CONECT

# Evaluating Biofilters with Waste-Derived Packing Materials for Hydrogen Sulfide Removal from Biogas

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## PUF + Biochar configuration achieved up to 91% $H_2S$ removal efficiency, outperforming PUF + CLC waste (up to 78%).

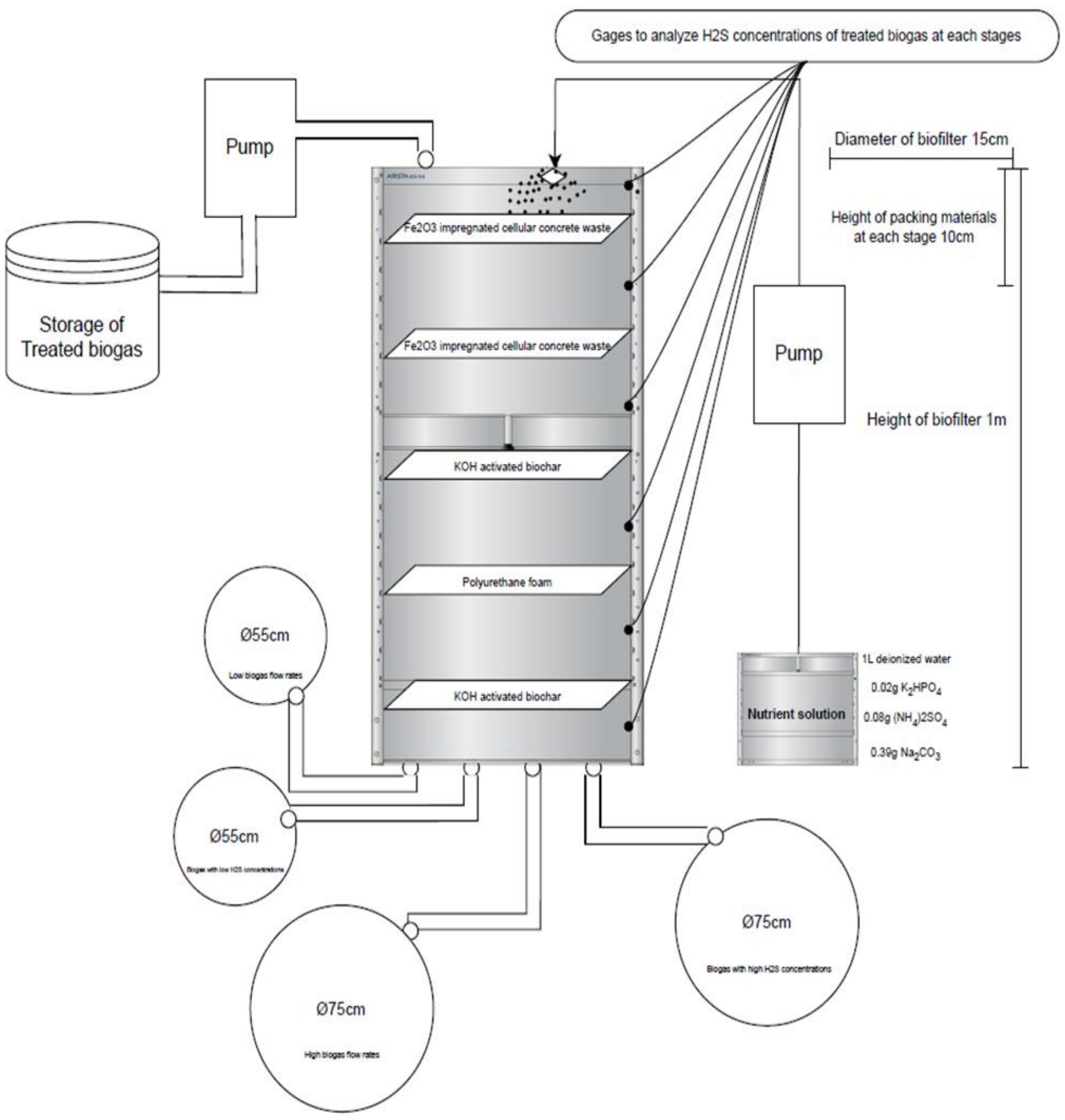
Biochar's high adsorption capacity and microbial support were key factors.

### Optimal removal occurred at lower gas flow rates and moderate $H_2S$ concentrations.

## Introduction

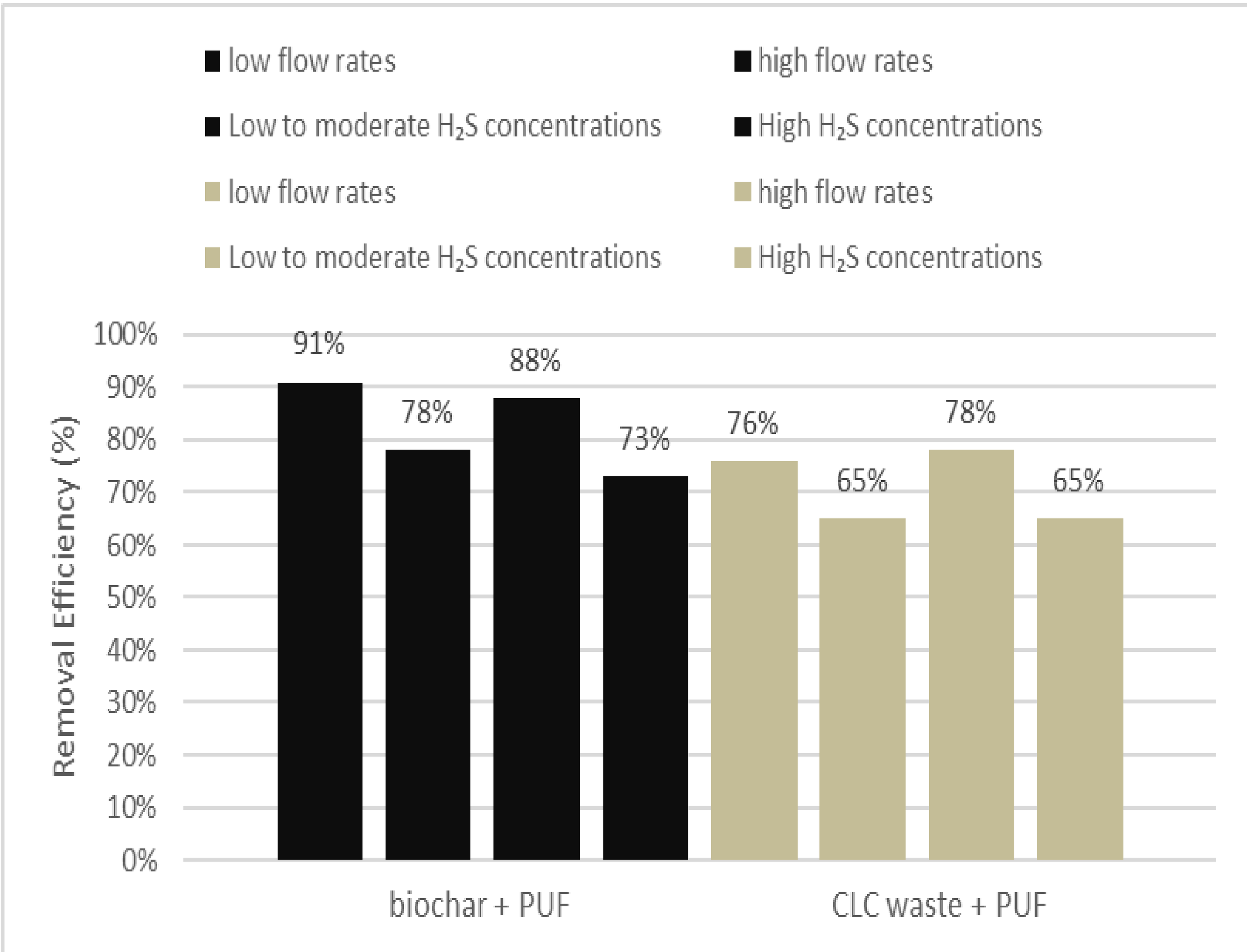
Hydrogen sulfide ($H_2S$) in biogas is corrosive and harmful to equipment and the environment. Traditional chemical treatments are costly and unsustainable. Biofiltration, using microbial activity for pollutant removal, offers an eco-friendly alternative. This study explores biofilters using cost-effective, waste-derived materials—biochar and CLC waste—combined with polyurethane foam (PUF).

## Materials and method




Laboratory-scale biofilter structure and main components

## Results




Comparing the biofilters' RE of $H_2S$ from biogas, in different packing materials configurations and operational conditions

Biochar contributed high adsorption and microbial support, especially at moderate loading. CLC waste showed moderate biological oxidation capacity.

## Conclusion

Highest RE of PUF + Biochar achieved 91% (at Low flow rates 0.2–0.5 L/min conditions), outperforming 78% RE of PUF + CLC waste (at low to moderate $H_2S$ concentrations 100-1500 ppm conditions). Environmental conditions like **flow rate, temperature,** and **humidity** significantly affect performance.

**Waste-derived packing materials are viable for scalable, sustainable biogas purification.**