

CRYSTOLITE™

MICROFILTRATION MEDIA & SDI REMOVAL

INTRODUCTION

As a global leader in absorbents technology, iron, manganese and removal filtration. **Watch Water®** has developed a unique industrial water and waste water treatment filtration solution.

For microfiltration, Optimal **CRYSTOLITE™** Micro Filtration (CMF) could be achieved with very robust, long life, and simple backwash filter media. **CRYSTOLITE™** filtration media meets the needs of all industrial, municipal, residential and water reuse for any application. This unique, high-capacity media is designed to reduce the waste of expensive cartridges and plastic filter housings. This **CRYSTOLITE™** filtration media is an excellent alternative to all microfiltration membranes.

FEATURES



Filtration
down to 0.5 microns



High resistance to
chemicals and oxidants



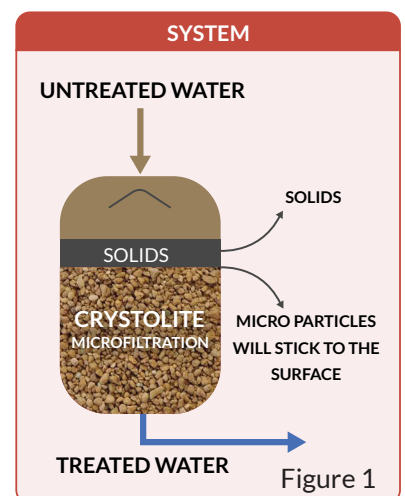
Long life time
10 to 15 years



Reduces Operating Cost
in Reverse Osmosis

TECHNOLOGY

Using **CRYSTOLITE™** media in a pressure vessel to provide a microfiltration effect, the **CRYSTOLITE™** media allows the water to flow through the top distributor on the top of media layer, when suspended solids are held on the highest surface area of the media allows only clean water to flow through the **CRYSTOLITE™** media. As a result, **CRYSTOLITE™** can be used to filter down 0.5 microns without clogging. It allows all suspended solids to accumulate on the surface of the **CRYSTOLITE™** media and are easily backwashed to drain. The system can be designed either manual backwash or by using automatic backwash cycle and the backwash cycle is maximum 10 minutes which uses 80% less water than any traditional anthracite or multimedia filters, it is because 90% of the solids are captured on surface and not inside of the **CRYSTOLITE™** media-bed. This results in the High-tech filtration that can filter solids and particles down to submicron levels at 10 to 15 times the flow rate of all traditional filters. Save on backwash water up to 80%.



NSF/ANSI/
CAN 61



PREMIUM QUALITY
MADE IN GERMANY

CRYSTOLITE

FILTERSORB

FILTRATION

ADSORPTION

INSTANT PRODUCTS

OXY TREATMENT

SYSTEMS



Feed Water

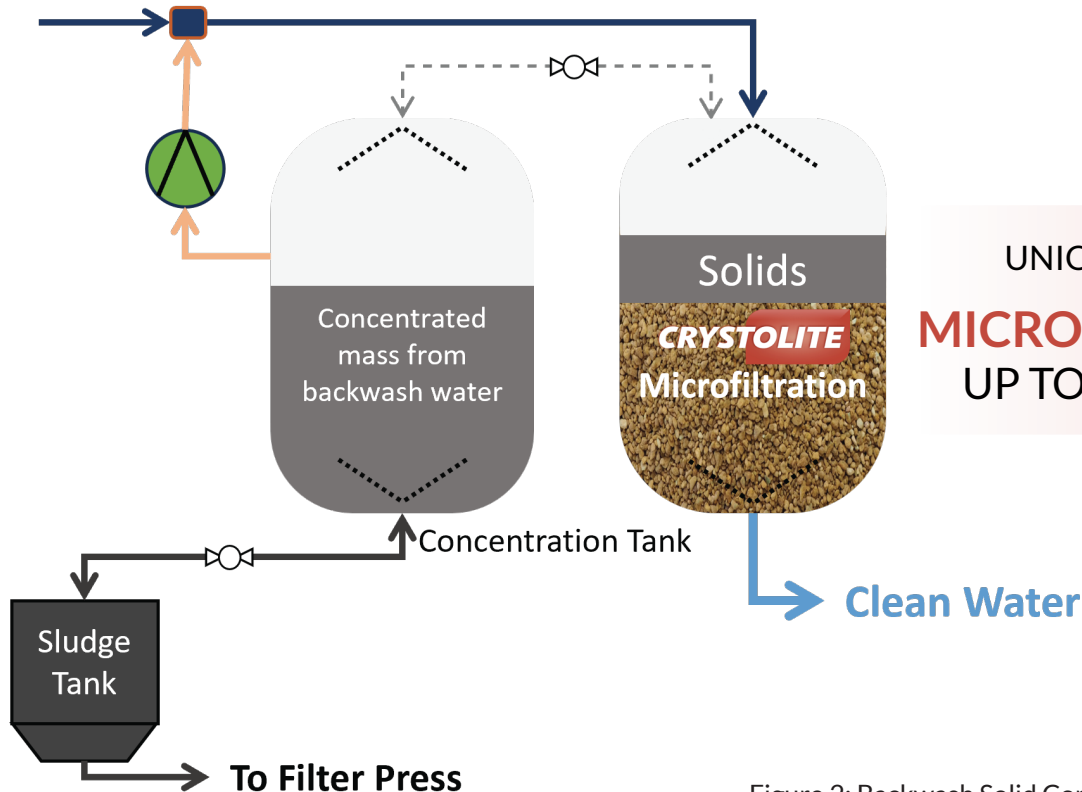


Figure 2: Backwash Solid Concentration (Flow Diagram)

Designing a CMF System

Solids and SDI removal system based on **CRYSTOLITE™** microfiltration media technology are very similar to sand, anthracite or multimedia filtration systems, where piping, valves and pressure vessels are mounted in the same way. But CMF systems are much more compact because of higher filtration rates. 20 to 25 bed volumes can be easily achieved using CMF media. Backwash water is collected in the concentration tank. Typically, 90% of feed water and 10% of backwash water passes through the CMF system (see Fig. 2). The concentrate is recycled up to 10 backwashes and is re-diluted with feed water. Solid concentration is kept at bottom of the concentration tank. Solid concentration is kept at 3-5% and with the excess solids it's sent to filter press for disposal. The number of **CRYSTOLITE™** systems requires is dependent on the total flow rate of the system needed and the pressure vessels are typically placed in parallel of up to 20 pressure vessels.

Benefits to Reduce SDI

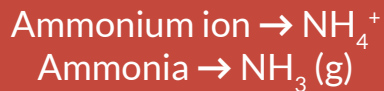
When **CRYSTOLITE™** is used to reduce SDI to a reverse osmosis or ultra filtration, operating a **CRYSTOLITE™** filtration system will immediately yield a significant process improvement, typically resulting in much longer ultra filtration or reverse osmosis membrane life, reduced cleaning cycles, chemicals costs, reduced antiscalant and less membrane blockage. **CRYSTOLITE™** media provides better filtration and cost effective alternative to changing filter cartridge on a weekly or daily basis. For solids removal up to 0.5 microns **CRYSTOLITE™** systems offer a compact alternative to extensive membrane systems which are requiring significant electrical and chemical costs.

CRYSTOLITE™ filtration media (CFM) that can handle any process streams with a high solids concentration.

CRYSTOLITE™ is a challenge to other sand or multimedia filtration based technologies.

INTRODUCTION

Ammonium ion removal from water and wastewater is dependable on parameters such as contact time, pH and initial ammonia created by **KATALOX LIGHT**® as described in a following description. pH has a notable effect in ammonium ion removal efficiency.



Ammonium $[\text{NH}_4^+]$ is a positive ion and is a conjugated acid of the weak base ammonia $[\text{NH}_3(\text{g})]$. When ammonia is dissolved in water (H_2O) it reacts with the water molecules to form ammonium according to the reaction:



As **KATALOX LIGHT**® has the unique ability to split water $\text{H}^+ + \text{OH}^-$ the pH changes into 9.5 where ammonium changes into ammonia (NH_3) gas and this occurs rapidly within the first EBCT of 4 to 5 minutes. The ammonium ion removal capacity of **CRYSTOLITE**™ increases with the increase of pH and ammonium ion concentration. The optimum pH for ammonia removal is at 8.5 - 9.0.

Regeneration/Desorption

Ammonium loaded **CRYSTOLITE**™ can be regenerated completely by high pH solution made by oxides at pH 10 to 11. 5% of **OXYDES** solution is sufficient for direct chemical cleaning and desorption/ regeneration. 100 grams of **OXYDES** is needed for 100 liters of **CRYSTOLITE**™.

Note: if Katalox-Light is not applied pH increase with NaOH is closed at the inlet of feed water. pH must be over 8.5 to achieve best results (see Fig. 4)

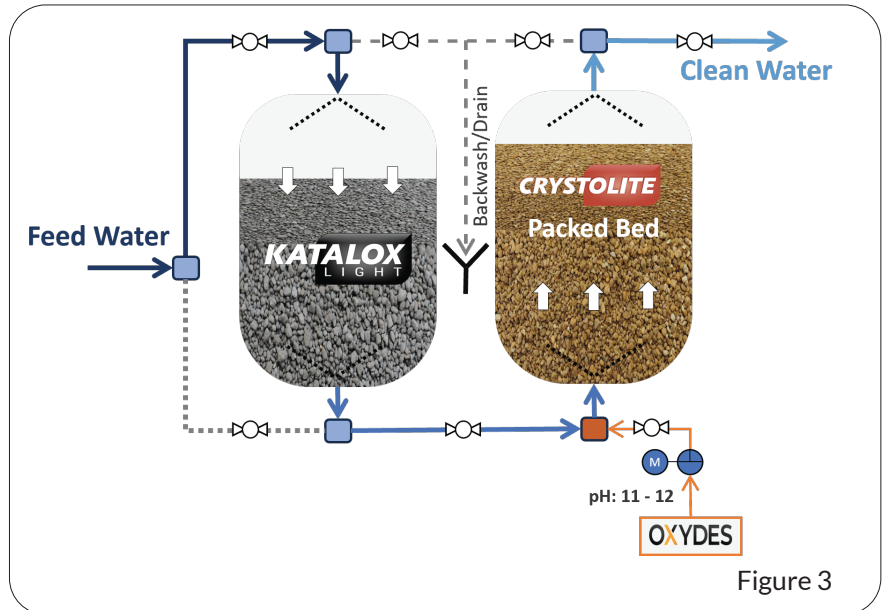


Figure 3

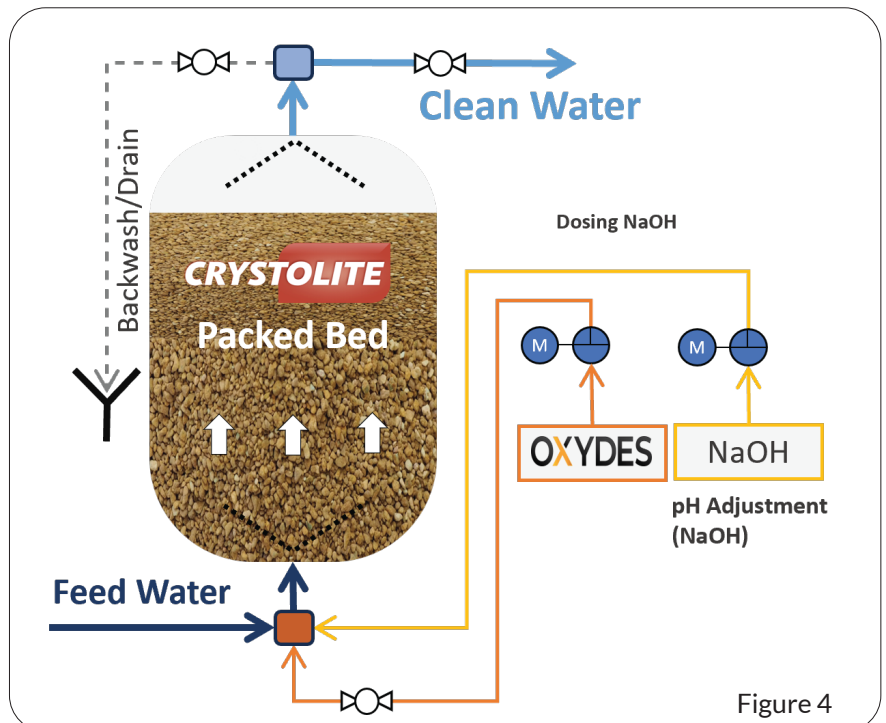


Figure 4

Note: When $\text{pH} < 7$, more than 95% of the ammonium existed in ionized form (NH_4^+) when the pH approaches 9, only about 5% ammonium is left in ionized form. Fig. 4 depicts that ammonium adsorption onto **CRYSTOLITE**™ Microfiltration Media is a pH Dependent process.

The total capacity is 250 mg NH_4 per liter of media at pH 8.5 - 9.5. Compared to Zeolites, the **CRYSTOLITE**™ exhibits 100% higher in adsorption capacity and fast adsorption rate.

FILTERSORB

FILTRATION

ADSORPTION

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OXY TREATMENT

SYSTEMS

TECHNICAL DATA

Appearance	Reddish crystalline granule	
Grain size	US	14 x 30
	SI	0.6 – 1.4 mm
Bulk density	US	65.5 lb/ft ³
	SI	1050 kg/m ³
Flow direction	Down-flow or Up-flow	
Inlet water pH	3 - 12	
Freeboard (downflow)	25 - 35%	
Min. Bed Depth	US	29.5 inches
	SI	75 cm
Optimal Bed. Depth	US	47 inches
	SI	120 cm
Service flow	US	6 - 12 gpm/ ft ²
	SI	15 - 30 m/h
Backwash velocity*	US	8 - 10 gpm/ ft ²
	SI	20 - 25 m/h
Backwash time*	5 - 10 minutes	
Rinse time*	1 - 2 minutes	

* Note : Stated parameters could be more or less in some cases depending on inlet parameters.

EFFECT OF pH & CONTACT TIME

The removal and adsorption of heavy metals from water, a global concern, have traditionally relied on expensive technologies like ion exchange, reverse osmosis, and activated carbon, with high costs of regeneration, concentration limitations, and complex activation processes. Heavy metals pollution occurs in many industrial wastewater such as that produced by metal facilities, mining industries, battery manufacturing processes and during production of paints and pigments. These wastewaters are acidic and contain toxic heavy metals like Cd, Pb, Cu, Zn, Ni and Cr. **CRYSTOLITE™** Microfiltration Media is designed to prevent these heavy metals in our food chains. The chemical composition of **CRYSTOLITE™** is $Al_2O_3 \cdot FeO_3 \cdot CaO \cdot SiO_2$ and it offers a cost-effective solution with a high surface area (600-620 m²/g). It has the ability to raise pH without chemicals, making it efficient in removing Cu_{2+} and Zn_{2+} ions. With a rapid uptake rate, **CRYSTOLITE™** can remove 98% of copper and 95% of zinc from water with a metal concentration of 15 mg/l. System design as on Fig. 4.

CRYSTOLITE® is an excellent preparation for:



Cooling Towers



Boilers



Power stations



Reverse Osmosis

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Standard Packaging

Packaging	Weight of product	Quantity/ pallet	Gross Wt./ pallet	Certification
Bag (28 L)	30 kg	40	1225 kg	NSF/ANSI/ CAN 61
Bulk Bag (1000L)	1060 kg	1	1085 kg	

★ Other packaging can be considered on request

