

TECHNOLOGY SHEET

MULTI-POLLUTANT HIGH-RATE BIOMEDIA (MPHR Biomeida)

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The use of submerged media in activated sludge treatment of wastewater has been in practice for well over 60 years. The use of submerged media gave a stable process that responded well to influent fluctuations, and achieved treatment in a small footprint. The primary goal of the treatment process then and now is reduction of Biological Oxygen Demand (BOD) in the wastewater, before the wastewater is discharged into the environment, such as the ground, creek, river or ocean. In the 1980s and 1990s, integration of this media began with conventional activated sludge plants, resulting in the development of Integrated Fixed Film Activated Sludge (IFAS) plants. The main benefits of using media in an activated sludge plants or IFAS systems were:

- Higher effective biomass within the system, which allowed biomass concentrations to be well above the 2,500 mg/L limit for conventional activated sludge plants, thereby increasing treatment rates of BOD;
- Enhanced nitrification, especially during cold weather conditions, due to excess biomass present and presence of anoxic conditions within the interior of the biofilms;
- Resistant to organic and hydraulic shock loads, since the biomass was immobilized on the submerged media, it could not easily washout of the system, when the hydraulic load increased, and biofilms were less susceptible to influent BOD shocks;
- Improved process stability due to increase in bacterial population and stability of biofilms on the media;
- Improved Sludge Volume Index (SVI), which results in a more concentrated sludge in the clarifier, thereby improving the process operation;
- Reduced sludge production due to higher sludge retention times (SRT), due to the immobilization of biomass on the media, which did not leave the system; this significantly reduced the sludge handling, drying and landfilling that most plants had to use for sludge disposal;

There are two kinds of submerged medias:

1. Suspended media – Sponge, extruded
2. Fixed media – web/rope, caged

Fixed media need to be installed, while suspended media are simply added to the activated sludge basin, and a screen is added to prevent the media from leaving with the treated water.

Major disadvantages with fixed media, which are also advantages of suspended media are:

- Fixed media need to be installed, which increases cost;
- Fixed media gets clogged, due to biomass growth
- Liquid by-passing occurs around fixed media
- Fixed media cannot be easily cleaned, without draining the basin

PRD Tech, Inc. in conjunction with Global Mold, Inc. has developed a **Multi-Pollutant, High Rate Biomeida (MPHR Biomeida)**, which is a novel suspended media for improving the performance of currently operating activated sludge wastewater treatment plants (WWTP). It offers all the benefits of IFAS systems, without any of the disadvantages of fixed media. Its unique design consists of the following:

A plastic, high impact resistant, high surface area plastic extruded media, which surrounds a high surface area open-cell foam. This media has bacterial population adhering to the plastic surface, which is very open to prevent clogging, with an anoxic, de-nitrifying zone within the open cell foam piece. The media characteristics are as follows:

Dimension:	7.5 x 7.5 in
Void fraction	96%
Density (polypropylene)	1.8 lb/ft ³
Number of pieces	22/ft ³
Geometric surface area	
Plastic cage	30 ft ² /ft ³
Foam	275 ft ² /ft ³

The performance characteristics of this media in an operating activated sludge system are as follows:

Plant Loading (kg BOD/m ³ .day)	0.96
Media Volume (%)	20
BOD ₅ Influent: 200 mg/L	Effluent: 2 mg/L
COD Influent: 320 mg/L	Effluent: 18 mg/L
TKN Influent: 37 mg/L	Effluent: 3 mg/L
Total P Influent: 8 mg/L	Effluent: < 1 mg/L
Specific Removal Rate (kg NH ₃ -N/1000 m ² .day)	0.92

The MPHR Biomeida is capable of BOD, COD, TKN and Phosphorus removal simultaneously from the wastewater. It is fairly large and easy to contain within the activated sludge basin.

The only competitive suspended media in the market is the Linpor Media, which is open cell 2 cm size foam cube. This media suffers from solid buildup, and abrasion loss of about 5% per year. The other types of suspended media are plastic extruded shapes, which only remove BOD and offer very low TKN and phosphorus removals. The MPHR Biomeida offers the advantages of both these types of media, but with added benefits of larger size and flotation characteristics.

For a technical and cost quotation, please contact Dr. Rakesh Govind, PRD Tech, Inc., Tel: (513) 673 3583.