

SPECIFICATION / DATASHEET

Amyloid-carbon hybrid membranes

Our amyloid-carbon hybrid membranes, made from protein fibers and activated porous carbon, can be used to remove heavy metal ions and radioactive waste from water at unprecedented efficiencies. 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.

The toxic metal ion pollutants "stick" mainly to the protein fibers when the water is flowed through the hybrid membrane. These fibers have numerous amino acid binding sites on which individual metal ions can adsorb. The combination of proteins fibrils with activated carbon, further delays the saturation level of these membranes, allowing the capture of even larger quantities of heavy metals, which can then be converted into valuable elemental metal via chemical or thermal reduction.



Advantages and characteristics

- High retention of heavy metals
- Absorbs radioactive substances
- Fits in any already existing filter housing
- Suitable to process small and large volumes
- Universally applicable
- Scalable to any size
- Gravity filtration without energy requirements
- High recovery

E F F I C I E N C Y

approx. 99.28%	Chrome	approx. 90.00%	Cadmium
approx. 99.97%	Lead		
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

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Technical specification

Ambient temperature:	0° to 40 °C
Maximum operating temperature:	5° to 70 °C
Maximum operating pressure:	10 bar
Maximum differential pressure during filtration:	150 ka, 1.5 bar at 20 °C (*)
Maximum pressure during cleaning:	300 ka, 3.0 bar at 20 °C (*) 200 ka, 2.0 bar at 40 °C (*)
Flow rate:	10 to 3000 Liter / m ² / min
Membrane pore sizes:	0.5 to 10 µm

Regeneration / Backflushing

For some specific applications, it is possible to regenerate the filter. Please consult us directly for this purpose.

The sheets can be sterilized with hot water (85 °C) or inline steam (125 °C) prior to use.

Safety

The membranes are composed of biodegradable components of food-grade and thus are harmless when used to purify water in the broadest possible contexts. BluAct declines liability for usage non-conform to the scope of the hybrids.

Disposal

The membranes are to be treated as industrial waste when disposed. Depending on the filtered product, the local and official safety regulations must be observed. For organic contaminants, membranes can be disposed by incineration.

Storage

The membranes should be stored in the original packaging in a dry and odorless place, protected against UV radiation and sterilized by hot water (85 °C) or inline steam (125 °C) prior to use.

The membranes should be used within 18 months of the date of production.

Quality tested

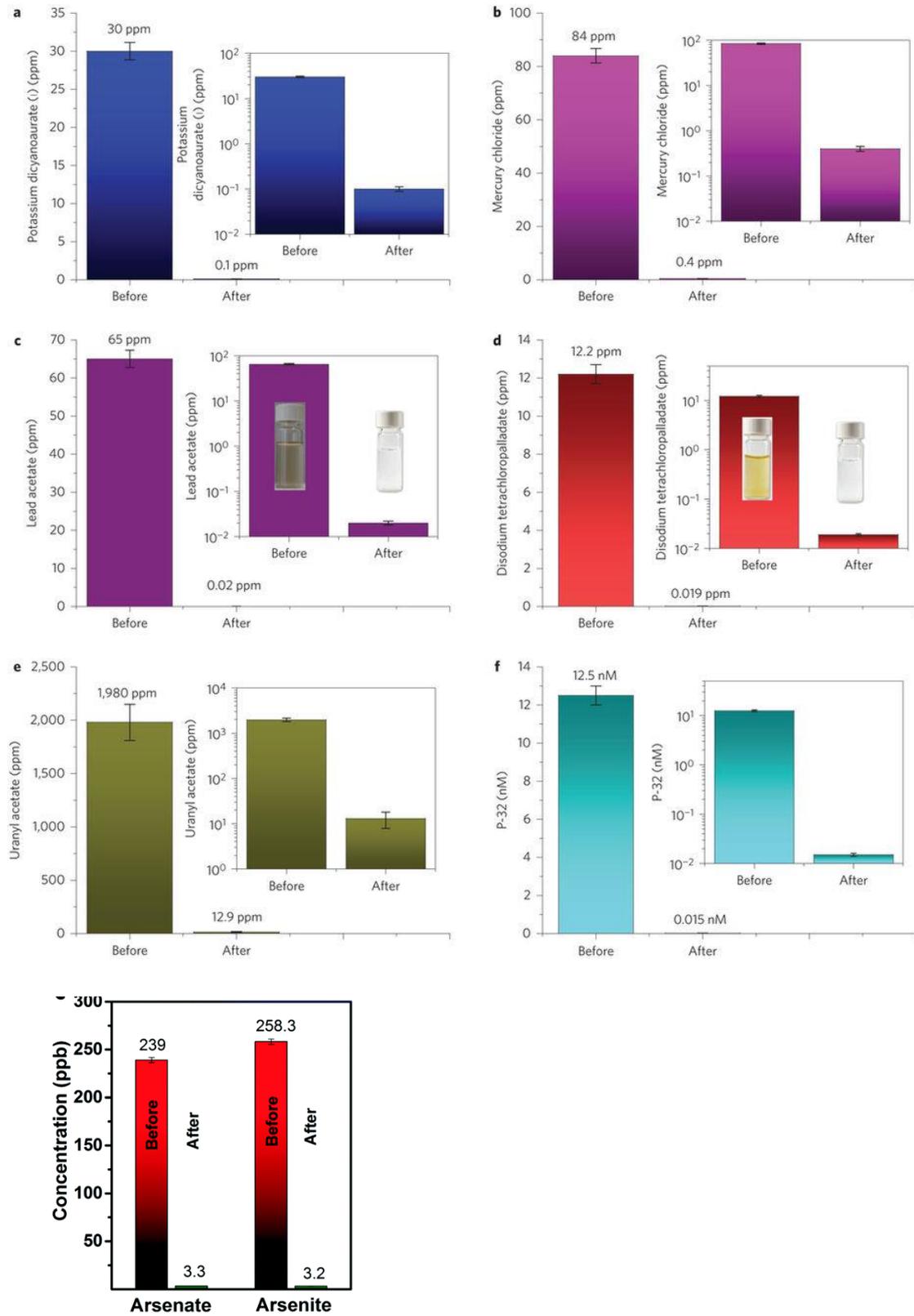
All membranes available for sales have passed BluAct quality assessment.

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

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Filtration examples



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References

Amyloid-carbon hybrid membranes for universal water purification

Sreenath Bolisetty and Raffaele Mezzenga

Nature nanotechnology, 11: 365-371, 2016. <https://doi.org/10.1038/nnano.2015.310>

Efficient purification of arsenic-contaminated water using amyloid-carbon hybrid membranes;

Sreenath Bolisetty, Noemi Reinhold, Christophe Zeder, Monica N. Orozco and Raffaele Mezzenga

Chemical Communications, 53 (42): 5714-5717, 2017. <https://doi.org/10.1039/c7cc00406k>