



WASTEWATER TREATMENT SOLUTIONS FOR THE PHARMACEUTICAL & LIFE SCIENCES INDUSTRY

Technology for Water



ENVIROCHEMIE

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, we offer a complete range of services based on our long 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. Additionally, 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. 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.

SUSTAINABLE PLANT SOLUTIONS –

environmentally friendly and economic

TASKS

Minimising operating costs

Energy efficiency

Sustainable technologies

Plant optimisation of cost reduction

Zero discharge

SOLUTIONS

Wastewater treatment

Reliable removal of traces of substances

Water recycling

Wastewater detoxification

Energy recovery from wastewater and waste

Flexible modular plant solutions



BIOLOGICAL WASTEWATER TREATMENT

Biomar[®]OMB – Membrane biological reactors



EnviModul – modular plant system with Biomar[®] OMB membrane biology

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

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



DETOXIFICATION AND REMOVAL OF ORGANIC AND INORGANIC COMPOUNDS

Envochem® – Chemical-physical wastewater treatment



Envochem® chemical physical wastewater treatment plant ready for FAT

Chemical-physical water and wastewater treatment ranks among the most efficient basic processes in water purification. EnviroChemie has been using tailor-made Envochem® systems to produce high-quality solutions for chemical-physical wastewater treatment for more than 35 years.

Envochem® 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.

Envochem® 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.



**Advanced oxidation
UV-system built as
EnviModul plant for the
pharmaceutical industry**

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

TREATMENT OF RADIOACTIVE WASTEWATER

BioChroma – Decay of radioactive iodine



After undergoing radiotherapy, patients generate wastewater with a considerable quantity of radioactivity, which can reach levels of as much as 90% of the administered dose. Due to the risk of accumulation after discharge into the sewer, it is advisable to collect this effluent for treatment prior to final discharge.

Delay and decay (natural decomposition of the isotope) is the most commonly used technical method of abating iodine, but it is frequently criticised as being complex and very expensive. BioChroma was developed as an alternative to these complicated and expensive systems. The BioChroma technology combines an optimised biological treatment of the incoming radioactive effluent with a final adsorption and filtration stage.

Biochroma plant for the abatement of isotopes from a nuclear medicine department



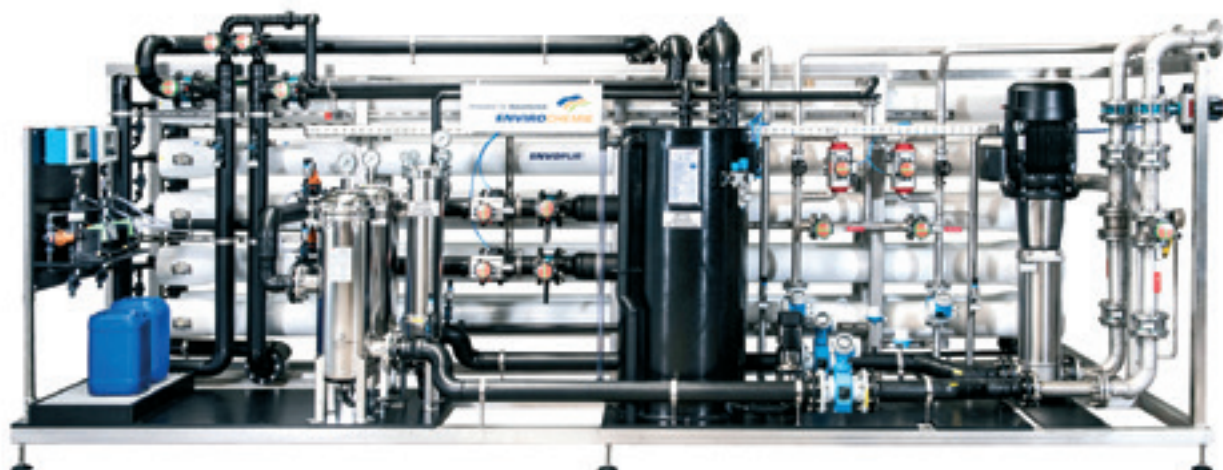
Envipur® ultrafiltration plant pre-assembled in a rack

WATER RECYCLING AND RELIABLE REMOVAL OF TRACES OF SUBSTANCES

Envipur® – 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.



Envipur® reverse osmosis plant pre-assembled in a rack a ready for shipment

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BLUECOMPETENCE

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