

PO4 Sponge for Soluble Phosphorus Removal



MetaMateria offers a unique product **for absorption of phosphorus (PO4 Sponge)** that uses nanotechnology to provide more absorption of phosphorus than other materials. Capacity to absorb P is overwhelmingly higher than other natural and manufactured products. Phosphorus can be removed and PO4 sponge reused multiple times. Phosphate ions can be recovered. Shapes can be made for many applications.

PO4 sponge removes soluble phosphorus at both high and low concentrations, so it can be effective for treating waste water or lower levels found in lakes, streams and agriculture water runoff. Phosphorus can be lowered below 0.1 mg/L (ppm), making it ideal for many applications..

PO4 sponge works at both higher concentrations of phosphorus found in waste water and in lower concentrations found in lakes, streams and water runoff. Testing shows phosphorus can be lowered to well below 0.1 mg/L (ppm). The product has a long life and continues to remove phosphorus from waste water for over 1 year.

Long Life

PO4 Sponge shows a long life for removing phosphorus. Testing conducted at Michigan State University using septic water show removal continues for over 600 days. With effluent below 1 mg/L for 400 days.

Low Concentration

PO4 Sponge was tested using water containing 1 - 0.1 mg/L phosphorus. Circulation of water through 2.5 Kg of PO4 Sponge lowered phosphorus to below 0.01 in 30 min (graph). Separately, a single pass through PO4 sponge plates with influent of 0.1 mg/L was maintained below 0.03 mg/L for 220 days at a contact time of 30 min.

Media Reuse

Once effluent exceeds a desired level, PO4 ions can be chemically removed and product reused. Capacity to absorb phosphorus is similar to starting material. This can be treated *in-situ* or another location. Product is expected to be reused over 15 times.

Capital and Operating Costs

These depend upon the application, but will be economically viable for most applications, where chemical treatment is too costly or too complex. The average cost for PO4 Sponge declines with reuse, since regeneration is an inexpensive operation.

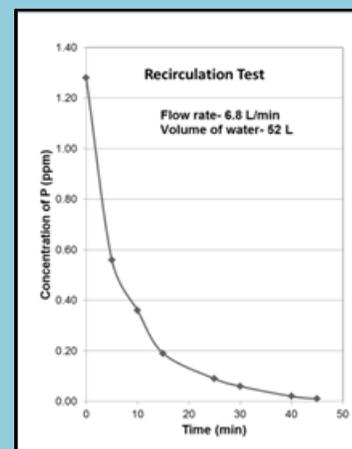
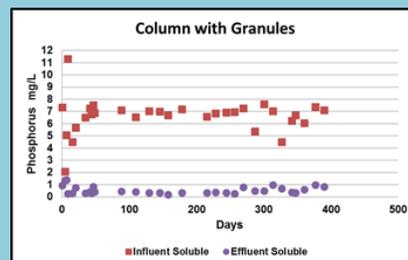
Unique Capabilities for PO4 Sponge Include:

- **Holds much more phosphorus** than other products
- **Effective at both high and low concentrations**
- **Can be reused multiple times** – a Kg of product can remove a Kg of Phosphorus
- **Long Life & Cost Effective** removal for most applications
- **Flexible Shapes & Sizes** for most applications
- **Water Passes thru Product** at low pressures
- **pH Remains Stable** for good process control



Absorption Comparison

Sorption Media	mg-P/Kg
PO4 Sponge - Meta	
High > 5mg/L	80,000
Low < 2 mg/L	25,000
Iron Ore (Hematite)	1,430
Iron Slag	420
Crushed Red Bricks	510
LECA (expanded clay)	800
Activated Fe Alumina	17,100
Filtra-D	2,500
Phostec	7,000



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