as active pharmaceutical ingredients, endocrine disrupting compounds, aromatics, volatile organic compounds etc. in wastewater.

The contaminant materials are to a large extent converted into stable inorganic compounds such as water, carbon dioxide and salts, i.e. they undergo mineralization.

One goal of wastewater purification using AOP procedures is to reduce chemical contaminants and toxicity to such an extent that the cleaned wastewater can be recycled, or at least discharged into conventional sewage treatment.



Inactivation of biologically active wastewater **SteriFix – Thermal inactivation plants**



SteriFix plants are designed to safely inactivate, sterilise and disinfect wastewater containing infectious or genetically altered materials via thermal sterilisation. Simultaneously, micro-organisms and bacteria are eliminated by this process, while viruses, plasmids and DNA fragments can also be deactivated. The SteriFix sterilisation process additionally delivers the optimal sterilisation output for the most efficient energy input.

SteriFix E continuous wastewater sterilisation for treating volumes of continuously inflowing wastewater from 100 l/h to 15 m³/h

Water recycling and reliable removal of traces of substances **Envopur® – Membrane technologies – reverse osmosis and ultrafiltration**

Efficient use of resources plays an important role nowadays when planning industrial processes. Intelligent water technology solutions help to save water and minimise operating costs. EnviroChemie plans, constructs and commissions plants which provide solutions for water recycling using conventional construction, or in the EnviModul modular plant concept.

Moreover, wastewater treatment plants comprising a final reverse osmosis stage provide us with a safe and reliable barrier against the undesired discharge of dangerous trace elements (e.g. active pharmaceutical ingredients, endocrine disruptors, etc.) into the environment.



Pharmaceutical Water solutions

Purified Water

Water for Injections (membrane based)

With our modular concept for constructing purified water plants (as well as membrane based WFI systems), capacity requirements of between 100 l/h and more than 25,000 l/h for pharmaceutical water can be met.

Each client has individual system and production requirements.

All our pharmaceutical water systems as well as the entire system lines comply with the guidelines of the PhEur*, USP** and JP*** as well as GMP and FDA, so they guarantee the correct production process, product quality and economic efficiency.

We are partners and technical advisors for all aspects of pharmaceutical water treatment: from consulting, planning and design, through the entire construction and production of the plant in our own production facilities, to the engineering of a storage and distribution system or, alternatively, integration into an existing system.

We offer all-in after-sales services including support during the PQ phase and a subsequent maintenance concept.

*PhEur: Pharmacopoea Europaea, **USP: The United States Pharmacopeia, ***JP: Japanese Pharmacopoeia



Meet your needs – Individual PW and WFI plants

Purified Water (PW) and WFI (Water for Injection) plants according to PhEur, USP or JP are delivered as pre-qualified compact plants, ready for connection.

The compact package unit construction technique on a stainless steel skid provides all the required processing technologies, which are adapted specifically to the prevailing quality of potable water.

The PW and WFI compact plants with a performance range of between 100 and 25,000 l/h are assembled with special components. This includes double softening (serial connection, quality-controlled), alternative conditioning according to the drinking water guidelines (TVO), reverse osmosis in single or double-stage construction, membrane degasification, electrodeionization CEDI and final membrane step.

On customer's request either hot water sanitization at > 80°C or chemical sanitization can be realized.



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Technology for Water

ENVIROCHEMIE

