

APPLICATION OF THE UASB- REACTOR FOR ANAEROBIC TREATMENT OF BREWERY EFFLUENT

P. J. F. M. Hack

Paques B.V., P.O. Box 52, 8560 AB Balk, The Netherlands

INTRODUCTION

In 1979 the Bavaria Brewery (Holland) build an aerobic wastewater treatment plant (low loaded : 6000 kg COD/day).

Despite the occasionally poor settling characteristics of the sludge, the plant functioned satisfactorily.

Due to the increase of the wastewater flow from the time of construction, it became obvious that the treatment plant had to be extended.

There were two possibilities to consider:

1. Building a second aerobic plant (parallel).
2. Building an anaerobic pre-treatment plant (UASB-reactor).

The advantages of an anaerobic pre-treatment versus an aerobic treatment are well known and will not be discussed in this paper.

PILOT-PLANT

In January 1984 Paques B.V. started up a pilot-plant (acidification tank = $1\frac{1}{2}$ m³, UASB-reactor = $2\frac{1}{2}$ m³) at the site of the treatment plant.

The influent of the pilot-plant was from the main wastewater flow of the brewery.

The UASB-reactor was inoculated with granular sludge so that the COD-load could be raised very quickly.

RESULTS

The concentration of the pollution was weak (av. 1230 mg COD/l) and the temperature was low (av. 22°C), the COD reduction was reasonable (av. 80% COD removal).

Because the wastewater has a very low COD concentration and because the COD is very readily biodegradable, the COD conversion rate is not the limiting factor.

For this reason COD shock-loadings can be handled without any trouble. In this

case the hydraulic load (hydraulic retention time) is the limiting factor. At shorter retention times sludge wash-out will occur because of sludge-bed expansion. During the experiments the sludge settleability improved and sludge wash-out became negligible.

Because of the very good results of the pilot-plant, and the general advantages of the UASB-system (i.e. little space required), the Bavaria Brewery decided to build an anaerobic pre-treatment plant.

CONCLUSIONS

- Anaerobic treatment of brewery effluent with a UASB-reactor is a very good possibility, despite the low temperature and COD concentration.
- Anaerobic pre-treatment is a very promising solution for extending an overloaded aerobic treatment plant.

DESIGN CHARACTERISTICS OF THE FULL-SCALE PLANT

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| Buffer-tank (existing) | Volume = 3000 m ³ |
| Acidification tank | Volume = 1500 m ³ Hydraulic retention time \geq 6 hours pH control with HCL and NaOH |
| UASB-Reactor | Volume = 1400 m ³ Hydraulic retention time \geq 5,6 hours Temperature 20 - 25 °C Load 5 - 15 kg COD/m ³ .day |
| Aeration tank (existing) | Low loadedd carousel 10.400 m ³ |