# Research on Membrane Bioreactor with Ceramic Flat Membranes

| Year of research | 2010～2011 | Establishment of sound water environment |
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**(1) Purpose**

Membrane bioreactor (MBR) is a method of waste water treatment of combining the membrane filtration with the biological treatment by the activated sludge procedure, and the partition stage of sludge and effluent is done by the membrane filtration in place of the precipitation-separation with final sedimentation tank.

The main feature of MBR is as follows.

(1) It needs more little space than a past activated sludge procedure does, because of the omission of final sedimentation tank and the driving at high MLSS.
(2) It is easy to manage the activated sludge, because the worry of the SS outflow is lost.
(3) The processed water is reusable, because of the removal of E. coli bacteria and SS.

On the other hand, MBR needs stopped up (fouling) measures of the membranes fundamentally. The running cost to maintain such as the flow velocity securing and the aeration washing on the membrane surface is more expensive than a past activated sludge procedure. For the solution, the feature of the ceramic flat membrane is paid attention in this study. The solidity and physical, chemical durability enable it to be used and washed with high flux.

In this study, the MBR plant is set up in the sewage plant and the experiment in various service conditions is conducted. It aims at the development of the energy conservation type MBR that applies ceramic flat membranes to obtain good quality effluent with stability.

**(2) Experimental plant**

Figure 1 shows the flow chart of the MBR experimental plant that uses ceramic flat membranes.

Real sewage is processed by the activated sludge procedure in the plant. The experimental plant has the reaction vessel (two tank total 7.5m$^3$) that divides into an anoxic tank and an oxic tank, and the filtration units (module filtration area 32.5m$^2$) are sunk in the oxic tank.

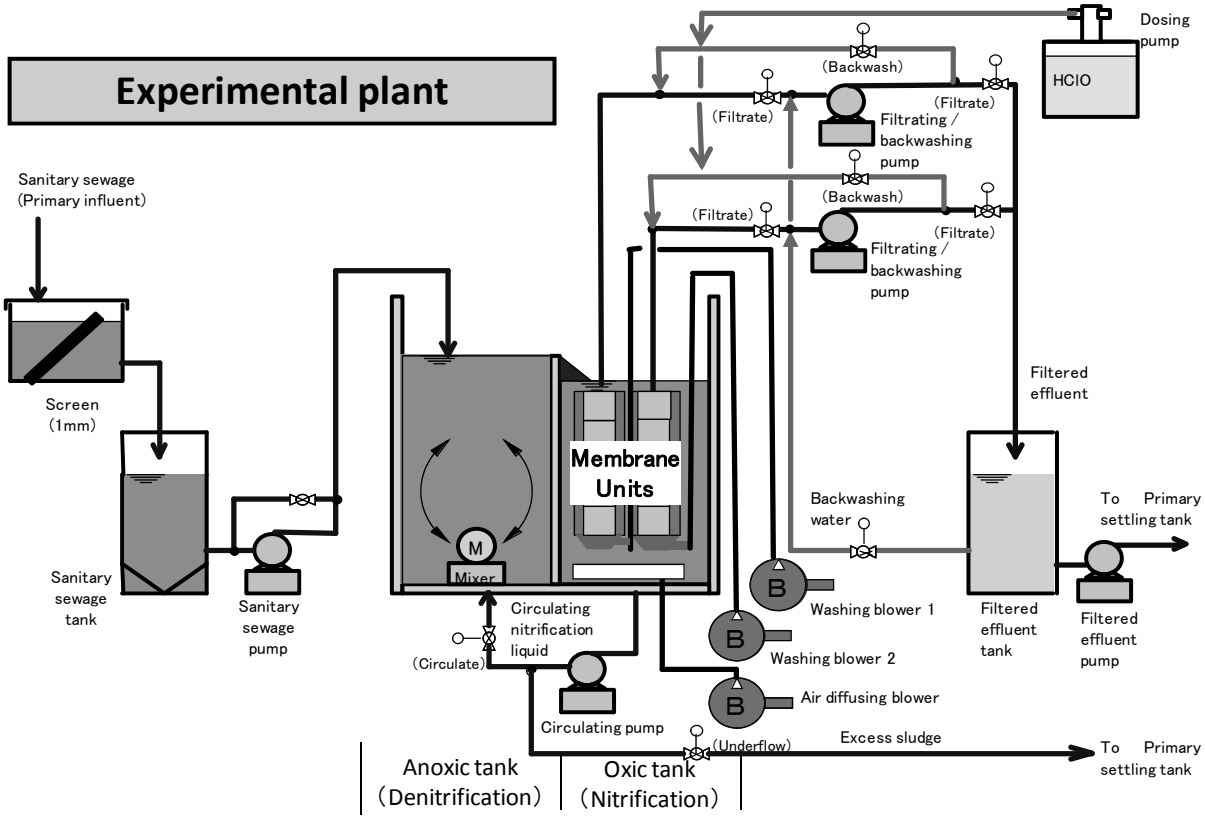


Figure 1: The flow chart of the MBR experimental plant that uses ceramic flat membranes.

**(3) Results of examination in FY 2010 and Schedule in FY 2011**

In the examination in fiscal year 2010, the related preliminary examination was executed to the proof examination, and the basic driving condition (flux and backwash period, continuance time, flowing quantity, flowing quantity of the air which washes the filter elements, control specification of the supplementary aeration amount, management value of filtration differential pressure, oxic tank MLSS, and circulation flowing quantity of nitrified sewage, etc.) in the proof examination was set based on the result.

The research chiefly about the following items is advanced in fiscal year 2011.

1) Verification of driving condition for efficient filter processing

By evaluating the filtration differential pressure rise controlling effect economically, caused by the change from the basic condition about the backwash period, the continuance time, and the flowing quantity of the air which washes the filter elements, the best driving condition for the maintenance fee control is led.

2) Making of technical manual

The technological explanation and the design method explanation of the membrane bioreactor that uses ceramic flat membranes, and the case study of the plant for various scale are arranged.

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| Key words | ceramic flat membrane, membrane bioreactor, MBR |
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