

# PURON® MBR Effectively Removes Phosphorous



### Customer Benefits

- Compliance with regulatory requirements
- Improved effluent quality and reduced environmental impact
- Ability to increase process capacity while minimizing plant footprint
- Cost effective

### Overview

Controlling phosphorous discharge is a key factor in preserving surface water quality. Today, new legislation and regulations strictly limit phosphorous discharge into sensitive waters. Typically, conventional phosphorus removal processes using biological and tertiary treatment steps are capable of providing effluent total phosphorous in the range of 0.5 to 1 mg/L, levels which exceed many regulatory requirements.

Municipal wastewater treatment plants are now looking to membrane bioreactor (MBR) technology as a solution for phosphorous removal. MBR technology is already being adapted at a rapid pace due to two main advantages compared to conventional biological wastewater treatment—significantly improved effluent quality and a substantially smaller footprint.

### The Challenge

To provide a physical barrier that captures nearly all of the suspended solids. Conventional gravity clarification and filtration separation methods fail to remove all biological and chemical solids, thus allowing phosphorus to pass into treated water.

### The Solution

Koch Membrane Systems' (KMS) PURON® single header, submerged hollow fiber ultrafiltration MBR modules are ideal for phosphorous removal. Membrane filtration is used as the liquid solids separation method in an MBR system to capture solids and results in a very low level of phosphorous in the treated water.

When coupled with membranes, biological and chemical phosphorous removal methods can be employed to meet total phosphorous effluent limits of less than 0.1 mg/L. Phosphorus precipitation combined with the positive barrier provided by the membrane significantly reduces the amount of phosphorus and suspended solids in the plant effluent.

### Study Demonstrates Lower Phosphorus Levels with MBR

A study conducted by a leading worldwide provider of consulting, engineering and construction services to the water and wastewater markets examined the nitrogen and phosphorus removal capabilities of PURON MBR technology for the wastewater treatment plant, from January to June 2007.

The study employed a biological phosphorous removal process that used anaerobic, anoxic, and aerobic zones prior to the solids separation step performed by the membrane module.

The system demonstrated nutrient removal capability that meets or exceeds regulatory limits. The system reduced total phosphorus from 8 mg/L to 0.04 mg/L, with the addition of acetic acid to the anaerobic zone. The supplemental acetate was required to boost the BOD/P ratio to the optimal performance conditions of between 10 and 25 BOD/P.

Also critical was the reduction of the solids retention time (SRT), which is commonly referred to as sludge age. Keeping an eye on the SRT is important in managing phosphorus removal, because as the SRT increases, the microbes age and perish, releasing the contents of their cell mass (including some phosphorus) into solution.

The study demonstrates that lower effluent phosphorus levels can be achieved with an MBR system when

compared to the conventional biological removal process. The phosphorous removal capability of the MBR technology creates an additional compelling rationale for municipal wastewater treatment plants to consider submerged membrane bioreactor technology, on top of other key benefits such as improved COD and BOD reduction and greater treatment capacity within a small footprint.

Submerged MBR technology will play an increasingly important role in phosphorous removal as municipal treatment plants address increasingly stringent discharge limits.

**Overview of Products**

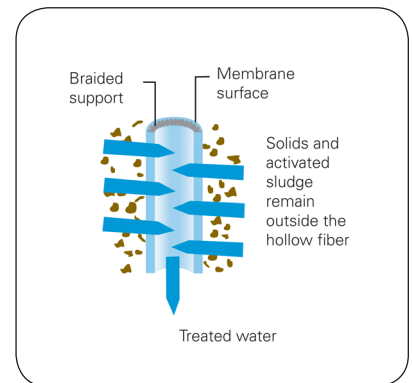
KMS' PURON® MBR modules are well suited for municipal wastewater treatment and reuse. PURON modules are designed to provide significantly lower lifecycle costs, including a single header design that provides better solids management in the module, braided fibers to reduce the risk of fiber breakage, and highly effective air scouring that virtually eliminates sludging.



PURON® MBR Module

**The PURON Module**

Fibers are sealed at the top. Filtrate is drawn through the membranes and flows down the inside of the fibers to the bottom header and is removed from the tank. Air bubbles rise from the center of the fiber bundle and scour the membrane surface to keep it free from a buildup of debris. The module design avoids the clogging and sludging that can be an issue with other MBR module designs.



MBR Performance			
	Influent	Effluent	Units
Flow	1.5	1.5	Gpm
COD	469	23	mg/L
BOD <sub>5</sub>	153	0.6	mg/L
TSS	NM	< 1	mg/L
NH <sup>3</sup> -N	39	0.03	mg/L
<sup>1</sup> NO <sub>3</sub> -N	ND	2.5	mg/L
<sup>2</sup> Total Phosphorus	8	0.04	mg/L
Turbidity	NM	<0.1	NTU

<sup>1</sup>Effluent results with the addition of acetic acid to anoxic zone.  
<sup>2</sup>Effluent results with the addition of acetic acid to anaerobic zone.  
 NM = Not Measured  
 ND = Non Detect

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