

Refinery, Sweden

The Client

The refinery is located on the west coast of Sweden. The wastewater had previously been treated using a trickling filter, with the purpose of reducing both COD and ammonia. The trickling filter reduced the COD concentration relatively well but the ammonia was not nitrified, likely because of a higher COD load. The challenge was to introduce a treatment system with the aim of reducing the COD concentration prior to the trickling filter, allowing nitrification to take place in the trickling filter. The nitrate is later denitrified in a reed bed.

The Client's Needs

The client needed to introduce a treatment system for COD removal upstream of an existing trickling filter, allowing nitrification to take place in the trickling filter.

The Solution & Design

An AnoxKaldnes™ MBBR was introduced upstream of the trickling filter with the aim of reducing the COD concentration.

The AnoxKaldnes™ MBBR reactor has a water volume of 95 m³ and a fill rate of 40% with K3 biofilm media. The AnoxKaldnes™ MBBR is designed to allow an increase of the fill rate up to 50%, making it possible to further increase the capacity of the process if necessary. The design characteristics for the AnoxKaldnes™ MBBR are presented in Table 1.



Table 1: Design characteristics for the AnoxKaldnes™ MBBR.

design flow (DF)	4190 m ³ /d
average flow (AF)	2830 m ³ /d
SCOD concentration	90 mg/L
SCOD load at DF	4 kg COD/m ³ .d
SCOD load at AF	2.7 kg COD/m ³ .d
HRT at DF	33 min
HRT at AF	48 min

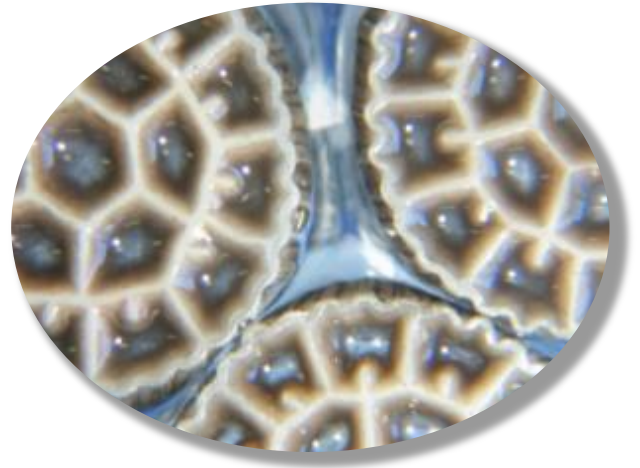
Key figures

- > Capacity: 4190 m³/day
1.1 MGD
- > Start-up year: 2011
- > COD Load: 4 kg COD/m³.d

The Results

The AnoxKaldnes™ MBBR was installed and has been operating since July 2011. Samples have been collected and analyzed in the AnoxKaldnes research facility to evaluate the capacity of the AnoxKaldnes™ MBBR after installation.

The expected reduction over the AnoxKaldnes™ MBBR was set to 50% according to the design characteristics, but the mean reduction measured as much as 60% during the first year after installation.



Regarding the nitrification it is clear that the ammonia concentration decreases over both the AnoxKaldnes™ MBBR and the trickling filter. The nitrate and nitrite on the other hand, is below measurable values (0.23 mg/L and 0.03 mg/L respectively) in the inflow and after the AnoxKaldnes™ MBBR, but increases after the trickling filter. This indicates that nitrification has taken place in the trickling filter, just as expected. The ammonia decrease in the AnoxKaldnes™ MBBR is most likely due to assimilation.