Mobile water treatment unit for the treatment of heavy metals

Dimensions

L-W-H:	6 x 3 x 3m
Weight:	6t

Equipment:

Fitration:	2x 100%
Main Filter:	Hybrid compound membran

Technicals datas

Pump performance:	30m^3/h
Max. inlet pressure:	2-5 bar
Max. outlet pressure:	10 bars
Max. water temperature:	40°C
Min. water temperature:	5°C

Short description Type GW-HM30

applicsign's mobile groundwater treatment unit provides dedicated pre-filtration in combination with the hybrid compound membrane for highly efficient filtration of heavy metals and all in an ISO standard container. The units are designed to produce water at flow rates of up to 30 m3 / h per hour in single-pass operation. For a seamless operation, even during maintenance work and filter changes, the processes are completely 2x 100% equipped. Our system is monitored by differential measurement systems with optical displays with saturation of the filter systems. This version can be rented or operated by us. For stationary long-term water treatment, our systems can be ordered according to customer-specific requirements.

If you would like a customized offer, please feel free to contact us.

Advantage of our ISO container module

- Modular design for combination of various processes according to purity requirements
- Simple construction "Plug and Play"
- No further pretreatment of the raw water is necessary except for mechanical filtration
- Suitable for high heavy metal contents
- Final conditioning
- 90 % - 99.7% deposition rate of heavy metals per step (1)
- Energy-efficient, cost-effective and environmentally compatible
- Cost planning / Forecast

Applications expandable to separate

- Nitrates
- Surfactans

Field of application for a special treatment

- ✓ Mines
- ✓ Coal plants / Heavy industry
- ✓ National institutions / Waste management companies
- ✓ Waste water with an heavy metal content

1) Average deposition rates depend on the influence TDS (total dissolved solids), ionic composition and maintenance.

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Hybrid membrane filtration in our modules

Hybrid compound membrane

Industrial development, energy production and mining have led to dramatically increased levels of environmental pollutants such as heavy metal ions, metal cyanides and nuclear waste. Current technologies for purifying contaminated waters are typically expensive and ion specific, and there is therefore a significant need for new approaches. One of the best option is the hybrid membranes made from protein amyloid fibrils and activated porous carbon developed by the research institute which is ideally suited for removing heavy metal ions and radioactive waste from water.
During filtration, the concentration of heavy metal ions drops by three to five orders of magnitude per passage and the process can be repeated numerous times. Notably, their efficiency remains unaltered when filtering several ions simultaneously. The performance of the membrane is enabled by the ability of the amyloids to selectively absorb heavy metal pollutants from solutions.

There are several methods to remove heavy metal ions from the wastewater, all have advantages and disadvantages, here is overview:

a. Chemical precipitation is the most widely used method, because of its efficiency, an ideal efficiency of up to 99% is achieved. However, this technique can produce a secondary fusion in the form of high amounts of sludge and toxic vapors. Moreover, it is expensive and is only suitable for the treatment of contaminated water with high concentration of heavy metals.

b. Ion exchange resins can also be used to remove heavy metal ions and other pollutants. However, this technique is expensive and only suitable for small sewage deposits, as well as only low effects (60-90%) can be achieved. Moreover, fully saturated ion exchange resins must be converted by chemical reactions, which can also lead to uncontrolled secondary impurities.

c. The flotation or electrochemical treatment of wastewater can be very efficient in the treatment of special heavy metal ions, but are in the form of resources demanding and thus only economical in large-scale processing and are therefore not suitable for decontamination in small quantities.

d. Membrane cleaning is an alternative technology that can work in continuous operation. It has several variants, among other micellar-assisted ultrafiltration, polymer-supported ultrafiltration, reverse osmosis and nanofiltration. All these variants work under ideal pH and concentration conditions with an efficiency of about 98%. However, these technologies are impractical due to saturation and deep pollution limits in their use at industrial relevant scales and suffer from high intrinsic costs.

All of the techniques mentioned above are particularly problematic in the case of high ion removal. In other words, although they can very well deal with a given heavy metal ion, they are very inefficient in the treatment of other metal impurities, which greatly limits their use. The removal of several ions is very inefficient.

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Hybrid membrane filtration in our modules

Advantages of the hybrid compound membrane

The hybrid composite membrane is cost-effective, environmentally friendly and is characterized by B-lactoglobulin amyloid fibers in combination with activated carbon. This new technology is a very suitable tool for the efficient removal of heavy metal ions from water. Likewise, the same technology is used in the removal of radioactive waste from contaminated water.

In summary, the research institute has developed an efficient hybrid membrane composed of amyloid fibers and activated carbon, which can be used for the purification of waste water with toxic heavy metal and atom waste environmental pollutants but also simultaneously in the ion removal mode. The membranes can be used for several cycles of waste water purification with minimal performance reduction. The technology is flexible, covers a wide pH range, is scalable and can be easily converted with protein precursors. Likewise, the membranes can also be used for removing bacteria from water via the size exclusion filtration, ie the range of application in the water purification can be extended.

By utilizing the high metal-binding properties of the amyloid fibers and the high porosity, the membrane composition can be customized to optimize your performance as a water purification membrane or a metal recycling membrane.

In order to provide you with an assembly solution adapted to your water values, please submit us your water values and environmental conditions using our application forms and send us your water samples.

Technical data

Ambient temperature:	0° bis 40 °C
Max. operating temperature:	5° bis 40 °C
Max. operating pressure:	10 bars
Max. differential pressure during filtration:	150 ka, 1.5 bar bei 20 °C (*)
Max. pressure during cleaning:	300 ka, 3.0 bar bei 20 °C (*)
	200 ka, 2.0 bar bei 40 °C (*)
Flow rate:	10 bis 3000 Liter / m^2 / min
Membrane pore sizes:	0.5 bis 10 µm

(*) The maximum permissible pressures must not be exceeded.

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Hybrid membrane filtration in our modules

ABSORBING RATE			
approx. 99.76%	Chrom	approx. 90.00%	Cadmium
approx. 99.97%	Lead	approx. 64.60%	Cooper
approx. 99.50%	Mercury	approx. 98.01%	Silver
approx. 98.60%	Arsenic	approx. 99.40%	Nickel
approx. 99.35%	Uranium	approx. 99.88%	Phosphor-32
approx. 99.97%	Potassum		

Regeneration / Backwashing

Depending on the absorbed pollutants / heavy metals, it is possible to regenerate the membrane filters. The membrane plates can be sterilized with hot water (85 ° C) or inline steam (125 ° C). Please observe the special instructions.

Disposal

The membranes must be treated as industrial waste during disposal. It must be noted that local and official regulations are observed, taking into account the filtered pollutants. Used membranes must be disposed of according to the type of contamination.

Assurance

No harmful effects are known if the product is used in accordance with its intended purpose and in accordance with the operating instructions. No safety data are required for the membranes. Storage, handling and transport are not dangerous for humans and the environment.

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