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## SUMMARY

In recent time, there have been many approaches to eliminate hydrogen sulphide from the biogas that are based on physical and chemical processes. These technologies are relatively expensive and associated with the need for replacement or regeneration of adsorption substance, washing liquid, large consumption of chemicals, etc. The interesting branch is the approach based on the application of biological agent (SOB).

This project aims to supplement the offer of additional equipment in the biogas station by the biological system through which it will be possible to reduce the hydrogen sulphide with conversion into sulfur or sulphates.

Two-stage system consisting of scrubber and bioreactor was suggested. Polyether foam Filtren (Eurofoam TP) with defined pore size and polyethylene carrier 2H-BCN 030 (GEA 2H Water Technologies) were selected as carriers for commercially available desulphurization equipment. Water from treatment plant was used as a washing liquid in scrubber. Sufficient amount of microelements was provided by adding liquid share of digestate from biogas station (10 % v/v).

The following bioreactor sizes are designed for biogas station with an average daily production of biogas 2,000 m<sup>3</sup>/day with an average concentration of 2500 ppm hydrogen sulphide. From the experiment result, the removal rate of sulphides and the facility capacity for biomass concentration 1 g·l<sup>-1</sup> were calculated; the removal rate 1,080 g·m<sup>-3</sup>·day<sup>-1</sup> (1,344 sulphides g·m<sup>-3</sup>·day<sup>-1</sup>) and facility with a capacity of 5.94 m<sup>3</sup> (4.77 m<sup>3</sup>) for the suspension system, resp. biofilm system.

## METHODS

Iodometric determination of sulphides

Sulphate and thiosulphate determination (ITP-CZE)

## RESULTS

### Choice of biofilm carriers

The appropriate carriers should fulfil these attributes:

- easy local availability (Czech republic)
- reproducible shape and quality, with the same mechanical and physical-chemical properties
- large surface of carrier

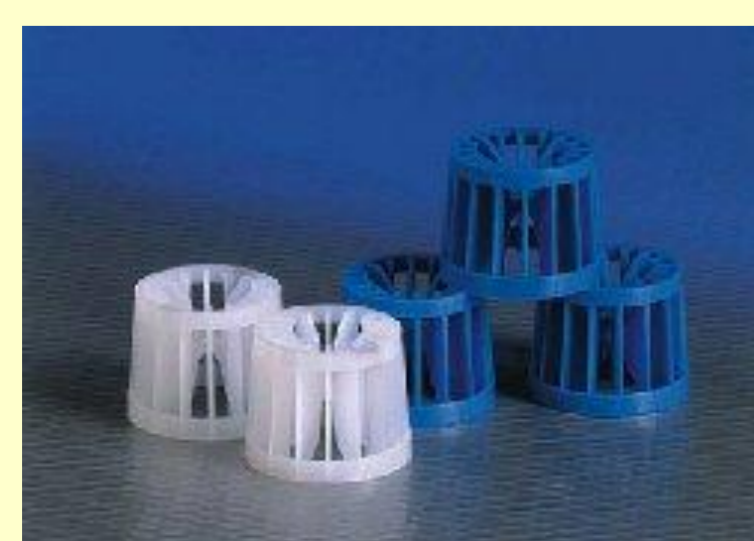
Only two carriers met these requirements:

**2H-BCN 030** (GEA 2H Water Technologies s.r.o., CZ)

- made of high-density polyethylene
- resistant against acids, hydroxides, other chemicals, UV radiation...
- easy colonized surface

**Filtren TM 30** (Eurofoam TP spol. s r.o., CZ)

- made of polyether
- defined pore size
- large surface of carrier

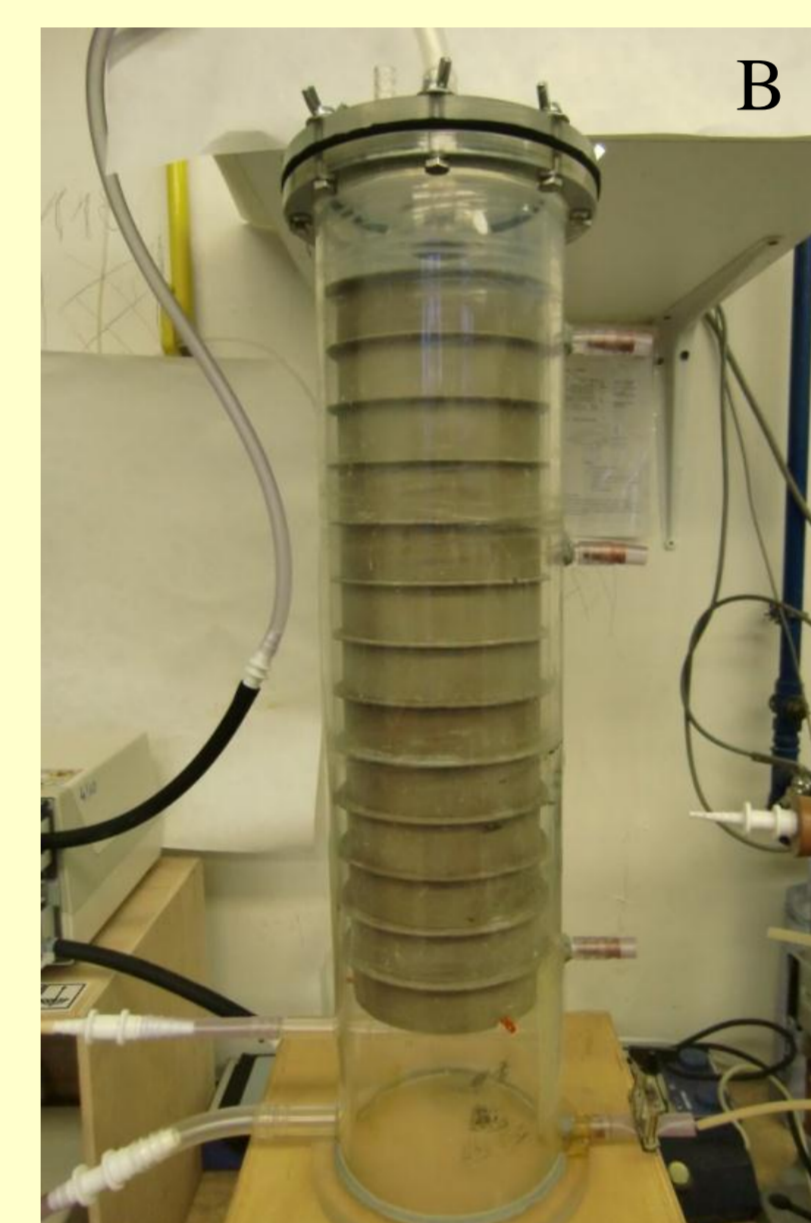
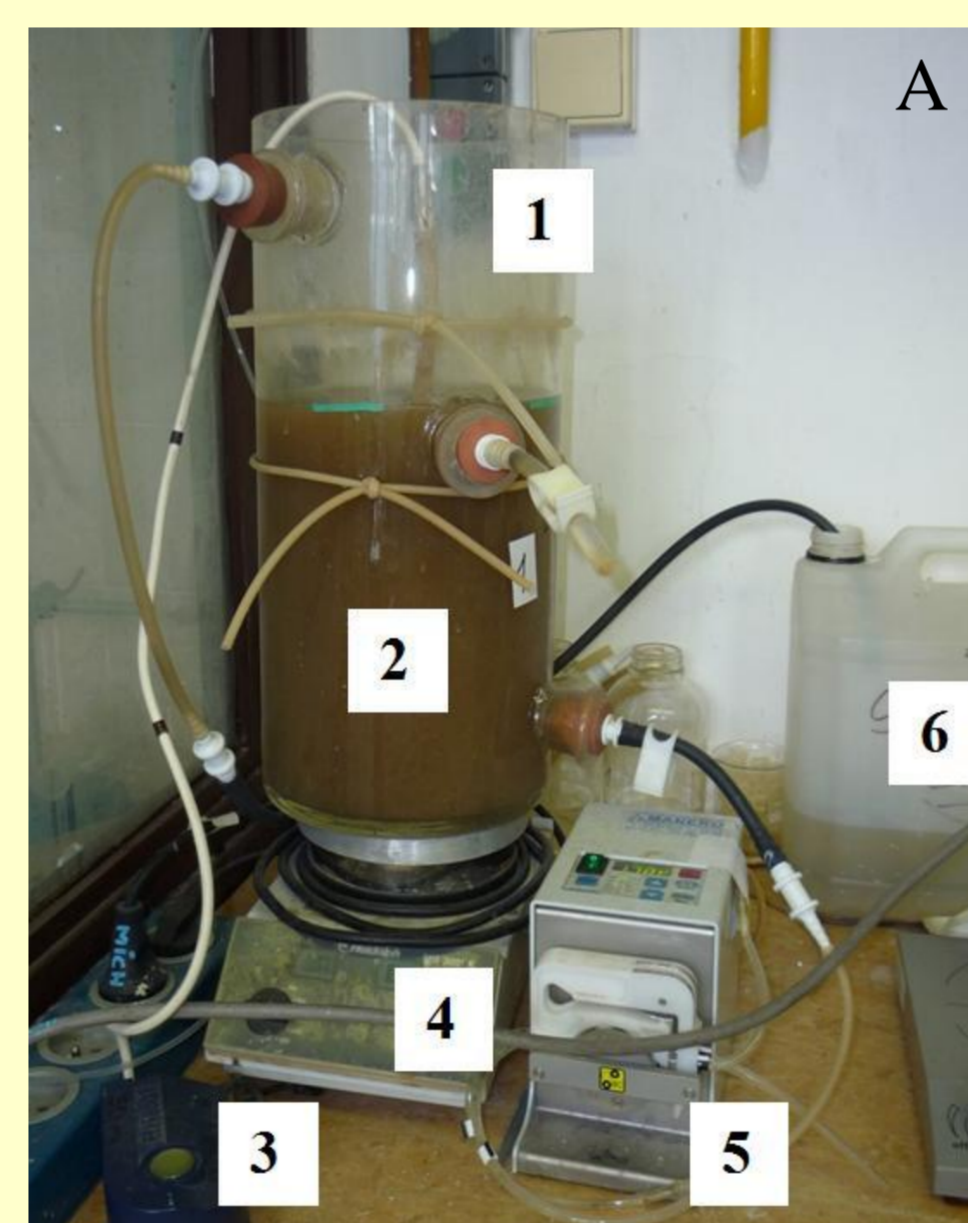


2H-BCN 030



Filtren TM 30

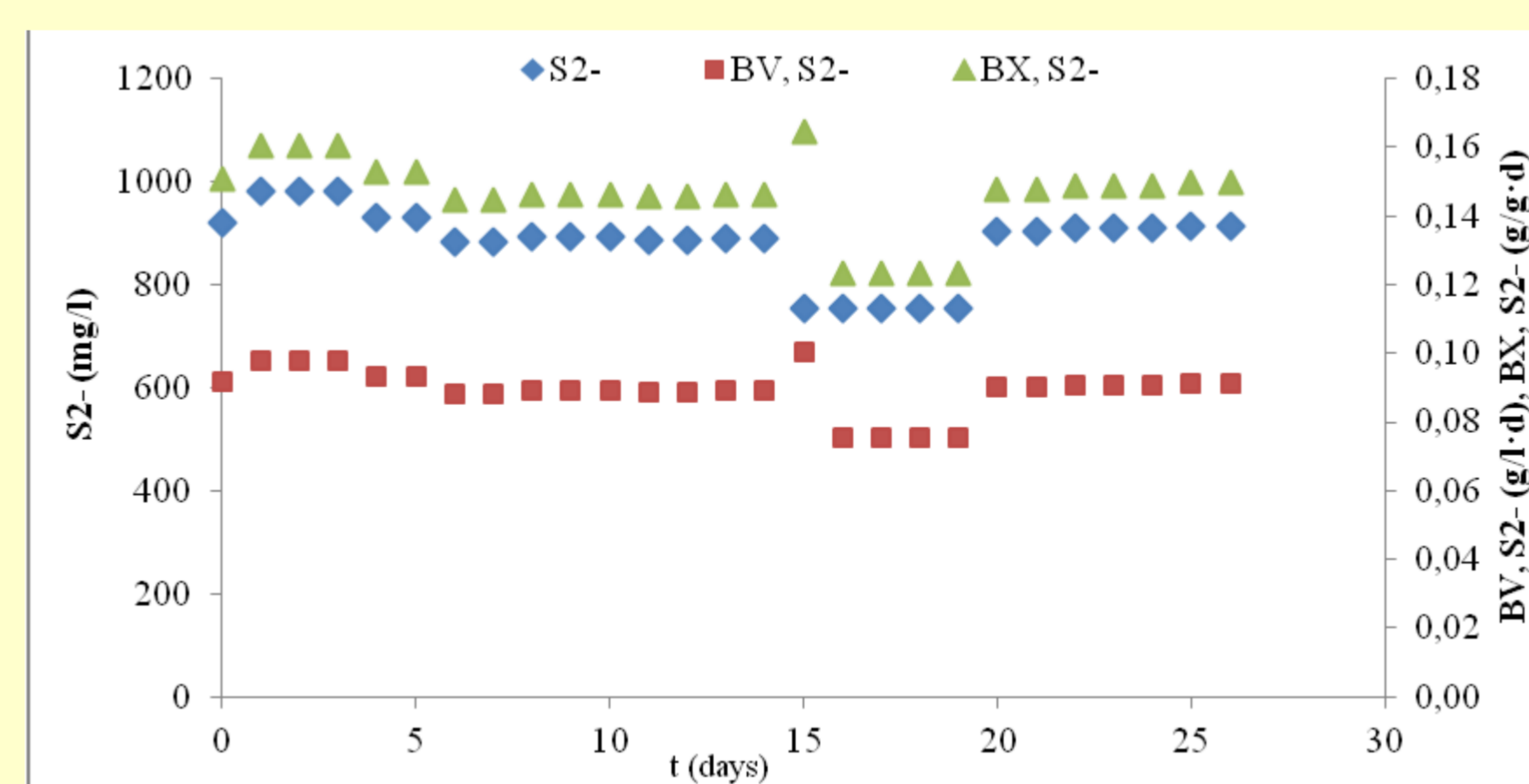
## Bioreactor optimization



**A- Semicontinual bioreactor with microbial suspension**

1 – reactor, 2 – bacterial suspension, 3 – pump (air), 4 – magnetic stirrer, 5 – pump (sulphidic liquid pumping), 6 – reservoir of sulphidic liquid

**B – Biofilm reactor - Scrubber**



Bioreactor in operation: sulphide concentration, volume load (BV), sulphide load for biomass (BX)



Biogas plant EPS-Nový Dvůr, Kunovice; installation of desulphurization facility,

## CONCLUSIONS

- ✓ two biofilm carrier were chosen: **2H-BCN 030**, **Filtren TM 30**
- ✓ specific rate of sulphide removal is 1080 g/m<sup>3</sup>·d for **suspension bioreactor** (for 1 g/l biomass) and bioreactor volume 5.94 m<sup>3</sup>
- ✓ specific rate of sulphide removal is 1344 g/m<sup>3</sup>·d for **biofilm bioreactor** (carrier: Filtren TM 30) and bioreactor volume 4.77 m<sup>3</sup>
- ✓ optimization of hydrogen sulphide adsorption in washing-out liquid process in progress
- ✓ biofilm system will be used in prototype construction (high pressure loss in suspension system)